INTEGRATION IN THE FOREST INDUSTRY
OF BRITISH COLUMBIA

by

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We accept this thesis as conforming to the
required standard

University of British Columbia
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The University of British Columbia
Vancouver 8, Canada

September, 1971
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This thesis has of necessity relied heavily upon those in the forest industry for the supply of information and the testing of ideas. It has proven to be a most agreeable necessity. Not only were those contacted extremely cooperative and generous with their time, but all were most encouraging and showed considerable interest in the project. Their enthusiasm has been fully as valuable as their advice.

To the chairman of my thesis committee, Mr. J.B. Warren, sincere thanks for his patience and understanding.
Integration in the forest industry of British Columbia is a complex phenomenon. Its history is almost as long as that of the industry itself. The industry is multi-faceted, with many spheres of concern and activity, and the process of integration has necessarily been a highly differentiated one. Characteristically, it has developed at different rates and to different degrees in and between each of the various sectors of activity.

This thesis will examine the growth of integration in the forest industry of British Columbia and will inquire into the fundamental factors of influence in the development of this phenomenon.

The terminology applied to the various types of integration is reasonably standard and self explanatory. However, for the sake of clarity and since the industry is a complex one, it is appropriate to discuss the precise application of these terms in this thesis.

There are four basic components of the British Columbia forest industry—forestry, harvesting, conversion, and marketing. Only the first of these functions remains substantially outside the private domain, and in consequence of this, timber control is generally treated as a function in itself.
Within each of these sectors one finds the process of horizontal integration whereby like entities become amalgamated. This is generally referred to as concentration or as consolidation.

In the conversion or manufacturing sector, activity is sufficiently differentiated by output that four major product groups may be identified—lumber, shingles, plywood, and wood pulp. Integration between these sectors is vertical integration.

Integration between any of the four functions in the industry (e.g. logging, conversion, etc.) is referred to as vertical integration. It involves the inclusion of two or more industry functions within a single corporate structure.

Not all integration is corporate however, and various forms of cooperative integration are prevalent throughout the industry. This is an extremely important aspect of industry structure, and it is found in harvesting (contract logging), conversion (log exchange, residue sales), and marketing (consortium selling.)

The major environmental forces acting upon the industry lie in three principal areas—the nature of the raw material base, the activities of government, and the nature of the market environment. Their influences upon integration have always been a combination of pressure and facilitation. Government, for instance, has introduced forest utilization regulations and large-scale and semi-permanent tenures. The
former development has put great pressure on firms to integrate, while the latter has facilitated the formation of large-scale manufacturing operations. In marketing, competitive pressures have stimulated integration of many types, while the consolidation of channels and growth of markets have facilitated forward integration into this phase of activity.
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GLOSSARY

Board foot  
abbv. b.f. or f.b.m. A unit of measurement applied to either logs or lumber. 
By volume it equals 1"x1"x12".

Chips  
Pulp chips. These are chips of wood used in all chemical pulp-making processes.

Clear cutting  
A common logging technique whereby all commercially-valuable timber in an area is harvested at one time.

Coast  
In British Columbia, this refers generally to all regions of the province lying west of the crest of the Cascade Mountains and the Coast Range.

Conversion  
Manufacturing.

Cubic foot  
abbv. cu. ft. or ft\(^3\). A volume measurement for wood. On the coast, 1 cu. ft. = 6 b.f. In the interior the conversion factor commonly used is 5.75.

D.b.h.  
Diameter at breast height. A commonly used standard in forest inventory terminology.

High lead  
A common coastal logging technique involving the use of an elevated tower (the spar) and a system of blocks and cables.

Highgrading  
The removal of only the highest quality and most accessible resource.

Interior  
In British Columbia areas of the Province lying east of the Coast Range and the Cascade Mountains.

Log  
Timber which has been felled. To be differentiated from timber which is the standing resource.
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<tr>
<td>M.C.F.</td>
<td>One thousand cubic feet.</td>
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<td>Scale</td>
<td>A synonym for measurement in respect to wood volumes. The total log cut for the province is referred to as the log scale.</td>
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<td>Standard of Utilization</td>
<td>A specified standard of harvesting in respect to species and grades of log which must be removed from the land.</td>
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<tr>
<td>Upset price</td>
<td>The reserve price in government timber disposals.</td>
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<td>Yarding</td>
<td>The assembling of logs at a central point prior to their removal from the logging area.</td>
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CHAPTER I

FOREST RESOURCES

Introduction

Any discussion of the forest industry of British Columbia must first deal with the nature of the raw material base upon which it depends. An appreciation of this topic is fundamental to any understanding of the industry, since the stimulus for a great many major trends and developments has originated in some considerable part in the nature of the forest resources. Many events are significant only when considered in this context.

The forest resources of British Columbia are not homogeneous, for the Province encompasses a great diversity of natural conditions. This regional variation in the forest resource is one of its most fundamental characteristics. The nature of the resource is the subject of this chapter.

The two principal topics to be examined in this connection are those of the accessibility of the stands and those characterized as features of the stands themselves.

This chapter will discuss first some of the physical features of British Columbia which are of particular consequence for forest growth and conditions of timber access, and this will be followed by a preliminary statement on
regional forest potential. This discussion will illustrate the extreme range of character of timber resources and their essentially heterogeneous nature. Next in order of examination will be the elements of the resource of major importance in subsequent analysis—accessibility, volumes per acre, species, and tree size and grade. As each element is discussed, its pertinence to this enquiry will be briefly outlined. The chapter concludes with a discussion of some characteristics of the resource which are not included in the foregoing but which are relevant to this study.

The Physical Environment

The interrelationships between environmental conditions and forest cover are extremely complex, and an examination of them in detail lies far outside the scope of this paper. However, since the primary purpose of this chapter is to highlight the extreme spatial variations in provincial forest resources, a brief discussion of this topic will serve well as an introduction to the area and as the basis of a full appreciation of the nature and magnitude of these variations.

British Columbia is a large province and it stretches some seven hundred miles from north to south through eleven degrees of latitude. The east-west extent is of the order of eight hundred miles. The province is bounded on the west by the Pacific Ocean, on the east and north by continental Canada. The topography of the province is highly varied,
and British Columbia encompasses a variety of mountain ranges, plateaus, coastal plains, and river basins. These three major features—size, location, and topography—together comprise the major factors affecting the distribution and nature of the timber resource.

One of the primary factors affecting tree growth is the amount of precipitation. Close to the coast and at higher altitudes, annual precipitation may be as high as 150 inches, while amounts less than 10 inches per year are common in some interior valleys. Typically, coastal areas of the province receive from 30 to 150 inches annually, while extensive areas in north-eastern British Columbia receive an average of 15 to 20 inches.

Temperature, as measured by various indices, shares with precipitation the position as one of the primary determinants of vegetative growth. Like precipitation it too is subject to extreme regional variation throughout the province, and frost-free seasons vary from 250 days at coastal locations to less than 50 days in regions of higher attitude. Northern interior seasons are less than 50 days throughout the region, central interior frost-free seasons range from less than 50 to 100 days, and in southern interior valleys the season may average as long as 200 days.

Both these features—temperature and precipitation—vary latitudinally and altitudinally, and on the coast a change found over several hundred miles in the interior may
be duplicated in a few thousand feet.

On a more local scale, several elements of the region's geography also have a profound impact upon forest growth—the depth and type of soil, soil drainage, and the aspect and exposure of the site. As may be expected in a province as topographically diverse as British Columbia, these elements too are subject to wide variation on both a very local and regional basis.

It should be pointed out that these regional and local differences are not everywhere subject to the same degree of variation. As a rough generalization, it will serve to point out that wherever altitudinal factors are involved, the changes tend to occur over a relatively short distance, and a lack of large-scale uniformity is typical. Away from the mountains however, environmental changes are on a much lower gradient and uniform conditions often prevail over very extensive tracts of land.

Besides being primary factors affecting the nature of the timber resources of the province, the climate and the topography of the various regional and local areas has a profound impact on the accessibility of the forests. When one is considering the economic accessibility of an area, there is of course a degree of interrelation between the technological accessibility of the stand and its physical nature in terms of species, volumes per acre, size of the stand, and so on.
In coastal areas and in some interior areas too, the terrain and climate create local access problems for the forest industry.

"Much of the land of the Pacific—coast timber belt is extremely rough, a succession of benches and ravines. Streams generally are small and often fast-flowing, snow is the exception rather than the rule, and rain and soft ground are always to be expected."  

A very basic consideration in accessibility too is the long distance transportation of the raw material. On the coast and in a few interior locations, log assembly is much facilitated by the presence of large bodies of water—the Strait of Georgia and the Arrow Lakes being examples. On the coast particularly, the assembly of logs from a very large hinterland has long been feasible because of the early development of the technology of rafting and towing. In contrast, interior development of this phase of industry activity has been tied closely to the much slower growth of viable land assembly techniques.

To summarize a complex situation one could say that conditions of local access on the coast are highly variable because of the topography of the area, but that the proximity of much of the resource to the Pacific ocean and in particular to the extensive sheltered waterways has greatly facilitated the long-distance assembly of raw materials. The interior on the other hand presents a generally more favourable and
uniform topography than the coast, and in most cases local access conditions are better than on the coast. These areas however, generally lack the extensive waterway system of the coast, and the long-distance assembly of logs depends upon an entirely different technical system.

Forest Resources

1. Resources in Total

In consequence of these environmental differences throughout the province, the forest also shows great regional and local variation. This section will introduce the topic in a general manner; subsequent sections will discuss aspects of the resource most relevant to this thesis.

The land and water area of the province in total amounts to 234 million acres. Of this area, some 171 million acres or about 75% are classed as forested. Not all of this land however is productive forest land or "land bearing or capable of bearing forests that are commercial by current standards of utilization." This area in total amounts to only 60% of the total provincial area of 136.7 million acres. In Coast districts of the province, non-forest land exceeds the forest area and is some 22.3 million acres compared to 19.3 million acres.

Further classification reveals that of these 136.7 million acres of forest lands only 22.7 million acres or some
9.7% of the total provincial area is classed as mature forest.\textsuperscript{17} There are tremendous areas classed as "other" forest and as "scrub" as can be seen in Table I below. While the criteria used in this table seem to lead to an understatement of the true resource potential by including only the best and most exploitable sites actually covered by mature timber, it does underscore the rather restricted nature of the acreage of prime mature timber in the provincial context.

\begin{table}
\centering
\begin{tabular}{|l|c|c|c|}
\hline
 & Coast & Interior & Province \\
\hline
Mature Forest & 3,694,000 & 18,982,000 & 22,676,000 \\
Other Forest (Includes immature stands) & 6,197,679 & 74,635,293 & 80,832,972 \\
Scrub (Includes lands not stocked with commercial species) & 9,597,000 & 25,009,000 & 34,606,000 \\
Total & 19,488,679 & 118,626,293 & 138,114,972 \\
\hline
\end{tabular}
\caption{BRITISH COLUMBIA, COAST AND INTERIOR FOREST LANDS, 1957 (acres)}
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\end{table}

Source: Continuous Forest Inventory of British Columbia, \textit{op. cit.}

The distribution of these various types of forest land is by no means regular, and discontinuity is most apparent, especially in the mountainous areas.\textsuperscript{18} So far of course, only
very generalized figures have been considered. The wide variation in volumes per acre means that the use of acreage data conceals the true picture to some considerable extent.

2. **Accessibility**

In many ways, accessibility is the most critical element in the value of any particular stand to the forest industry. More than any other feature of the resource it must be seen in the context of British Columbia to be fully appreciated. The problem of access to regional and local timber stands has been typical of the industry throughout its entire history.

"Accessibility has always been a tremendous problem in British Columbia because of its size, its rugged topography, and the limited funds available for forest development."¹⁹

The transportation of logs dominates all forest harvesting activity, for except for the actual falling of the tree, logging is almost wholly involved with moving wood from one point to another. The yarding function is affected by the steepness of the terrain and the presence of rocks, cliffs, and gullies. The altitude at which the stand is found affects the seasonality of access. Local hauling costs on main access and spur roads are determined by distance, grade, topography, and such diverse factors as the presence or absence of gravel deposits and rock outcrops. Once again, the altitude and aspect of the operation has a pronounced
impact on the seasonality of access. It must be borne in mind that on a local scale logging takes place in areas away from public roads, and that the construction and maintenance of resource access routes of one kind of another is an integral part of almost all logging activity. Away from the local problems of access, the cost of transport of the logs to the conversion plant is determined by distances and by the nature of available transport systems.

Each stand of timber is thus in many ways unique in its accessibility to the industry, and its location plays a major role in the state of exploitability. The range of variation can be extreme.

While the accountants can compile an accurate statement of average cost of logging, this statistic is of little relevance unless it can be interpreted in relation to the timber, topographic and operating conditions as they exist on the show under consideration. The variations are wide. For example, analysis of productivity of men and machines on 50 camps on the Coast shows a range from 2.8 hours to more than 9 hours required to produce a thousand board feet. This range is not due to the variation in operator's efficiency but to the fact that timber volumes per acre, road cost per mile and topographic conditions vary widely.

The impact of resource accessibility upon the industry would be difficult to underestimate. The availability of readily extractable timber has always governed the distribution of logging activity, for like all resource utilization, timber harvesting tends to take place first in the raw material offering both high quality and accessibility. From the very beginning, the pattern in British Columbia has been one of
expansion into less accessible and less desirable timber as stands of prime timber on tidewater were depleted. The relationship of industry demands to the volume of readily exploitable timber in reserve at any one time has of course conditioned the nature of the pressure on resources, but generally speaking there has always been a noticeable push against the boundaries of exploitability.

In 1942 for instance, it was said that

The logging industry, no longer capable of western expansion, is creeping up the Coast northward . . . . 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. 22

The impact of this pressure has been very evident in the field of industry technology for logging and transportation, and changes have been continuous and often dramatic since as early as the 1880's. 23 It is in this area of a changing technology where a major influence of accessibility is felt. The capital investment in the extractive sector of the industry is greatly affected, and the trend has been mostly in an upward direction. 24 The minimum scale of operation has continually risen.

As might be expected, the costs of operation vary widely between sites, and the viability of any logging operation is profoundly affected by the location of the timber in which it conducts its harvesting activity.
On the coast the ability of industry to assemble logs from a large hinterland has led to the early development of specialized sawmilling, and industry structure has been conditioned to some considerable extent by the spatial separation of logging and milling activities. The Vancouver Log Market is a notable example of industry structure as affected by the size of the log hinterland.

Control of the accessible timber resource has long played a large part in determining industry structure.

3. Volumes per acre

This feature of timber stands is subject to variations of tremendous magnitude. On Vancouver Island for instance. Volumes up to 50,000 board feet per acre are not unusual and individual acres have been found to produce as high as 200,000 board feet. In one area in the Esquimalt and Nanaimo Railway Land Grant, some sections were estimated to carry as much as 100,000 board feet per acre, though the average for the whole tract was placed at about 26,000 board feet per acre. Around 1920, some Coast stands were estimated to carry as much as 500,000 board feet per acre, and even today some Vancouver Island stands average 200,000 board feet per acre. It should be emphasized too that these early estimates were based on a rather rough standard of utilization and were frequently highly inaccurate.
In 1967, the average volumes of timber per acre on a close-utilization basis in the Vancouver Forest District was 32,000 f.b.m. in Sustained-Yield Units and 44,000 f.b.m. in the Farm Licences.\(^\text{29}\) The Provincial average calculated on the basis of close-utilization volumes and the acreage of mature commercial timber was 20,508 f.b.m. per acre.\(^\text{30}\) This same statistic for the Coast is 30,054 f.b.m. per acre, for the Interior, 17,417 f.b.m. per acre.\(^\text{31}\) It is apparent that in both Coastal and Interior areas, acres bearing as little as 5 or 10 thousand feet per acre are not uncommon. According to government standards established as early as 1896, "timber land" was defined as land bearing 8,000 f.b.m. per acre on the coast and 5,000 f.b.m. per acre in the Interior.\(^\text{32}\)

Stand density characteristics exert a most decisive influence on logging feasibility through their impact upon both operating costs and the capital investment in access roads. In reality, the timber density of the stand is an aspect of accessibility since as pointed out earlier, the only non-transport function of logging is falling and bucking.

Stand densities must be considered in the context of several scales. Firstly, on the smallest scale the volume of timber per acre affects yarding and local access costs. On larger scales, the contiguity and total volume of timber stands in an area affect the capital cost of roads and the operating costs of logging through their influence on road maintenance costs and log hauling distances. Quite simply,
the most profitable logging 'chance' is that which offers access to the greatest volume of timber from any given point, no matter what scale is being considered. In view of the accessibility problem previously outlined, it is clear that the nature of the timber stands themselves are of great importance in assessing the feasibility of any forest harvesting activity.

4. Species

British Columbia has fifteen commercial species in all, but six major type-groups make up the bulk of the inventory. All are softwoods. In order of 1957 inventory volumes, they are: spruce (34%), hemlock (18%), lodgepole pine (14%), balsam (12%), Douglas fir (10%), and cedar (7%).

As with other facets of the forest resource, the species composition of stands is subject to a great deal of local and regional variation. Regionally, for instance, the province may be divided up into a number of zones on the basis of the dominant tree species. The south-eastern sector of Vancouver Island and much of the Southern interior of the mainland is predominantly Douglas fir, while the rest of Vancouver Island and most of the mainland coast is characterized by a hemlock-Sitka spruce forest type. Spruce-fir associations are characteristic of enormous areas in the central and north-eastern zones of the province.
These divisions present only a rough picture however, and a significant range of species is found within them. It is important to emphasize the mixed nature of the stands—only rarely does one species make up the entire volume of timber on even a small area and more commonly two or more species are associated with each other. This feature of the resource is most significant on the coast, where altitudinal zonation is often pronounced.

On the southern and eastern part of Vancouver Island and on the southern mainland coast [Douglas] fir is the predominant species at the lower elevations up to about 2,000 feet. 

In the southern coast belt, Douglas fir is often mixed with Western red cedar. As one moves higher up the slopes the Douglas fir-cedar mix is replaced with a Western hemlock-Western red cedar association, and this in turn is replaced at around four thousand feet by stands of Western hemlock and Balsam fir types. 

The properties of the woods of the various species differ considerably, and this has a pronounced impact on the suitability of each for the various manufacturing processes. Although a degree of substitutability does exist in some cases, this circumstance does lead to widely varying values for the different raw material species. It should be pointed out too, that the value and suitability of any particular log for the various manufacturing processes is also a function of its size, soundness, and such diverse factors as the presence or absence of knots, disease, and so on.
Throughout its history, the industry has expressed a preference for certain species, and it is only in the last few decades that others have been of significant value to conversion plants. Douglas fir was the basis of much of the industry before 1940, and logging was heavily orientated towards the exploitation of this species. Hemlock and Balsam fir types both sold for low prices, and often a logger's profitability depended on his obtaining stands with a suitable proportion of Douglas fir, cedar, or spruce. This situation was still true in many cases at least as recently as 1966.

On the Coast returns to logging have depended heavily on the Douglas fir portion of the cut. In many areas logging is only possible because fir values subsidize the cost of producing other species.

In both 1930 and 1935 Douglas fir made up 50% of the total provincial log scale, and though the relative importance of this species has declined somewhat since then, the industry has continued to cut heavily in stands where Douglas fir forms a good percentage of the volume. By 1955, Douglas fir volumes harvested still made up some 38% of the provincial log scale, quite a remarkable circumstance in view of the tremendous post-war growth of the timber harvest.

One important impact of the species mix falls in the area of logging feasibility, since it governs to some extent the value of the logs produced. The influence of species per se in this respect, however, has declined somewhat as conversion plants have adapted to a changing raw
material base, and this is reflected in a rising level of prices for species such as hemlock and balsam.

In the conversion sector, the species mix has affected the nature of investment to a certain extent. In processing hemlock, for example, capital costs are increased by the need to provide drying facilities for the lumber shipped to rail markets. This investment is of course a function of the nature of market demands too, and it is in this area where many of the ramifications of the species mix are determined.

Cedar shingle markets for example are highly volatile, and this has influenced the survival of an independent shingle industry. Since cedar grows in association with other species it is clear that this aspect too will influence the nature of industry structure, since a shingle manufacturer must in some way either dispose of unwanted species if he does his own logging or find some mechanism whereby his raw material supply is assured if he chooses to purchase his logs.

5. Tree Size and Grade

Resource variations of this nature are perhaps the most important ones in the context of current industry conditions. They are detailed in Table II below. Government regulations now specify the level of utilization to be practiced by the industry in harvesting operations, and in conjunction with the nature of the stand have a marked influence on the capital investment in logging and milling (particularly sawmilling),
operating costs in both areas, and the nature of the final product. The structure and nature of the industry is affected to some considerable extent.

**TABLE II**

BRITISH COLUMBIA. NET VOLUME IN M.C.F., ALL SPECIES, AT 7.1"+ d.b.h. AND 9.1"+ d.b.h. CLOSE-UTILIZATION LESS DECAY ONLY

<table>
<thead>
<tr>
<th></th>
<th>7.1&quot; + d.b.h.</th>
<th>9.1&quot; + d.b.h.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Province</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coast</td>
<td>268,634,693</td>
<td>195,928,668</td>
</tr>
<tr>
<td>Interior</td>
<td>112,695,729</td>
<td>93,745,111</td>
</tr>
<tr>
<td>Forest Districts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prince George</td>
<td>155,938,964</td>
<td>102,183,557</td>
</tr>
<tr>
<td>Kamloops</td>
<td>29,413,130</td>
<td>16,660,239</td>
</tr>
<tr>
<td>Nelson</td>
<td>14,650,390</td>
<td>8,756,367</td>
</tr>
<tr>
<td>Prince Rupert</td>
<td>64,814,062</td>
<td>35,081,697</td>
</tr>
<tr>
<td>Vancouver</td>
<td>29,413,130</td>
<td>16,660,239</td>
</tr>
</tbody>
</table>

* Coast sector inventory at 13.1" + d.b.h.


Although the difference in these two standards of utilization is only 2" d.b.h. the increased volumes gained by including all trees down to a d.b.h. of 7.1" instead of 9.1" d.b.h. is some 72.7 million m.c.f., an increase of over 37%. The increase in more dramatic in the interior forest districts where the average size of tree is much smaller than on the coast. The Prince George Forest District inventory, for
instance, is increased almost 46% by the inclusion of all trees down to a d.b.h. of 7.1". While coastal districts have a small percentage of their inventory volumes in the 7.1" d.b.h. to 9.1" d.b.h. category, there are very substantial volumes in only slightly larger diameter trees. In the Vancouver Forest District for example the inventories at three d.b.h. levels are as follows:

**TABLE III**

VANCOUVER FOREST DISTRICT. FOREST INVENTORY, NET VOLUME IN M.C.F., ALL SPECIES, AT 7.1" +, 9.1" +, AND 13.1" + d.b.h., CLOSE UTILIZATION LESS DECAY ONLY

<table>
<thead>
<tr>
<th>Diameter Class</th>
<th>Net Volume M.C.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1&quot; + d.b.h.</td>
<td>69,590,420</td>
</tr>
<tr>
<td>9.1&quot; + d.b.h.</td>
<td>67,021,527</td>
</tr>
<tr>
<td>13.1&quot; + d.b.h.</td>
<td>40,630,539</td>
</tr>
</tbody>
</table>


Over the past three decades, there has been a most remarkable decline in the average size of log brought to the mills, and as mentioned earlier this decline is a function of both the available resource and government regulations. Though neither of the following examples can be assumed to be fully representative, they will serve to point out the range of this decline. In 1935, the average better-grade fir log at Vancouver scaled 2,910 f.b.m., while at a medium-sized logging operation in the Vancouver Forest District the average
size of log extracted in 1967 was 328 f.b.m., and up to June 30 in 1968, 373 f.b.m. Since almost three quarters of the present forest resource is in mature forest, harvesting operations will be increasingly involved with lower quality logs. This decline has been in evidence for a good many years, and as early as 1924 the proportion of high grade logs being produced by woods operations on the coast began to fall markedly. The proportion fell from 13% to 5 % between 1924 and 1942, while the proportion of No. 3 fir rose from 13% to 31%. Similar trends were observed in the production of logs of other species—cedar, spruce, and pine.

Current inventory data reveals that very little high grade sawtimber remains.

**TABLE IV**

SOUND-WOOD VOLUMES BY TREE QUALITY CLASS IN COMMERCIAL FORESTS OF BRITISH COLUMBIA.*

<table>
<thead>
<tr>
<th>Quality Class</th>
<th>Coast</th>
<th>Interior</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.9</td>
<td>4.3</td>
<td>7.2</td>
</tr>
<tr>
<td>2</td>
<td>17.2</td>
<td>29.1</td>
<td>46.3</td>
</tr>
<tr>
<td>3</td>
<td>54.9</td>
<td>85.4</td>
<td>140.3</td>
</tr>
<tr>
<td>Total</td>
<td>75.0</td>
<td>118.8</td>
<td>193.8</td>
</tr>
</tbody>
</table>

*Close-utilization standard of live merchantable trees 14" d.b.h. and over in old immature and mature forests, regardless of site or accessibility.

Source: Continuous Forest Inventory of British Columbia, Initial Phase, 1957, op. cit., Fig. 47.
6. **Other Characteristics of the Resource**

Although much of the foregoing discussion has been involved with types of resource (i.e. volumes accessible, volumes by species, etc.), it is most important to remember that the entire resource base is highly heterogeneous when the individual stand is considered. Almost all stands contain a variety of species, tree grade, size of timber, and each area has its own unique location. Very seldom indeed is the resource in any sizeable area homogeneous in even a single respect.

These characteristics of the resource tend to co-vary in a number of situations and this is of considerable relevance in seeking to understand the development of the industry. Several resource features are affected by the same variable in the environment—altitude being perhaps the best example. As altitude increases, the species mix tends to change, the average size of tree tends to decline, and the volume of timber per acre decreases. Accessibility is of course much affected. As one moves up the coast of the province, the species mix changes, the average grade of log declines, and of course distance from the main conversion centers on Georgia Strait increases constantly. At the same time it should be borne in mind that some features do not co-vary. Existing public transportation routes do not necessarily provide access to prime timber resources.

It is clear that in many periods in the past there
has been considerable pressure on the accessible forest resources of the province, and the implications this pressure has had for industry structure have been many and varied. The curtailment of power logging on hand-logger's licences in the early 1900's effectively eliminated the popularity of this form of tenure,\textsuperscript{54} and the reduction in the number of licences issued following the introduction of this stricture is a commentary on the disappearance of stands which were accessible using only hand-logging techniques. The "... exhaustion of cheap accessible stumpage..."\textsuperscript{55} was listed as one of the causes of mill failure in the period 1933-1942, and according to Hardwick,\textsuperscript{56} by 1945 the industry faced a severe shortage of the Douglas fir resource upon which it had so far been largely based.

The shortage of raw materials is now more than ever apparent and its impact upon the industry was probably never so great. Government regulations concerning sustained-yield cutting have been very important in this respect.

It is fair to say that in the southern two-thirds of the province indicated additions to capacity by 1970 plus currently installed capacity significantly exceeds the annual harvest now allowed.\textsuperscript{57}

"The coastal situation clearly indicates an increasing log shortage in the immediate future."\textsuperscript{58}

The 1957 Forest Inventory\textsuperscript{59} indicated that the exploit-able mature volume of Douglas fir on the coast would be "liquidated" in only eight years at the rate of cutting activity prevailing in the period 1952-1956. The figure for Douglas
fir in the interior was 24 years. On the coast, Western red cedar and hemlock, and in the interior Western red cedar faced exhaustion periods almost as short as those for fir. On the coast, the major species with the longest projected period during which reserves would be available was balsam and the number of years left before exhaustion was only 68. In spite of the exaggeration inherent in these statistics, the fact is that the ultimate ceiling on the ability of certain regions to produce wood fibre has been apparent for some time, and in the last two decades the introduction of sustained-yield cutting programs has brought the shortage into sharp focus in a very rapid and decisive manner.

The basis for much of the structure of the present industry lies in the control of timber resources.

Summary

The nature of the provincial forest resource has played a major part in the development of the British Columbia forest industry, and an outline of their nature furnishes a background essential to a full understanding of the industry.

The control of strategic timber and timber lands, a development of critical importance in determining industry structure is necessarily involved with the nature of resource variations. Such a concentration of control in the industry is comparatively meaningless unless viewed in the context of the total resource situation.
The nature of the resource has played a major role in the shaping of government forest management policy, and in recent years most specifically this statement refers to the policies of sustained-yield and close-utilization.

The nature of the resource, in conjunction with government forest management legislation has played a major part in such diverse areas as costs, capital investment, diversification and the marketing of all types of primary and end products. Since developments in areas such as these have implications for industry structure, this thesis has of necessity been concerned with the resources upon which the British Columbia forest industry is founded.
CHAPTER II

1880-1945. INDUSTRY STRUCTURE

Timber

1. Introduction

Any company in the industry must at all times have access to the raw material. This is true of logging operations and equally true of any type of conversion plant—whether sawmill, plywood mill, pulp mill, or shingle mill.

British Columbia has in the past and still does offer the forest industry a distinctive resource base. It is distinctive in two ways; firstly, by virtue of its natural character and secondly by the nature of government regulation. Access to the resource has been traditionally though sometimes loosely regulated by government edict.

The lack of uniformity in the resource base is one of its major features. Similarly, one of the major characteristics of government timber disposition has been its lack of consistency over the years. Operating in combination, the two sources of influence have played a decisive role in shaping the development of the British Columbia industry. In many ways the impact of a highly variable timber resource has been compounded by an even more irregular succession of timber tenures.
The development of the structure of the forest industry has been strongly conditioned by the nature of access to timber resources which individual firms have been able to achieve. Throughout the industry's history, the ability to secure access to suitable timber holdings has been essential for the survival of the individual company. The consolidation of large timber holdings incorporating a high degree of security has been and still is a major factor in the growth of large-scale operations of all types.

2. Tenures

Certainly one of the most important features of early British Columbia tenures is the enduring nature of their influence. A significant number of present timber holdings were secured by means of tenures now long-discontinued. Crown-granted lands for instance, alienated as early as the 1880's still play a major though declining role in timber supply for the industry. Pulp leases granted between 1901 and 1903 are still a source of supply on the coast, and substantial numbers of Timber Licences taken up before 1907 are still in good standing.

The role of these tenures is, however, confined to neither the supply of timber from the tenures themselves nor to the present day situation. Private control of timber through either permanent or temporary alienation for instance has played a part of some consequence in the granting of Tree
Farm Licences in the last twenty years. The transferability and value of certain timber holdings has had a marked impact on industry structure through the consolidation of timber control and accompanying disappearance of certain industry units. It is clear too that the influence of timber tenures on industry structure is not confined to the present day, and a number of important developments and trends date from as early as the 1890's. There were for instance a few very major sawmilling units with substantial timber limits on the coast in the early years of this century, responsible it seems for most of the province's lumber output.\(^1\) Through acquisition and company growth, this domination has continued.

This long-standing importance of many tenures is a function of several factors. Crown Grants for instance were given in perpetuity, and a claim established in 1887 is as valid today as it was then. Both Timber Licences and Timber Leases have had a twenty-one year term with the added feature of renewability since the early 1900's. Another factor of consequence in the continuing importance of many timber tenures is the widespread alienation of timber which was allowed to occur in earlier periods. This circumstance coupled with the transferability of holdings has allowed timber positions to be taken and major consolidations to take place long after the issuance of these tenures was discontinued by the authorities concerned.

The most striking characteristic of timber tenures is their extremely varied nature, and some observers have
likened the total picture to a "patchwork quilt." While the permanency of many tenures has been important, they have nevertheless varied in both this and other respects. The ownership of Crown-granted lands for instance involves rights to cut current and all subsequent crops of timber, while the control of future timber crops on Timber Licences lies with the Province since lands held under this form of tenure revert to the government after logging has taken place. Timber Leases and Pulp Leases involve performance obligations of a manufacturing nature, while Timber Licences do not. Timber Sale Licences are awarded only with fairly strict and often short-term harvesting stipulations, while the holders of Crown Grants and Timber Licences must comply with no such regulation.

In spite of such diversity, a fairly consistent set of objectives seems to have underlain government policy in the area although it is clear that legislation and enforcement in respect to these objectives has from time to time not led directly to the desired long-term results. Basic government philosophy in respect to timber tenures is summarized as follows:

(a) The Province was to retain control of all productive forest land.

(b) Timber speculation by the private sector was to be minimized.
(c) A fair share of the wealth derived from forest exploitation was to accrue to the public sector.

(d) The export of primary raw materials was to be minimized.

The underlying rationale behind the disposal of timber will be of some relevance as the major forms of tenure are examined in some detail. It will be noted that both objectives and the efficacy of government action have been subject to considerable change throughout this early period.

Crown-Granted Lands

The first alienations of land from the Crown in British Columbia took place in 1858. Title to the land included all timber standing upon it, and a proclamation of 1859 made this quite clear by stating that "Unless otherwise specially announced at the time of the sale, the conveyance of the land shall include all trees. . . ." During this period, timber land could be acquired for the same rates as any other land, and the grants were made in fee simple with no reservation as to royalty on the timber involved. In view of the value that timber was to assume as early as the 1890's prices were nominal to say the least. From 1861 to 1884 the land was sold for $1 an acre.

This system operated in its unaltered form until 1887 when a royalty of 25 cents a thousand board feet was imposed and the applicants were required to declare that the land was
"not chiefly valuable for timber". However, in spite of this early attempt to curb the permanent alienation of mature timber lands from the Crown, effective control seems to have been beyond the power of the authorities, and the transfer of mature timber lands to the private sector continued.

In 1896 the government defined "timber land" more explicitly and its sale was once more prohibited. Again, without appropriate enforcement mechanisms, the Province failed to check the steady flow of mature timber land into private hands and it was not until some time after the formation of the British Columbia Forest Service in 1912 that the process was eventually halted. The effectiveness of the inspection system thus established was reinforced by the Timber Royalty Act of 1914 which imposed a variable royalty subject to periodic statutory change thereby eliminating at least one avenue through which holders of these lands stood to gain from the appreciation of timber values.

The total area alienated in this manner was quite substantial, as is shown by the following table.

<table>
<thead>
<tr>
<th>CROWN-GRANTED TIMBER-LANDS</th>
<th>1911-1915 (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1911</td>
<td>824,814</td>
</tr>
<tr>
<td>1912</td>
<td>874,715</td>
</tr>
<tr>
<td>1913</td>
<td>922,948</td>
</tr>
<tr>
<td>1914</td>
<td>960,464</td>
</tr>
<tr>
<td>1915</td>
<td>913,245</td>
</tr>
</tbody>
</table>

In 1917, an estimated 50 billion board feet of timber stood on Crown-Granted lands.12

Esquimalt and Nanaimo Railway Company Lands

Because of the rather privileged status of the title to these lands, they are most comparable to the early Crown Grants made before 1887. In extent too the comparison remains valid, and their subsequent impact upon the industry is much the same.

In 1884 the Province of British Columbia transferred in excess of twenty-five thousand square miles to the Dominion Government in consideration for the undertaking by the latter of a number of railway construction projects, including the first transcontinental line, the Canadian Pacific Railway.13

In 1887, the Dominion conveyed some 2,110,000 acres of this land on Vancouver Island to the Esquimalt and Nanaimo Railway Company,14 a corporation formed to construct a railway line from Esquimalt near Victoria, to Nanaimo. An additional grant of between 20,000 and 30,000 acres was made directly from the Province in 1910 to the company, in compensation for lands included in the first grant but which were already held by settlers in 1887.15

Timber on all Esquimalt and Nanaimo Railway Belt lands is free from royalty both before and after alienation from the company,16 although land disposed of by the company loses its exemption from property and other taxes and carries the
same burden as other privately-owned timberland.\textsuperscript{17} Lands held by the railway company not used for railway purposes are taxed at the rate of 1 1/2 cents per acre,\textsuperscript{18} certainly a minimal holding charge fifty years ago and almost an absurdity today.

**Timber Licences**

Timber Licence holdings differ from the previous two types of tenure in one very important respect—only the mature timber is sold, control of the land remaining at all times with the Crown.\textsuperscript{19} After the mature merchantable timber has been cut, the licensee has no longer any rights in respect of the property and hence no control over subsequent timber crops or immature timber on the licenced area at the time of logging.

Timber Licences were first authorized by the "Timber Act" of 1884,\textsuperscript{20} but the restrictive nature of their attached terms and conditions is at once apparent. They were non-transferrable, and could be cancelled if the timber was not cut;\textsuperscript{21} the term of tenure was four years, and 1,000 acres was the maximum area which could be held by one person. The only alleviating conditions were that royalty was not payable until the timber was cut and that an individual did not have to own a sawmill in order to take up a Timber Licence.\textsuperscript{22}
Over the next twenty-one years, various revisions were made in respect to the terms attached to this form of tenure, none of which significantly altered the basic impact of Timber Licence Legislation. Most were in fact somewhat restrictive and thus the attractiveness of Timber Licences decreased to some extent. Since 1888 these tenures were renewable at the end of one year only at the discretion of the Chief Commissioner of Lands. Fee and royalty increases were made on several occasions, for instance, and in 1901 the annual rental on a Timber Licence was made payable five years in advance.  

It is quite clear that up to this time the provincial government made every possible effort to prevent both permanent loss of Crown control on licenced lands and the development of speculation in timber held under this form of tenure. In 1905, however, there was an abrupt change in the licensing system, the principal objective being to increase government revenue.

Timber Licences were made renewable annually for twenty-one years and became freely transferrable. Further, there was no limit on the number of licences that one person could acquire. The annual rental on a 640 acre tract at this time was $140 west of the Cascades and $115 east of the Cascades, a sum considered by some observers to be a small initial expense since it amounted to only from 16 to 22 cents per acre.

With the coming of these changes, two features of
Timber Licences dating back to their beginning in 1884 assumed a great deal of importance. The first was the lack of a need to own a conversion plant of any type, and this left the area open for speculation by great numbers of individuals. The second was a royalty system under which the operator paid for the resource only as he utilized it, thus enjoying lower carrying charges than implied by full ownership.

This [special Timber Licence] legislation . . . did in fact cause the alienation of more timber than any other measure. . . . So optimistic were the timbermen of those days that the staking of licences, often without regard to accessibility, became a popular occupation. In 1904 the number of licences in existence was reported to be 1,451. After three years of wild staking, when the privilege was withdrawn by Order in Council in 1907, the number was over 15,000. 28

The government was reportedly quite concerned over the development of such large-scale speculation in public resources,29 and in 1909 the Fulton Royal Commission was appointed to investigate all aspects of the matter. That the legislators of 1907 should have become apprehensive in respect of Special Timber Licences is not surprising, for in excess of 100 billion board feet had been alienated from the Crown in less than three years, and this at a time when the total annual cut of the province was probably less than one billion board feet.30 Even these figures probably understate the full extent of staking, for at the end of 1916 although the number of active licences had declined to 14,957,31 Whitford and Craig estimated that in excess of 161 billion board feet of timber were being held in this manner.32
One of the first recommendations of the Fulton Commission was that the renewal privileges of the licences be extended indefinitely\textsuperscript{33} since it was apparent that the "... 15,000 square miles of heavy forest in the timber licences could not be cut off within twenty-one years without reckless logging..."\textsuperscript{34} Starting in 1910, licensees could have their holdings made permanent upon the payment of a $20 fee, and some 12,850 licences were converted in this manner.\textsuperscript{35} This renewal feature made possible timber consolidation subsequent to 1928, and indeed made consolidation of timber holdings before this date a far more viable proposition since the maximum value of the holding would normally have occurred in this year, and without the prospect of long-term gain there would have been little point in anyone holding a timber licence except to supply current timber requirements. It must be remembered that although royalties payable on timber extracted were subject to revision by the government,\textsuperscript{36} the industry had to have accessible timber upon which to operate. Inaccessible timber, no matter how low the royalty, has never been of significant current or short-term value to logging operations. The value of these holdings stemmed in fact from their strategic locations on tidewater, at the mouths of creeks and rivers, and along the valley floors.\textsuperscript{37}
Timber Leases

This form of tenure is similar in many respects to the Timber Licence in that rights to cut only mature timber are sold. Control of the land and immature timber remains with the Crown.

Timber Leases were first authorized by the Land Ordinance of 1865, and under the provisions of this Act timber of any extent could be taken up. Initially, no limit was set to the period of tenancy. Timber Leases were, however, restricted to those engaged in lumbering, and it is on this point where one finds the most pertinent difference between licences and leases.

The term of leases was reduced to thirty years by amendments to the Land Act in 1888. This was the first of several attempts to limit lease holdings to a mill's actual requirements. Lessees were required to operate a mill with a capacity of 1,000 f.b.m. per day for each 400 acres under lease. In 1892 the term of leases was reduced to twenty-one years and in 1899 the lessee was required to operate the mill appurtenant to the lease for at least six months a year.

In 1901 Timber Leases were made "... renewable for consecutive and successive periods of twenty-one years..." and all holdings thus became perpetual until such time as the timber was harvested.

In spite of the very significant advantages of a longer term (i.e. before 1910) and lower royalty and rental
rates than licence holdings the 'mill clause' seems to have limited the value of this tenure as a speculative vehicle. Shortly after the issuance of licences and leases was suspended in 1906 and 1907 it was estimated that some 12 billion feet of timber were held under lease. Later estimates in 1917 placed the figure at 22 billion feet, and though very substantial holdings are clearly involved the total volume is only one fifth that held under Special Timber Licences. As in the case of licence holdings, timber held under lease was of the choicest type and stood on highly accessible sites.

Timber Berths

This form of tenure was granted by the Dominion Government on lands granted to it by the Province in aid of railway construction. No time limit was placed on this period of tenure, and the berths were renewable annually as long as merchantable timber remained. As in the case of Timber Licences and Leases, the lands revert to the Crown after removal of the mature timber, and since these lands were returned to the jurisdiction of the Provincial government in 1930, this authority ultimately controls all Timber Berths. Holding costs in the form of rentals are comparatively small ranging from $10 to $64 per square mile annually. The timber on berths is not subject to stumpage, but royalties of $1.25 to $1.50 per m.f.b.m. are payable on all species and grades.
Again like licences and leases timber held under this form of tenure occupies strategic locations, all, naturally, within twenty miles of the Canadian Pacific Railway. In 1917 in excess of 17 billion board feet of timber was held in Timber Berths.\textsuperscript{51}

\textbf{Pulp Leases}

The original Pulp Leases were taken up between 1901 and 1903 when the government amended the Land Act in an attempt to encourage the growth of a pulp and paper industry in British Columbia.\textsuperscript{52} Rentals on the leases and royalties payable on pulpwood extracted were considerably lower than those attached to other tenures, and though terms governing the construction of suitable manufacturing facilities were included in the contracts, none of the companies taking up the leases complied with them for one reason or another.\textsuperscript{53} Four companies—The Oriental Power and Pulp Company, Limited, The Quatsino Power and Pulp Company, Limited, The Canadian Industrial Company, Limited, and The Bella Coola Development Company, Limited—took up 354,399 acres. In 1917 these four leases were estimated to contain almost 10 billion board feet of timber.\textsuperscript{54}

These four Pulp Leases were the only ones ever issued by the British Columbia Government, but since they were fully renewable at the end of their twenty-one year term\textsuperscript{55} all are still in existence today.
**Timber Sale Licences**

Of all the forms of tenure so far discussed, the timber sale is the only one which has been issued subsequent to 1907. It is still issued today and in fact this form of tenure has become increasingly important in the disposal of Crown timber. Paradoxically, for all its permanent and growing importance the Timber Sale Licence has the shortest term of any major form of tenure.

Timber Sales were first provided for by the Forest Act of 1912, at that time principally as a means of providing timber for interior operators in regions where longer-term alienations were not so widespread. In comparison with other forms of tenure, the terms allowed for the removal of the timber were very short—usually one to three years.

This short term, in conjunction with the then undeveloped interior industry meant that only insignificant volumes were held under this form of tenure in 1917, and Whitford and Craig estimated that only 1/3 billion feet were so alienated in this year. This small figure also testifies to the abundance of otherwise alienated timber superior to that held by the Crown in coastal regions.

This discussion of timber sale licences concludes the treatment of major pre-1945 forest tenures. There were tenures other than these, such as pulpwood timber sales and pulp licences, but their impact upon the industry has not been great. Limited acreages are involved in all cases.
The significance of these early tenures stems basically from their permanency. All, with the exception of timber sales may be held for extended periods, and Crown-granted lands furthermore carry rights to the timber in perpetuity. In spite of attrition in some forms of tenure, particularly in the early 1900's, timber logged from these holdings was the basis of the pre-1945 industry, and even with heavy depletion in both this and subsequent periods, production from pre-1907 tenures has remained at a consistently high level until the present. Some of these holdings are being operated in 1971.

Such heavy exploitation of timber held under these forms of tenure by a rapidly growing industry over a period in excess of sixty years would of course have been impossible had it not been for such extensive original staking. Exclusive of timber sales, over 260 billion board feet of timber was held under long-term tenures in 1917. The strategic location of these timber lands has been stressed, and again the extent of industry reliance on them as a basis for raw material supply is ample testimony to this fact.

The government's desire to retain control of the province's forest lands and to minimize speculation seems to have been severely compromised by several pieces of legislation and by the lack of an effective administrative apparatus in matters pertaining to the forest. This refers most specifically to the Crown-granting of lands and to the issuance of Special Timber Licences. In the case of the latter tenure, short-
term revenue considerations assumed a position of great im-
portance in the passage of the legislation. Attempts to
limit timber control to existing industry and most particularly
to conversion plants seem to have been by and large
unsuccessful.

3. Timber Control

Thus far, two major background topics have been dis-
cussed in considerable detail. Both constitute an extremely
brief treatment of a complex area, but the basis for British
Columbia's unique raw material situation will by now be
apparent. With an understanding of the resource and of the
early legislation governing its disposal we can now examine
the developing picture of timber control.

Justice Sloan commented in 1956 that

It has been said, and I believe it to be so, that by 1907, generally speaking, the best timbered areas had been alienated by the Crown in one form of tenure or another and that about 30 per cent of the remaining Crown timber in the Vancouver Forest District was growing at altitudes of 2,000 feet and higher. 62

His observation is equally true of most coast forest areas, and he later refers in this connection to "... the long-established pattern of private ownership with its concomitant and strategic control of unalienated Crown lands." 63

The single most important feature of these private holdings was of course their high accessibility to the industry, but as Sloan indicates, many privately-held lands
occupied strategic locations on tidewater and at the mouths of valleys. Thus, not only did the private sector control many billions of feet of standing timber directly, but indirectly controlled substantial tracts of timber still owned by the Crown.

The importance of these alienated forest lands is many times greater than their share of the provinces total area, for their area is disproportionately small—16,019 square miles in 1917, only four per cent of the total provincial area.64 The full importance of these 16,000 square miles lies not entirely with accessibility however. In Table IV following, an examination of merchantable timber inventory statistics reveals that over 70% of the total timber volume stood on this 4% of the provincial area.

**TABLE VI**

**MERCHANTABLE TIMBER IN BRITISH COLUMBIA, 1917.**

(billions of b.f.)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber Licences</td>
<td>161.3</td>
</tr>
<tr>
<td>Timber Leases</td>
<td>22.0</td>
</tr>
<tr>
<td>Pulp Leases</td>
<td>9.6</td>
</tr>
<tr>
<td>Timber Sales</td>
<td>.3</td>
</tr>
<tr>
<td>Dominion Licences</td>
<td>17.4</td>
</tr>
<tr>
<td>Crown-granted</td>
<td>50.0</td>
</tr>
<tr>
<td>Total alienated</td>
<td>260.6</td>
</tr>
<tr>
<td>Crown Owned</td>
<td>105.7</td>
</tr>
<tr>
<td>Total</td>
<td>366.3</td>
</tr>
</tbody>
</table>

Forest industry firms in this early period seem to have had no alternative to this timber. With 260 billion board feet of the finest timber in private hands an operator had to have access to a portion of it in order to survive. There cannot have been any other alternative.

Since the bulk of these alienated lands were of a relatively low elevation, they naturally held a preponderance of the most desirable species. Volumes per acre were very high in a number of cases. In a promotional brochure published by the Esquimalt and Nanaimo Railway Company, one finds the following statement.

Some instances may be given of large Blocks of Timber Land which are open for sale.

(1) Adjoining Sproat's Lake, and in the neighbourhood of the southerly end of Great Central Lake . . . the company has a solid area of about 10,000 acres of beautiful standing timber, which is estimated to carry about 260,000,000 feet (Board Measure) of timber, consisting of approximately 90% Douglas Fir and the balance Hemlock and Cedar.

Some sections of the area are estimated to carry as high as 100,000 feet per acre. . . . 65

Douglas fir was the basis of the industry before 1945, and ". . . a whole forest industry became based upon the exploitation of a single major species, Douglas fir."66

The almost exclusive demand for Douglas fir by lumber manufacturers encouraged most loggers to operate their camps where Douglas fir predominated, on the land of low elevation around Georgia Strait. 67

High grading of timber stands being logged was a very common practice during this period,68 but even with the advantages implied by this manner of operating, the timber
being cut still had to have a high proportion of Douglas fir before the logger could show a profit. "Too high a percentage of hemlock and silver fir in a stand was enough to make the difference between profit and loss."69

The problem of accessibility was brought into sharp focus as early as 1900, for although there were tremendous volumes of timber within a few miles of tidewater, the industry of this time operated with only a primitive technology in forests without Canadian parallel. The ramifications that these problems of access had and still have for industry structure center around the size of, and necessity for, capital investment.

Douglas fir forests found within a short distance of the coastal waterway were depleted by 1900. Penetration of the large valley stands was deemed imperative if production was to be maintained. 70

Operators thus faced a difficult situation as they sought to secure the most accessible alienations in their efforts to keep capital investment within their financial capabilities.

As indicated in Table VII following, the extent of industry reliance upon these early alienations furnishes ample proof of the fact that they provided the only viable source of raw materials at this time. Alternative sources, such as Timber Sale Licences after 1912 were utilized to only a nominal extent.
TABLE VII

BRITISH COLUMBIA TIMBER CUT BY FORM OF TENURE. 1925-1937
(millions f.b.m.)

<table>
<thead>
<tr>
<th>Year</th>
<th>Timber Licences</th>
<th>Timber Leases</th>
<th>Handlogger Licences</th>
<th>Timber Sales</th>
<th>Crown Grants</th>
<th>Dominion Lands</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925</td>
<td>531</td>
<td>343</td>
<td>11</td>
<td>316</td>
<td>1047</td>
<td>303</td>
<td>2612</td>
</tr>
<tr>
<td>1926</td>
<td>554</td>
<td>424</td>
<td>8</td>
<td>296</td>
<td>1308</td>
<td>293</td>
<td>2919</td>
</tr>
<tr>
<td>1927</td>
<td>575</td>
<td>384</td>
<td>5</td>
<td>292</td>
<td>1283</td>
<td>286</td>
<td>2854</td>
</tr>
<tr>
<td>1928</td>
<td>602</td>
<td>410</td>
<td>5</td>
<td>325</td>
<td>1522</td>
<td>303</td>
<td>3208</td>
</tr>
<tr>
<td>1929</td>
<td>575</td>
<td>374</td>
<td>6</td>
<td>383</td>
<td>1669</td>
<td>313</td>
<td>3345</td>
</tr>
<tr>
<td>1930</td>
<td>445</td>
<td>421</td>
<td>5</td>
<td>321</td>
<td>1230</td>
<td>186</td>
<td>2664</td>
</tr>
<tr>
<td>1931</td>
<td>284</td>
<td>387</td>
<td>5</td>
<td>239</td>
<td>886</td>
<td>113</td>
<td>1949</td>
</tr>
<tr>
<td>1932</td>
<td>399</td>
<td>390</td>
<td>5</td>
<td>198</td>
<td>578</td>
<td>17*</td>
<td>1611</td>
</tr>
<tr>
<td>1933</td>
<td>560</td>
<td>330</td>
<td>8</td>
<td>161</td>
<td>861</td>
<td>7*</td>
<td>1952</td>
</tr>
<tr>
<td>1934</td>
<td>607</td>
<td>401</td>
<td>7</td>
<td>248</td>
<td>902</td>
<td>19*</td>
<td>2215</td>
</tr>
<tr>
<td>1935</td>
<td>750</td>
<td>549</td>
<td>5</td>
<td>269</td>
<td>1039</td>
<td>9*</td>
<td>2649</td>
</tr>
<tr>
<td>1936</td>
<td>817</td>
<td>659</td>
<td>4</td>
<td>362</td>
<td>1142</td>
<td>11*</td>
<td>3020</td>
</tr>
<tr>
<td>1937</td>
<td>893</td>
<td>535</td>
<td>3</td>
<td>446</td>
<td>1300</td>
<td>18*</td>
<td>3242</td>
</tr>
</tbody>
</table>

* Transferred from Dominion to provincial jurisdiction in 1931, and the cut from Timber Berths is included under that from other tenures.

Source: Annual Reports, British Columbia Forest Service, 1925-1937.

During the years 1934-43, 40.3% of provincial log production came from Crown grants, 26.8% from Timber Licences, 16.4% from Timber Leases, and only 14.5% from Timber Sales. 71

It is difficult to ascertain the exact disposition of timber holdings during this period, but with such widespread staking of so large a volume of standing timber there would likely not be a severe shortage of alienated raw material.

It seems that the original staking of these lands was
carried out by numbers of individual operators rather than by the corporations which ultimately came to control large tracts of timber land. Several factors appear to have been responsible for the transition in the pattern of ownership.

Firstly, a great deal of disorganization was inherent in the staking activity which took place before 1907. Some Timber Licences controlled timber which would not become economically accessible for a number of years, and these were doubtless allowed to return to the government through non-payment of the annual rental. In excess of 2,000 original claims lapsed in this manner. Some confusion existed also in respect to the existence of prior claims on the land, and as many as six licences were taken up on the same property. A certain amount of attrition was thus typical in the early years as a result of the rapid and speculative nature of much staking activity.

For the holders of forest lands and timber per se, gain could come from only two sources—sale to another party or extraction of the timber being held. Quite clearly, such a large volume of timber could not be expected to be cut by the industry in even the first few decades of this century, and the situation lent itself to the development of a timber market and a certain amount of consolidation of holdings. This was particularly true at a time when fears of a timber shortage were widespread in North America, especially among timbermen in the United States. This was in fact the
condition which developed, and an active exchange of timber and a market complete with timber brokers was characteristic of the early 1900's.\textsuperscript{76}

Financing timber holdings was difficult for many individuals and smaller companies, for annual rentals had to be paid on licences and leases. Some difficulty was experienced in borrowing from the banks because of the uncertainty intrinsic in royalty and rental charges which could be varied at will by the provincial legislature. "... this uncertainty militated strongly against the value of licences for purposes of financing. In many cases the banks refused to accept these licences as collateral. ..."\textsuperscript{77} Without adequate financing, the idea of immediate sale must have seemed attractive to many people.

The acquisition of timber rights by companies with substantial financial backing began at an early date. The Canadian Western Lumber Company was formed in 1910 under a Dominion charter. Capitalization was $10 million, and its initial objective was

\begin{quote}
... the acquisition of the different properties of the Fraser River Lumber Company including the control of 80,000 acres of freehold timber in the Comox district on Vancouver Island. In addition, the Company had leasehold timber rights from the Province of British Columbia and the Dominion of Canada to the total of 60,460 acres. The timber standing on these properties in 1910 represented no less than 5-1/2 billion feet. 78
\end{quote}

There are many recorded instances of large purchases of timber, both leasehold and freehold. Much of the capital
came from the United States. In 1909, for instance, E.C. White, a lumberman of Boyne City, Michigan bought $2 million worth of timber holdings near Klaanch River on the northeast coast of Vancouver Island. "One tract for which he paid $1,500,000, was estimated to contain three billion feet." The American Timber Holding Company, with a capital of $6 million, invested some $2.5 million in B.C. timber from 1905 onwards. By 1911 this company had accumulated 5 billion feet of standing timber. Many operating Canadian mills also purchased extensively in this period--the Fraser River Lumber Company, 75,000 acres, the British Columbia Mills, Timber and Trading Company, 75,000 acres, and the Toronto and British Columbia Lumber Company, 45,000 acres.

Consolidation and the sale of blocks of timber continued throughout this period. The E and N Railway was one of the major sellers and by the 1920's many mills were operating on timber purchased from them--the Victoria Lumber and Manufacturing Company, 65,000 acres, the Comox Logging and Railway Company, the Mayo Lumber Company, the Bainbridge Lumber Company Limited, and the Empire Lumber Company. In 1910 and 1911 this latter company "... purchased from the Railway Company 30,135 acres of very choice timber land at Cowichan Lake." In 1922, the E and N Railway Company was offering tracts for sale of from 7,000 to 10,000 acres, though "Smaller areas are available for purchasers with limited capital."

It is apparent that 'purchasers with limited capital' were much in the minority and played only a small role in the
purchase of timber rights. The total volume held by small
holders through the next forty years was very small indeed.
The capital required to finance a licence or lease for forty
years was quite substantial, as must have been the sums needed
for a private purchase of freehold land.

The depression of 1929 had a pronounced impact upon
the British Columbia forest industry, and the process of
attrition among small timber investors seems to have been
considerably accelerated.

Between 1929 and 1932 annual timber scale fell one
billion feet. Out went the small marginal logger. Out went the speculator who had too much borrowed
money invested in timber. Out went the small
marginal mills. . . . Individuals and companies
with wealth or credit purchased timber at grossly
discounted prices. 86

In 1936 the H.R. MacMillan Export Company, Limited
purchased about one billion feet of timber, chiefly Douglas
fir, and from the J.D. Rockefeller interests, nine tracts of
timber on the Ash River near Port Alberni for $2,627,500. 87
In 1939, the MacMillan company purchased the timber holdings
of the Campbell River Timber Company for $950,000. 88 Bloedel,
Stewart and Welch bought timber from 1922 onwards, a major
purchase being the McLaren Holdings for $3 million in 1926. 89

It is almost an understatement to say that the pattern
of timber ownership by 1944 was one showing a considerable
degree of concentration. The two largest timber holders held
more timber than the 2,500 smallest holders. 90 Out of a
total number of holders of Timber Licences, Sales, Berths,
Leases, and Pulp Leases and Licences of 2,877, 138 or just
less than 5% controlled an estimated 3.335 million acres or 86% of a total area of 3.889 million acres so alienated.  

The average small holding was slightly in excess of 200 acres; none of the 138 largest held less than 5,000 acres. The largest held over 245,000 acres. **Merchantable** timber on leasehold lands was estimated to total 82 billion feet in 1937, and one can only speculate on the actual volumes held by this 5% of the holders.

The nature of ownership patterns on Crown-granted timberlands is not known, but it surely cannot have been much different from that on leasehold lands. If anything, more consolidation would be evident because of the larger sums required for acquisition from the original holders. Some 535,918 acres of Crown-grant timberlands were held privately in 1935, and in 1944 the E and N Railway Company still held 698,058 acres of timberland at an annual tax burden in that year of $10,470. As previously mentioned, from 1934-43, 40.3% of British Columbia's log production came from lands which had been Crown-granted.

**Harvesting and Transportation**

This subject has already been touched upon briefly in the previous few pages in connection with the control of accessible timber, for the nature of access to and the type of timber being operated are major factors affecting the capital investment required. Although both features are
still of importance today, and the relationship expressed remains valid, neither circumstance is or recent origin.\textsuperscript{97} Problems of this nature have been part and parcel of Pacific coast logging since the 1860's.\textsuperscript{98}

As early as 1900 many mills were being forced into either new coastal areas or further back from the shoreline as they sought to maintain the flow of raw materials. Canadian prairie markets grew rapidly from 1900 to 1912, providing a great deal of the impetus for growth in the industry at this time,\textsuperscript{99} and even with the levelling off and decline of these markets after 1912,\textsuperscript{100} revitalization of trade with export markets more than sustained the expansion in capacity which had taken place.\textsuperscript{101} As is shown in Table VIII following, the demand for raw materials remained strong.

\begin{center}
\textbf{TABLE VIII}
\end{center}

\begin{center}
\textbf{BRITISH COLUMBIA LOG SCALE. 1917-1929. (million b.f.)}
\end{center}

<table>
<thead>
<tr>
<th>Year</th>
<th>1917</th>
<th>1918</th>
<th>1919</th>
<th>1920</th>
<th>1921</th>
<th>1922</th>
<th>1923</th>
<th>1924</th>
<th>1925</th>
<th>1926</th>
<th>1927</th>
<th>1928</th>
<th>1929</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,647</td>
<td>1,761</td>
<td>1,758</td>
<td>2,046</td>
<td>1,790</td>
<td>1,899</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,522</td>
<td>2,550</td>
<td>2,611</td>
<td>2,918</td>
<td>2,854</td>
<td>3,207</td>
<td>3,346</td>
</tr>
</tbody>
</table>

Source: Carrothers, \textit{op. cit.}, p. 239.
No matter which alternative the coast industry adopted to maintain its raw material supply it found itself involved with new technology, and of necessity with a larger capital investment in logging. Longer hauls down the coast could be accomplished only through the use of steam tugs, and logs could be moved to tidewater over distances in excess of a mile or two only by use of the logging railway. Steam was applied in the yarding of logs too, replacing hand and animal power.

Steam locomotives and donkey engines were introduced around 1890, and their adoption grew fairly rapidly over the next three decades. By 1917, British Columbia had 62 operating railways, 410 miles of track and 98 logging locomotives. By 1929, there were 80 railway operations, 747 miles of track, 149 locomotives, and 1,187 logging cars. Other equipment was also in use by this time—steam-shovels log-loaders, skidders, and by 1929 549 logging trucks. Highlead logging, with all its attendant investment in cables, blocks, and donkey engines was common on the Pacific coast as early as 1915.

From the very outset, coast forests have resisted exploitation by small-scale operations functioning without the benefit of a substantial investment in capital equipment, and while the new technology meant that the raw material flow could be sustained as access problems became critical, it effectively eliminated those operators without adequate sources of funds.
"In the last decade of the nineteenth century only the largest camps could afford the luxury of steam power in the woods."\textsuperscript{106} Early steam donkeys cost $3,000 to $4,000, but many later models were priced at $10,000 to $14,000,\textsuperscript{107} certainly a sizeable investment for those days. W.A. Carrothers commented in 1938 that "The investment in railroad locomotives and rotting stock, power shovels and grading machinery, logging blocks and wire rope, is very high."\textsuperscript{108}

The burden of capital equipment investment alone must have been substantial enough, but when coupled with the cost of annual rentals on twenty or so years of leasehold timber or the acquisition cost of an equivalent amount of freehold land, the financial load must have been beyond the capacity of all but the largest operators. This conclusion is borne out by the structure of the industry during this period, which, like timber control evidences very strong trends towards concentration and vertical integration.

One of the earliest examples of vertical integration may be found in the operations of the British Columbia Mills, Timber and Trading Company around 1900. The name itself bespeaks the extent of its involvement in the various industry phases. In 1900 its subsidiary camps at Rock Bay and Thurlow Island produced some 60 million feet of logs, and in 1902 this company, already operating the Hastings mill, bought the Moodyville operation in its entirety.\textsuperscript{109}

Another major integrated firm of the early 1900's was the Canadian Western Lumber Company. Its timber holdings
have already been mentioned and its mill at Fraser Mills was "... perhaps the largest sawmill in the world during the 1920's". A Fraser Mills subsidiary logged as much as 200 million feet annually in the Tsolum Valley near Comox, and these operations extended over some thirty years.

The early years of the century were characterized, however, by a lack of integration between logging and sawmilling, and by the presence of a number of smaller operators in both fields. It is estimated that there were in excess of 1,000 independent loggers operating around 1930. This was the period during which the Vancouver log market came into being, and it grew generally as the division of function grew from 1900 to 1925. Whitford and Craig wrote in 1918 that

The greater portion of logging on the coast is done by independent loggers who sell their output to the mills... Quite a few mills operate camps, but few of them take out sufficient for their own needs.

From 1920 to 1930, an estimated 50% of coast log production went through the open market, 10% was sold by speculators, and the remaining 40% was sold under contract, first refusal, or was produced by logging divisions of the mills.

It should be noted that the Vancouver log market and its participants operated in a unique geographical situation in which it was possible to assemble logs from a very large hinterland at one central point. The nucleus of development was here too, for the growth of port and rail facilities on Burrard Inlet kept mills in this area in close contact with overseas and domestic markets. Away from Vancouver the
independent logging sector seems never to have existed, for the mills were located adjacent to their timber holdings and most did their own logging. 116 This situation was especially true in the interior where the mills were moved to the timber rather than the logs to the mill. 117

The depression of 1929-1932 proved to be an especially difficult period for the industry, and many smaller mills and logging operations ceased to exist. 118 "... the pattern of extractive and milling sites after the financial crash of 1929 was different. The larger companies commanded a greater proportion of the log market." 119 From 1935 to 1940, 35% of coast production went through the open market, 35% was sold under contracts of one type or another between mill and logger, and 35% (sic) was cut by the logging divisions of various mills. 120

The trend towards integration between milling and logging accelerated after the depression. 121 Firstly, the larger operations which survived the depression were possibly already integrated to some extent and they would naturally control a larger share of the output as smaller operators were 'shaken out.' It is quite possible, too, that the disappearance of many independent loggers would leave the conversion sector without adequate log supplies when lumber markets became more buoyant as they did after 1932. Faced with such a situation, some of them undoubtedly entered the business directly. Basically however, though the situation stems
directly from the same cause as that leading to direct mill involvement in logging, the main stimuli towards integration relate to the loggers' need for capital and the mills' need for a stable log supply. Both stimuli were undoubtedly particularly keen in 1932. Integration of the two types of unit solved these critical problems for both. The nature of the link between mill and logger was variable, ranging from complete amalgamation through a contract relationship down to an informal working agreement where part of a logger's production would be committed to a particular mill.

According to Hardwick, "Scarcity or fear of scarcity of raw material supplies appears to have prompted, about 1940, a trend toward vertical integration in the forest industry."122 This process in fact was well under way as early as the first decade of the twentieth century as is evidenced by the operations of the Canadian Western Lumber Company. Certainly, a great deal of timber consolidation occurred at this time, and as in the case of this company, a fair amount of it was initiated by the mills themselves. The 32 billion board feet of timber in Pulp Leases and Timber Leases was undoubtedly held by conversion plants by virtue of their attached terms and conditions, and the purchases made by the various mills from the E. and N Railway Company were partially outlined a few pages earlier.

It is very probable that a strong stimulus towards vertical integration and the growth of mill-logger ties lay
in the fact that mills controlled a large proportion of the accessible timber. Not only were many loggers poorly financed in relation to their capital needs, but successful operation was contingent upon their securing accessible tracts of prime Douglas fir timber upon which to carry out logging. Contracting was a device in common use by the industry as early as the 1860's, though at this time mill LOGGER links were likely a function of the relative thinness of the market. In the 1930's however, "... most of the small loggers tried to log on alienated lands under an agreement with the owner," and it is highly probable that this later incidence of contracting relates more directly to the need for accessible timber, since by this date there was a well-established and quite substantial log market in the Vancouver area.

As is shown in Table IV following, by 1943 the cut in the Vancouver Forest District was concentrated in the hands of a very few operators. The 24 largest operations produced an estimated 1,410,000 MBM of logs in this year, and in percentage terms this 3.5% of all operations produced over 60% of total coast log output. The smallest 561 operators or 83% of the total number of loggers produced only 11.1% of coast output.
TABLE IX
VANCOUVER FOREST DISTRICT, LOGGING OPERATIONS AND PER CENT OF TOTAL CUT, 1943

<table>
<thead>
<tr>
<th>Cutting more than (M.F.B.M.)</th>
<th>Number of Logging Operations</th>
<th>Per cent of Total Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>200,000</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>150,000</td>
<td>1</td>
<td>9.0</td>
</tr>
<tr>
<td>75,000</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>50,000</td>
<td>4</td>
<td>11.0</td>
</tr>
<tr>
<td>25,000</td>
<td>7</td>
<td>12.0</td>
</tr>
<tr>
<td>20,000</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td>15,000</td>
<td>4</td>
<td>3.6</td>
</tr>
<tr>
<td>10,000</td>
<td>14</td>
<td>8.0</td>
</tr>
<tr>
<td>5,000</td>
<td>34</td>
<td>12.0</td>
</tr>
<tr>
<td>2,500</td>
<td>44</td>
<td>6.5</td>
</tr>
<tr>
<td>1,000</td>
<td>68</td>
<td>5.5</td>
</tr>
<tr>
<td>500</td>
<td>67</td>
<td>2.3</td>
</tr>
<tr>
<td>100</td>
<td>190</td>
<td>2.3</td>
</tr>
<tr>
<td>&lt;100</td>
<td>236</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>677</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Sloan (1945), op. cit., p. 980.

It is apparent that in spite of growing integration and the concentration of activity in the hands of a few companies a large number of loggers survived to 1945 in a non-integrated state. This can be seen in Table IX or in the statistics dealing with log flows from 1940 to 1945. During this period approximately 30% of coast production went through the open market most likely originating with the smaller producers but obviously even the larger operations were
involved in some open market transactions. An estimated 30% of coast log production was sold through contracts or on a first refusal basis, and the remaining 40% was produced by the logging divisions of the mills.

It seems likely that the introduction of trucks in the 1920's was a major factor in the survival of non-integrated loggers, for it reduced the size of the necessary capital investment while simultaneously opening up timbered areas so far inaccessible to the forest industry. This flexibility of operation characteristic of truck logging must have brought substantial tracts of Crown timber into the realm of exploitability, thus freeing operators from the need to cut on mill-owned timber.

This rise and fall of the independent logging sector as technology changes has been a theme of continuing development throughout the history of logging in British Columbia. Hand-logging disappeared at a very early stage with the exhaustion of timber accessible to so primitive a technology. With the loss of timber accessible to the hand-logger went the small-scale operator, for the incoming technology of railway logging necessitated a substantial investment in capital equipment. Truck logging brought him back.
Unlike the logging sector, sawmilling has evidenced a degree of horizontal as well as vertical integration. A complete history of the process is not available, but it seems reasonably clear that such was the case. In 1936, for example, the MacMillan Export Company bought the old Dominion Mills on the Fraser River as well as the Alberni-Pacific Lumber Company at Port Alberni. In 1902, the British Columbia Mills, Timber and Trading Company purchased all the operations of the Moodyville mill, and from 1905 to 1910 the Bowman Lumber Company expanded through the purchase of various mills in the Kootenays to "... become one of the largest in the country."

Several factors could account for this process, the principal one being its close involvement with the acquisition of timber holdings. The funds available for this type of investment were quite large—by 1910 the United States investment in British Columbia mills and timber totalled $65 million. In 1925 the International Harvester Company bought the assets of the defunct Beaver Cove Lumber Company for $6 million, and these included timber and pulpwood tracts on the Nimpkish River.

Possibilities for growth and investment were everywhere in the coast lumber industry, but for some mills the shortage of capital was undoubtedly a major problem. For those with capital, acquisition must have appeared attractive, especially
during years of depressed markets when overextended mills were hard-pressed to remain solvent.

Sawmilling in this period was considerably less affected by technological change than was the logging sector, though by the 1940's the impact of a changing raw materials flow was being felt to some degree. Generally speaking, the larger and better financed mills were most fitted for survival in the face of change, for some of the required adaptation necessitated that they make sizeable new investments.

Justice Sloan said in 1945 that

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. 135

The first "Swedish mill" in fact was installed in a British Columbia mill as early as 1938. 136

Another major investment looming large upon the horizon was that required for dry-kilns, a major part of producing hemlock lumber to standards acceptable in some international markets. According to Sloan, "... their installation is frequently beyond the financial ability of the smaller sawmill operator." 137 The nature of investment in 1942 is shown in Table X following.
TABLE VII
BRITISH COLUMBIA COAST. PRODUCTION FACILITIES, 1942

<table>
<thead>
<tr>
<th>Number of Mills</th>
<th>Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>Dressing facilities</td>
</tr>
<tr>
<td>16</td>
<td>Bandsaws</td>
</tr>
<tr>
<td>5</td>
<td>Gangsaws</td>
</tr>
<tr>
<td>8</td>
<td>Small-log riggs</td>
</tr>
<tr>
<td>31</td>
<td>Resaw facilities</td>
</tr>
<tr>
<td>22</td>
<td>Kilns</td>
</tr>
</tbody>
</table>


There were approximately 245 operating sawmills on the coast in 1943.\(^\text{138}\)

The following statistics are quite instructive in respect to mill survival, and the tendency of smaller mills towards closure is clearly seen.

TABLE XI
AVERAGE CAPACITY OF OPERATING AND SHUT-DOWN SAWMILLS IN BRITISH COLUMBIA, 1943
(By forest district, in MBM)

<table>
<thead>
<tr>
<th>Forest District</th>
<th>Operating Average capacity,</th>
<th>Shut-Down per 8 hour shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>48.2</td>
<td>6.1</td>
</tr>
<tr>
<td>Prince Rupert</td>
<td>9.5</td>
<td>7.3</td>
</tr>
<tr>
<td>Prince George</td>
<td>12.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Kamloops</td>
<td>9.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Nelson</td>
<td>11.9</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Source: Calculated from 49, p.BB32, 1943.
Apart from the production efficiencies accruing to the larger operating units, it seems probable also that the larger mills were better equipped to participate in export markets, especially before the formation of the Canadian Trading Company in 1914, the Associated Timber Exporters of British Columbia, Limited in 1917 and the H.R. MacMillan Export Company in 1919. Market connections and port facilities were of great importance for any mill wishing to participate in offshore markets, and both took time and capital to develop. In 1900 for instance, three mills--Hastings, Moodyville, and Chemainus--dominated the province's export lumber markets, between them controlling almost 97% of the trade. The ability to participate in export markets came to be of particular importance after 1920, when they took from 18.9% to 59.4% of British Columbia's lumber production. Carrothers said in 1938 that "Marketing organization contributed to the concentration of the Pacific-coast lumber industry in large production units. The expensive selling agencies required to sell diversified wood products in distant and highly competitive markets necessitated large volume of sales if sufficiently low-unit marketing costs were to be attained."

By 1942 the structure of the coast sawmilling industry could be characterized as fairly concentrated, all the previously mentioned factors--capital, timber, efficiency, and market access--doubtless playing a part in the process.
TABEL XII

COAST SAWMILLS. PRODUCTION AVERAGES, 1942

<table>
<thead>
<tr>
<th>Size</th>
<th>Number</th>
<th>Daily Cut</th>
<th>Percent of Total Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>20</td>
<td>&gt;85 MBM</td>
<td>67</td>
</tr>
<tr>
<td>Medium</td>
<td>24</td>
<td>35 MBM-79 MBM</td>
<td>21</td>
</tr>
<tr>
<td>Small</td>
<td>140</td>
<td>&lt;34 MBM</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: Manning, op. cit., p. 40.

According to Table IX only 24 logging operations on the coast in 1943 were capable of producing more than 85,000 f.b.m. daily, and only 72 produced more than 35,000 f.b.m. a day. From the point of view of the large and medium-sized mills seeking to obtain adequate, reliable, and secure flows of raw materials, the more than 500 small loggers could not offer the volumes required because of their undercapitalization and small scale operations. Integration took place most naturally between firms of a comparable size, since each could offer the other benefits commensurate with the costs involved. With an injection of capital and in many cases timber also, most logging companies would increase their scale of operations. With assured raw materials flows, the mills involved would have the security to back an expansion of their operations. Integration was most sought after by the larger firms in both logging and sawmilling since they rather than the smaller operators has the most urgent need to follow such
a course as well as the resources most adequate for this action. Integration in the forest industry is fostered by and fosters by itself a great deal of concentration of economic power.

Marketing

In the initial phases of the development of the British Columbia forest industry the responsibility for marketing output was undertaken by the individual mills. There was at this time no sales agency to which the mills could turn, and the success or failure of the venture depended for the most part upon the effectiveness of sales efforts and the continued strength of the various markets.

Since as early as the 1850's, brokers in the United States, particularly those in San Francisco had controlled a great deal of the offshore trade from the Pacific coast of the continent. This domination increased considerably during the period 1900 to 1915, and when Canadian prairie markets weakened rapidly at the end of this period, the now-expanded British Columbia industry was faced with the urgent necessity of expanding overseas sales to fill the gap.

The obstacles to overseas trade in 1916 were thus centered largely around the nature of marketing and distribution facilities available to British Columbia producers. "At this time [1916] the American control of the distribution of British Columbia lumber . . . was being subjected to ever
more frequent criticism. . . ."¹⁴⁶

The first action taken in response to these problems came from the provincial government in 1916 when a variety of shipping subsidies were introduced to circumvent the necessity of using vessels controlled by the San Francisco brokers.¹⁴⁷ Operating subsidies were paid, and construction subsidies resulted in the rapid production of a number of vessels for the lumber trade from 1916 to 1921. Overall, these measures had a tremendous impact on British Columbia's ability to move lumber to overseas markets.

The next steps in this direction came in 1919 with the formation of the H.R. MacMillan Export Company and the Associated Timber Exporters of British Columbia Limited. Both organizations functioned as sales agencies for British Columbia lumber products in foreign markets.

The former company was formed on the initiative of H.R. MacMillan and "It owned no stands of timber, no lumber mills, no logging camps, and it had less than $10,000 in assets."¹⁴⁸ A large proportion of British Columbia's export lumber sales are reported to have flowed through its hands.¹⁴⁹ The Associated Timber Exporters of British Columbia Limited was formed by a number of coast mills to fill an order for 70 million feet of timbers and ties from the British Government for no one mill in the province at this time had the facilities to produce so large a quantity of timbers on such short notice. Following the successful execution of this
contract, the organization was kept intact, and "By far the larger number of export mills became members of the association, and all channelled their export business through it."  

Following 1919 there were thus two principle marketing agencies in the province, both formed in response to an urgent need to expand export sales of lumber. Both directly represented the interests of British Columbia mills and both actively sought out new markets for their output.  

Prior to the existence of these companies, channels for the export of lumber were long and complex. Sawmills sold to exporters and the lumber was subsequently channelled through a shipping broker, a transport company, a shipping agent, an import broker, a lumber wholesaler, and then possibly a retailer before it reached the ultimate consumer. With the formation of the Associated Timber Exporters company the mills took over the functions of the exporter directly, thus eliminating the San Francisco brokers and a certain amount of disruptive speculation carried on by them. In 1928 these mills formed the Seaboard Lumber Sales Company, Limited to handle waterborne sales to the Atlantic seaboard of the United States and the Marine Shipping Company, Limited to provide transportation for the lumber. The latter organization of course made a start at reducing the length of the channel still further by eliminating two more links, and the move was doubtless made for the same purpose as the government's action in respect to shipping subsidies—the transport sector had to be made fully responsive to the needs of export-
ing mills. Seaboard and the Associated Timber Exporters firm amalgamated under the former's name in 1937.  

Seaboard and its predecessors were controlled directly by the member mills and were thus fully responsive to their collective wishes. In this sense, Seaboard has always been highly integrated with the conversion, logging, and timber, owning phases of the industry. MacMillan's company on the other hand was not initially linked directly to any producing entities. Integration was not long in coming, however.

The major stimulus towards integration came from Seaboard and its forerunners in the lumber sales business and the acquisition of mills by the H.R. MacMillan Export Company came in response to threats to the stability and future depth of its lumber supply. Over the years export mills were apparently wont to join the Seaboard organization, thus reducing the base from which independent selling agencies could draw their lumber. The acquisition of both "... sawmills and timber stands to supply them," started in the 1920's and continued through to the end of this period, and indeed has continued to the present day. One of the first acquisitions was the Alberni-Pacific Lumber Company at Port Alberni.

MacMillan's need to integrate was given sudden urgency in 1935 by the rapidly growing membership of Seaboard, and in this year the mills subscribing to this organization represented almost 80% of British Columbia's lumber production. "The decision was made to expand, to acquire new plants and
Major timber purchases were made in 1936 and 1939. Like the Seaboard organization, the MacMillan company formed its own transport subsidiary at an early date. In this case it was the Canadian Transport Company Limited, formed, again like the Seaboard subsidiary "In order to ensure the cargo space that was required to fill orders. . . ." 

Thus, very early in their history the two dominant sales agencies for British Columbia lumber in offshore markets had become highly integrated with all other phases of the industry, and both were encroaching steadily on the channels between them and the ultimate consumer. It is not surprising that this latter process should be taking place—inefficiencies in this area had originally given rise to the formation of both companies.

Summary

This past section on the marketing phase of the industry completes the discussion of pre-1945 development. In this and in the previous chapter the root sources of industry structure have been examined in some detail. The primary sources of influence lay in the intrinsic nature of the provincial resource, the unique pattern of legislation, and in the character of such diverse features as the technology of logging, the control of marketing channels and lumber supply, and the direction given to the capital flowing into the growing British Columbia industry.
The basic patterns and directions of growth were very well established as early as 1945, and as we have seen, many of the primary sources of influence had their genesis as far back as the end of the nineteenth century. Many resulting processes had by 1945 run at least one complete cycle—the availability of accessible timber and logging technology cycle for instance, or the surge in the demand for logs following the slump of 1914 and again after the depression years. All these forces, however, were still fully operative at the end of this period, along with several others not hitherto apparent to any extent.

Marketing was highly concentrated in terms of the export component of sales—only two major firms were actively engaged in this phase of industry in 1945. Both are still in existence to this day and still control between them the bulk of exports of forest products. Characteristically, both were highly integrated with conversion, a feature which has also been perpetuated and in the case of one company has become even more pronounced.

One of the outstanding features of the industry near the end of World War II was the extent of concentration of timber ownership—less than 5% of the numbers of individuals and corporations with leaseholds held 86% of the acreage so alienated. The volume of timber held was very large, and in conjunction with freehold timber it formed the raw material base for the industry in this period.
The structure of the logging and milling sectors closely paralleled that in timber control, and as we have seen the development of the three phases was highly interrelated and closely intertwined from as early as 1890. In logging, some 17% of the operators produced almost 90% of the coast's output in 1943, and in coast sawmilling, 24% of the number of mills were responsible for 88% of coast lumber production one year earlier in 1942.

The capital-intensive character of coast logging was a development of early origin, and many smaller operations were unable to continue past the early years of this century. In consequence of the need for both capital and accessible timber, contract logging as well as much more highly integrated arrangements evolved at a very early date. By 1945 the open market for logs had declined from a peak of 100% to a position as the channel for only 30% of the coast's log production. Some 40% of coast output was already being produced by operations fully integrated with the sawmilling phase of the industry. The impact of technological innovation and adoption in logging upon the scale of operations and consequently upon the survival of the independent logger progressed through one complete cycle with the appearance of the truck. The resulting renewed viability of the 'small man' was a reversal of the ongoing trend and fostered the growth of conditions not seen since the turn of the century.

Although access to timber had assumed a critical role as early as 1900, the broader problem of adaptation to
a changing raw materials flow did not become an effective factor in the industry until about the mid-1930's, and even by 1945 its force was still hardly felt by the conversion sector. Demands on the resource were still modest in relation to its full capacity, and the lack of government control over logging practices left the whole industry relatively free to exploit the forest in the most profitable manner. High-grading was standard practice, and as a result neither loggers nor sawmillers were faced with an urgent need to adapt to new species or greatly different log grades. Change, however, was fairly close at hand, and the small-log milling facilities and kilns in use by mills in 1945 were the precursors of what was to become the major force in the post-war industry. The implications for further integration were most substantial.
CHAPTER III

TENURES AND REGULATIONS SINCE 1945

Introduction

In the previous period, although the government's role in the forest industry was largely one of non-involvement after 1907, its actions in this and earlier years exerted a profound influence upon the development of ownership and control patterns in respect to timber up to 1945. These early sources of influence have had considerable impact on the development of the industry in the post-war period too, principally through their role in respect to the granting of private control over additional areas of Crown timber.

This passivity on the part of the provincial government in the pre-war period has changed a great deal since 1945, and it is now taking an ever more active role in the management of the forest resources of the province. It is in the assumption of this more active role that the government has had cause to pass new legislation, much of it of very far reaching influence in terms of industry structure. New dimensions have been given to the raw material supply environment, and it is precisely here where the forest industry has been most directly affected.
Government actions in this period may be classified under one or the other of two very closely related areas—legislation in respect to tenures and their issue and legislation in respect to the degree of utilization to be practiced on government-controlled tenures. The relationship between the two is extremely close, as a specified standard of utilization is often a prerequisite attached to the granting of certain tenures, the Timber Sale Harvesting Licence for instance. The apportioning of 'third-band' wood quota and cutting rights too for instance is closely tied to sustained-yield cutting programs and tenures while originating itself in the implementation of close-utilization standards.

This next section will discuss first the implementation of sustained-yield cutting programs and the major tenures associated with this development in forest policy, the Tree Farm Licence and the Timber Sale Licence. Following the treatment of this topic, the introduction of standards of utilization will be covered, since much of the current tenure situation is involved with this matter. Following this, the remaining important tenures and policy will be outlined.

**Sustained-yield and Associated Tenures**

Since 1912 the government has consistently and more or less successfully adopted a policy of curbing the permanent alienation of forest lands and has further avoided the sale of even cutting rights on other than a short-term basis. In
addition, it will be remembered that only a small percentage of the forest land of the province was actually involved in leasehold and freehold commitments of a long-term nature. With heavy exploitation of these tenures both before and after 1945, their direct role in the context of provincial forest resources has dwindled to a marked extent. This arises in part because of the leasehold nature of many holdings and in part because of the time required to re-establish mature forest on lands permanently alienated from the Crown. By 1957, privately-owned land with timber totalled 6.6 million acres and comprised 4.8% of total provincial forest lands (bearing both mature and immature timber). Temporary tenures controlled only 1.5% of the total forest area, and after subtracting a few miscellaneous tenures this leaves the provincial government in control of 92.9% of the total forest land area. The industry has thus increasingly been dependent upon the provincial government for the issuance of new timber alienations for its raw material supply, and while in 1945 Crown timber played in many respects still a minor role in log supply for the industry, its future role was even then indisputably great.

In the 1940's, then, as the provincial government sought to increase its control over the industry it found itself in possession of probably the most potent weapon of all—control over almost 93% of the provincial forest area and although even this control was by no means absolute (as
will be discussed in connection with Tree Farm Licences) this weapon was used with great effectiveness to implement both sustained-yield cutting programs and higher standards of utilization of the forest.

Through the recovery period of the middle and late 1930's, the provincial log scale grew steadily, and from 1939 to 1946 totalled consistently above 3 billion feet annually. Technology too was vastly improved, and it was increasingly apparent that a great deal of wastage and despoilation of valuable resources was taking place.

By 1943 pressures for a more orderly management of the forest resource were very great, and as in 1905 the government appointed a Royal Commission to investigate all aspects of the area and to make appropriate policy recommendations.

The Sloan Royal Commission of 1945 laid the groundwork for most of the legislation that was to follow. One of the most important concepts delineated and the central theme of both investigation and recommendations was that of sustained-yield. The report defined sustained-yield as "... a perpetual yield of wood of commercially usable quality from regional areas in yearly or periodic quantities of equal or increasing volume," the basic objective of this policy being to protect the regional stability of forest-based industries by ensuring that resource management will provide a continuous crop of wood from each area.
As can be seen from Table XII following, the progress of sustained-yield cutting programs has been continuous since 1948 and the acreage so managed has increased constantly as new areas are organized for this purpose and to some small degree as lands formerly privately-held are included in tenures and lands under government control.

**TABLE XIII**

**BRITISH COLUMBIA. NUMBER OF ACRES OPERATING UNDER APPROVED ANNUAL ALLOWABLE CUTS, 1952-1969**

<table>
<thead>
<tr>
<th>Year</th>
<th>Acres</th>
<th>Year</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>2,095,747</td>
<td>1961</td>
<td>53,778,493</td>
</tr>
<tr>
<td>1953</td>
<td>7,844,870</td>
<td>1962</td>
<td>56,674,919</td>
</tr>
<tr>
<td>1954</td>
<td>9,864,646</td>
<td>1963</td>
<td>60,288,296</td>
</tr>
<tr>
<td>1955</td>
<td>14,081,278</td>
<td>1964</td>
<td>68,804,495</td>
</tr>
<tr>
<td>1956</td>
<td>26,417,617</td>
<td>1965</td>
<td>79,301,951</td>
</tr>
<tr>
<td>1957</td>
<td>34,007,694</td>
<td>1966</td>
<td>85,894,600</td>
</tr>
<tr>
<td>1958</td>
<td>38,252,455</td>
<td>1967</td>
<td>86,143,303</td>
</tr>
<tr>
<td>1959</td>
<td>40,973,781</td>
<td>1968</td>
<td>89,133,832</td>
</tr>
<tr>
<td>1960</td>
<td>46,858,754</td>
<td>1969</td>
<td>89,902,319</td>
</tr>
</tbody>
</table>


In seeking to implement sustained-yield management in the province, the government was confronted with the fact that important timber lands lay, for the time being at least, beyond the scope of its authority. From 1941 to 1949, some 36% of the province's timber scale came from Crown-granted lands and another 35% from long-term leaseholds. It was
this condition, no doubt which prompted Commissioner Sloan to comment that

... 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. ... 7

The vehicle for co-operation was the Forest Management Licence. Under the policy in respect to this tenure, the holder of the licence would be granted a considerable amount of Crown timber on a long-term basis in return for which the licensee would contribute his freehold and leasehold lands lying within the area. 8 The entire region was to be managed under a sustained-yield program. 9

The aims of the Forest Management Licence, however, went considerably beyond that involved in bringing private lands under sustained-yield management, although this was the major consideration involved. 10 The Forest Management Licence was in fact a tool for promoting a number of broader though still closely-related objectives. The bias towards the conversion sector is apparent in the granting of licences to "... support a mill of proved value to the community," 11 which Sloan states is the second basic reason for granting a Forest Management Licence. The nature of this objective, as well as the trade-off involved in the issue of these tenures was mentioned explicitly in 1959 by the Deputy Minister of Forests for British Columbia. "The basic philosophy behind
the tree farm licences\textsuperscript{12} is to provide industry with the opportunity to operate a long-term forestry tenure and benefit from long-term financing and integration, in return for the establishing of sustained-yield harvesting techniques.\textsuperscript{13} Although specific rules for the granting of these licences were never set out\textsuperscript{14} the inclination has always been towards the larger industry units.

In award of management licences, first priority must be given therefore, in my opinion, to the pulp and paper industries and other large conversion units, especially the great integrated organizations, because of their relative stability, the enormous investment required for their establishment, their continuous prosecution of research and development of new and better uses for wood, their ability to offer continuous, profitable employment, the support of communities and their direct and indirect contributions to the Provincial taxation structure.\textsuperscript{15}

In similar cognizance of the role of these companies in the provincial and regional economies, the Commissioner said "In a different category are the great mills planned for continuous improvement and periodic replacement of obsolete units. Upon their production depend thousands of employees and the communities in which they live. It is an essential of our economy that these plants be assured of their raw-material supply indefinitely."\textsuperscript{16} The impact of these latter objectives has been particularly important in the interior were long-term alienations played a much lesser role than on the coast.

A further objective of the Forest Management Licence was to shift the burden of sustained yield management on the crown lands involved to the private sector, and licencees are
fully responsible for these matters on the areas concerned. According to the Deputy Minister of Lands and Forests in 1956 the standards of forest management as practiced on Forest Management Licences were far higher than those that could be maintained by the provincial government on lands for which it was responsible.

The Forest Act was amended in 1947 to allow for the issuance of Forest Management Licences, and although their term is only 21 years, some sources have stated that they are a form of "perpetual tenure." In any event, the impact of the 'private sustained-yield unit' has been very great indeed. In 1969, almost 10 million acres were managed under this form of tenure and the cut from them in this year totalled almost 3 billion f.b.m.

Starting in 1953 and with the approval of Tree Farm Licence No. 14, a "thirty per cent clause" was inserted in all contracts. Under the terms of this clause the licensee is required to subcontract harvesting activity at a minimum level of 30% of the allowable cut on Crown lands not held under other tenure included in the area under licence.

The one other form of tenure which was being issued at this time, and had in fact been in continuous use for the disposal of Crown timber since 1912 was the Timber Sale Licence. Control over these tenures was maintained at all times, since the normal term was usually quite short, 1 to 3 years, although terms of 5 to 20 years are allowed in some cases. While the initial aim of the shorter term of these temporary tenures
was undoubtedly to prevent timber speculation in timber sales, its real value in 1945 was the control it gave the government over the amount of cutting activity to be carried out in each region.

By 1949, too, the industry was coming to rely more heavily upon formerly unalienated Crown timber to supply its needs and although fully 66% of the cut in that year originated on lands then lying outside provincial control, the 34% of the provincial scale from Timber Sales\(^ {26} \) did provide a degree of control. Twenty-five years earlier in 1924 the cut from Timber Sales was only 12% of the total scale. Not only did the growing province-wide dependence on Timber Sales augur favourably for government control, but the high degree of dependence of the interior industry on this timber\(^ {27} \) meant that this growth would be particularly rapid in view of the post-war forest industry expansion there.

To implement sustained-yield cutting programs on the Crown-owned timber crop, then, was comparatively simple. The means, the Timber Sale, was ready at hand. The framework for sustained-yield was provided by the Public Working Circle or as it later came to be called, the Public Sustained-Yield Unit.

Public working circles are in many cases direct descendants of forest reserves set up by the Federal Government in the Railway Belt as early as 1912 and 1913 and by the Provincial Government in the 1930's and 1940's.\(^ {28} \) Control
of the volume of cutting activity allowed was started in some circles as early as 1951, and by 1953, 24 Public Working Circles covering 5,649,162 acres had been established. By 1968, 77 Public Sustained-Yield Units had been established, and a total of 78,545,907 acres brought under public sustained-yield management.

While the primary aim of Public Working Circles was to bring Crown-owned timber into a program of sustained-yield cutting on a regional basis, it accorded also a measure of recognition to the smaller operators in the forest industry by providing them with a source of timber. Sloan mentions this intent on several occasions, and according to the Deputy Minister of Lands and Forests:

Something had to be done to give him an opportunity to continue operating . . . . Sustained-yield units make it possible for the smaller operator and the dependent local economy to benefit from a sustained-yield operation without requiring heavy capital investment.

The yield from Public Sustained-Yield Units is thus sold by the Crown through the medium of the Timber Sale, parcels of timber being "put up" by the applicant and sold at public auction or by sealed tender to him or to any other interested party who wishes to bid on the sale. In order to prevent the development of speculation in timber purchased through this medium, it was provided that the annual cut from a sale should not deviate more than 50% either way from the average annual volume purchased, and further, the licence
was subject to cancellation if after 5 years the aggregate cut was less than 70% of five times the average annual volume. 34

These regulations alone were not effective however, and at a very early stage in the history of Public Sustained-Yield Units certain complications arose in the disposal of timber which caused the government and many operators a great deal of concern. The complications arose from "blackmail" bidding, 35 a process which in essence amounted to speculation in Timber Sales.

In the face of often keen competition for Timber Sales, particularly the ones involving a large volume, and with the total amount to be sold in each region fixed by considerations of a silvicultural nature, the government instituted regulations designed to protect the logging operators established in the unit. On the surface at least these regulations—non-refundable bidding fees, special bidding rights for the established operator who "put up" the sale 36—do not eliminate competition. The net effect however is that established operators in a unit are given a great deal of effective protection from other bidders on timber in their region, and their "quota" status in effect becomes a privileged and valuable position, 37 not unlike the holder of a Tree Farm Licence who faces no competition on disposals of Crown timber in his licence area.
Utilization Regulations

The growth of sustained-yield management in the province has been followed by the gradual imposition of standards of utilization to be applied in the harvesting of the resource. The philosophy behind this process is simple, and it is designed to increase the wood yield from the resource without increasing the rate of cutting beyond its sustained-yield capacity. The rationale leading to increased stress on fuller resource utilization was expressed by the Minister of Lands and Forests in 1965.

What is the smallwood policy of the government? The answer is simple. It is waste not, want not. It is put to the best and most economic use every stick of wood that grows! 38

This policy, like sustained-yield, has represented a drastic change in conditions surrounding the harvesting of Crown timber. While sustained-yield eliminated a certain amount of areal high-grading, the introduction of utilization standards was the beginning of the end for grade and species high grading of the stands being operated.

The Forest Service has, since its inception, always had a standard of utilization to which industry was supposed to comply, however, it was not until 1940 that these standards were enforced to any extent. Industry viewed them as a guide line -- a lead factor and did not expect to follow them. 39

Table XIV following details current standards.
TABLE XIV
BRITISH COLUMBIA. LOGGING UTILIZATION STANDARDS

<table>
<thead>
<tr>
<th></th>
<th>Rough</th>
<th>Intermediate</th>
<th>Close</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stump height</td>
<td>24&quot;</td>
<td>18&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>Min d.b.h.</td>
<td>13&quot;+</td>
<td>13.1&quot;</td>
<td>9.1&quot; Coast</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.1&quot; Interior</td>
</tr>
<tr>
<td>Min top. diam.</td>
<td>12&quot;</td>
<td>8&quot;</td>
<td>6&quot; Currently</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4&quot; Ultimately</td>
</tr>
</tbody>
</table>

Source: Jones, op. cit., p. 115.

The year 1962 marked the transition in utilization standards in the province, though of course the change was a gradual process extending over some years. There has been a considerable lag between adoption in the interior and on the coast, and in 1962 interior logging generally had made the transition to its much higher standard of intermediate utilization while coast operators were only beginning to log to rough utilization standards. By 1967, large numbers of interior operators were logging to close utilization standards, while on the coast "... smallwood logging [was] concentrated largely on Vancouver Island, pioneered by several major forest firms," and generally practised only by them.

Close utilization regulations were not introduced until 1966, and up to 1971 their adoption by the industry has only been at the option of the individual operator.
Occasionally however, the government has hinted that close utilization may be made compulsory on all operations.\(^{43}\) Towards those logging to close utilization already the posture of the Forest Service is a fairly liberal one, but this too will change shortly.

For the present at least, the forest service attitude to waste on close utilization areas is one of leniency. In most cases penalties take the form of a deduction from the allowable cut \(\ldots\). Inspection procedures and a method of measuring waste are now being developed by the forest service.\(^{44}\)

The ultimate imposition of close utilization is inevitable, and some evidence indicates that these standards will be made compulsory on January 1, 1979.\(^{45}\) Too, the stumpage allowance concession of 55¢/100 cubic feet on close utilization material removed is effective only until December 31, 1978.\(^{46}\)

An aspect of harvesting regulations closely related to both sustained-yield and close utilization is found in the Forest Service policy in respect to the larger volume and longer-term sales. Rather than including just the best and most accessible timber in a given area, an application for a Timber Sale must "\ldots include the entire merchantable volume in the logging chance."\(^{47}\)

Including all the timber in the entire watershed ensures complete utilization and permits an economical logging operation of the less accessible with the more accessible stands and the lower quality timber with the higher quality. It forestalls high grading. \(\ldots\) \(^{48}\)
Other Tenures

Through the medium of Timber Sales and Tree Farm Licences the government controls the standard of utilization to be practiced on Crown lands, and ultimately close utilization will be imposed on the entire industry. In the meantime, the issuance of several new tenures is contingent upon compliance by the holder with rather stringent utilization regulations. These tenures include the Timber Sale Harvesting Licence, the Pulp Harvesting Area, and closely related, the award of additional cutting rights on the volumes involved in changing from intermediate utilization to close utilization. In the case of the Pulp Harvesting Area the government is able to take advantage of industry needs for a pulp timber supply to support what is in all cases an extremely large capital investment, and in the case of the award of close utilization volumes the gain in wood supply is similarly a great incentive for an industry which no longer has any alternative to Crown timber.

The Timber Sale Harvesting Licence is a recent variation of the Timber Sale Licence and incorporates a number of very important changes. Introduced in 1968, it allows the consolidation of scattered quota holdings in one area, thus providing scope for considerable advantage in organizing and conducting harvesting operations. These benefits are offset to a degree in that the timber limits must be logged to close utilization standards either immediately or in the
very near future. Operators are also charged with a higher proportion of the forest management responsibility than is the case on the Timber Sale, and this includes reforestation and planning as well as "general unit management." Some 39 Timber Sale Harvesting Licences were issued in 1968.

The Pulp Harvesting Area concept was "... designed to superimpose a pulpmill economy over an existing sawmill economy in certain of our Public Sustained Yield Units." Pulp Harvesting Areas are granted only in Interior districts and for purposes of harvesting only that proportion of timber below sawtimber size (i.e. from 11.1" d.b.h. to 7.1" d.b.h.). They may be granted in Public Sustained-Yield Units where established operators may or may not have cutting rights, although the present status of these established operators in respect to these rights is not impaired. Again, the tenure must be operated to close utilization standards.

As was mentioned at an earlier point in this paper (pages 21, 22) the wood yield from the forest is greatly increased upon the adoption of a higher standard of utilization. This is brought about because more wood will be harvested from existing stands, because more marginal stands will now be harvested, and because the rotation cycle is reduced as the average age to commercial maturity is decreased. While the additional volumes to be gained vary a great deal from one locale to another over the whole province "... about a 33 per cent average increase in merchantable volume. ..." will result from the application of close utilization standards.
The Prince George District increase is of the order of 46% on the basis of forest inventory statistics.

As an incentive towards the implementation of close utilization harvesting standards the government is prepared to increase the quota of the licensee by 15 to 20% when the changeover is made. In reality, this amounts to an increase in the volume of timber available to the quota holder on a permanent basis, or alternatively to the granting of additional Timber Sales to the operator. Not all the wood volume gained through close utilization is to be awarded in this manner however, and the remaining 10 to 25% of the gain is to be awarded on an annual basis only and subject to satisfactory logging performance. In either case, additional cutting rights are granted only when the licensee agrees to implement the highest standard of utilization. In addition, all applicants for a Timber Sale to be cut to close utilization standards must produce "... sufficient proof of a contract for chip or roundwood sales to a pulpmill. . . ."

Similarly, holders of current Timber Sales must have a contract for either smallwood or chips before they may be allowed the quota increase attached to the changeover to close utilization.
CHAPTER IV

TIMBER CONTROL SINCE 1945

Introduction

The forest industry of this province has grown tremendously in the twenty-five years that have elapsed since the end of World War II. Traditional markets have strengthened greatly in many cases, the competitive position of British Columbia producers has been maintained, and a number of new and growing markets have been successfully cultivated.

The growth in the production of a number of key commodities has been great, and of these products lumber, pulp, and paper will serve as ample evidence of this.

TABLE XV

LUMBER, PULP, AND PAPER PRODUCTION IN BRITISH COLUMBIA. SELECTED YEARS
1950-1969

<table>
<thead>
<tr>
<th>Lumber (millions of f.b.m.)</th>
<th>Pulp (thousands of tons)</th>
<th>Paper (thousands of tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>3,509</td>
<td>777</td>
</tr>
<tr>
<td>1955</td>
<td>4,914</td>
<td>1,364</td>
</tr>
<tr>
<td>1960</td>
<td>5,305</td>
<td>2,125</td>
</tr>
<tr>
<td>1965</td>
<td>7,449</td>
<td>3,262</td>
</tr>
<tr>
<td>1969</td>
<td>7,760</td>
<td>4,850</td>
</tr>
</tbody>
</table>


The demand for wood fiber has risen commensurately, and the growth of the provincial log scale is equally remarkable.

**TABLE XVI**

**BRITISH COLUMBIA TIMBER SCALE, SELECTED YEARS**

*1945-1969 (in billions of b.f.)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945</td>
<td>3.081</td>
</tr>
<tr>
<td>1950</td>
<td>4.560</td>
</tr>
<tr>
<td>1955</td>
<td>6.109</td>
</tr>
<tr>
<td>1960</td>
<td>7.074</td>
</tr>
<tr>
<td>1965</td>
<td>9.198</td>
</tr>
<tr>
<td>1969</td>
<td>10.980</td>
</tr>
</tbody>
</table>


Greenbook, op. cit., p. 56.

One billion equals one thousand million.

Conversion factor cu. ft. to f.b.m. = 6.

As was brought out at the end of Chapter II on the forest resource, provincial reserves of wood fibre are not limitless, and a long history of industry dependence on them has necessarily resulted in a certain amount of exhaustion. A crop of mature timber cannot be produced in British Columbia in even a few decades. Operating alone, however, this factor cannot of itself create more than local resource scarcities for the total resources are immense and can inherently support still further great expansions of harvest-
ing activity. The key factor in the provincial resource situation has of course been the introduction of sustained-yield forest management. Introduction of this policy at a time when industry demands on the resource were already large and growing rapidly has meant that the ultimate base to sustain expansion has been comparatively obvious. This limit is set by the actual capacity of the resource and by Forest Service estimates of the annual cut which can be sustained by its ability to grow wood volumes.

The growing demand for logs has meant that the industry's need for Crown timber has grown greatly, for the pre-1945 tenures, while still economically very viable could not support the tremendous expansion which has taken place. As mentioned earlier, this has been particularly true in the interior. In addition, the remarkable number of improvements in logging and milling technology have greatly broadened the industry's ability to profitably harvest and convert a wide variety of species and log grades. The great post-1950 expansion of sulphate pulp capacity is especially relevant in this context.

The rapid increase in the cut from Crown lands is outlined in Table XVII following. On the basis of the district figures detailed, the expansion in the cut from Crown lands was 342% while a comparable figure for the freehold and leasehold lands is only 12%. In the case of all Tree Farm Licences and interior Timber Sales, the growth of the harvest from Crown lands is still greater.
TABLE XVIII
BRITISH COLUMBIA. TOTAL SCALE OF ALL PRODUCTS IN MILLIONS OF CUBIC FEET, 1949-1969. SELECTED YEARS, FOREST DISTRICTS, AND TENURES


Conversion factor cu. ft. from f.b.m. = 1/6 .

Note: On Tree Farm Licences about 23% of the cut is from lands once held under long-term temporary tenures (sl, p. 21).
Some 95% of all Crown Grant timber was still held outside Tree Farm Licences in 1955 (s27, p. 111).

<table>
<thead>
<tr>
<th>Tenure</th>
<th>Forest District</th>
<th>1949</th>
<th>1961</th>
<th>1969</th>
<th>Absolute increase 1949/69</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber Sale</td>
<td>Vancouver</td>
<td>109</td>
<td>189</td>
<td>181</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Prince George</td>
<td>38</td>
<td>126</td>
<td>278</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Kamloops</td>
<td>33</td>
<td>157</td>
<td>177</td>
<td>144</td>
</tr>
<tr>
<td>Tree Farm Licence</td>
<td>Vancouver</td>
<td>-</td>
<td>66</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>Prince George</td>
<td>-</td>
<td>8</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Kamloops</td>
<td>-</td>
<td>9</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Crown Grants &amp; Federal Lands</td>
<td>Vancouver</td>
<td>195</td>
<td>140</td>
<td>236</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Prince George</td>
<td>4</td>
<td>8</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Kamloops</td>
<td>12</td>
<td>31</td>
<td>46</td>
<td>34</td>
</tr>
<tr>
<td>Timber Sale</td>
<td>Vancouver</td>
<td>105</td>
<td>121</td>
<td>141</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Prince George</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Kamloops</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

The reaction of the industry to this forthcoming ultimate restraint on the volumes of wood fiber which may be harvested has been for the individual firms to take up timber positions by whatever means was most appropriate. Virtually the entire future resource base was in fact open for bids, and the timber position established at this time would play a large role in
determining the ultimate limits of expansion of the individual firms, and very directly through this mechanism, their future viability. The taking of timber positions has been a widespread process, and not all firms have been as successful as they might have wished. It is in this context of timber positions that post-1945 government forest management has been of greatest import for industry structure.

Since 1945 there have been two possible avenues whereby a firm could increase its timber position. The first and most direct is to purchase the timber directly from the government under one form of tenure or another. The second is to purchase the timber tenure from another company. The adoption of close-utilization harvesting standards represents yet another method of increasing the firms timber position, though this alternative is largely an adjunct to the previous two methods. Both major avenues have been pursued with considerable enthusiasm since the late 1940's, and while close-utilization was of generally later prominence, it had become of major importance in the interior by the mid and late 1960's.

Tree Farm Licences

The criteria used by the government in the approval of applications for Tree Farm Licences have already been discussed in the preceding section. Quite simply they are the bringing of private lands under sustained-yield management,
the support of large mills, and the encouragement of private forestry. Large conversion plants have been heavily favoured in the award of these licences, for all need the wood volumes to support their investment, all have the capacity to support a private forest management program, and many have substantial holdings of both freehold and leasehold timber.

Although the Act does not require it, most licences that have been given to owners of manufacturing plants in support of their existing mills, or of proposed expansion in conversion facilities . . . or of new construction to improve integration by manufacture of another product . . . Three licences have been awarded to logging companies which do not supply the open market but were already, or shortly became, owned by, affiliated with, or contractors for manufacturing companies. 1

The extent of timber control by the seven largest forest products companies is readily apparent from the following table.

Several changes have taken place since 1961, including the approval of Tree Farm Licence No. 41 to Eurocan Pulp and Paper Company Ltd. in 1966 (473,077 acres of Crown land), and an extension (363,925 acres of Crown land) to Tree Farm Licence No. 19, also in 1966. 2

Allowable cuts have been revised upwards as licensees have managed these holdings to close-utilization standards, 3 and this mechanism has been freely used by them to gain additional wood volumes. In 1966, 6 licences were so managed, while by 1969 25 licences were being logged to these standards. 4
## TABLE XVIII

**TREE FARM LICENCES AND ALLOWABLE CUTS:**

**1961. COAST FOREST DISTRICTS ONLY**

<table>
<thead>
<tr>
<th>Company</th>
<th>Allowable Cut</th>
<th>Millions f.b.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacMillan Bloedel Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alberni</td>
<td>223.3</td>
<td></td>
</tr>
<tr>
<td>Tofino</td>
<td>123.3</td>
<td></td>
</tr>
<tr>
<td>Salmon River</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>&quot;Reserve&quot;</td>
<td>240.0*</td>
<td>646.6</td>
</tr>
<tr>
<td>Rayonier Canada Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quatsino</td>
<td>108.0</td>
<td></td>
</tr>
<tr>
<td>Naka</td>
<td>86.0</td>
<td></td>
</tr>
<tr>
<td>Moresby Island</td>
<td>47.0</td>
<td>241.0</td>
</tr>
<tr>
<td>Columbia Cellulose Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Edward</td>
<td>132.0</td>
<td></td>
</tr>
<tr>
<td>Canadian Forest Products Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nimpkish</td>
<td>122.4</td>
<td></td>
</tr>
<tr>
<td>B.C. Forest Products Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maquinna</td>
<td>96.0</td>
<td></td>
</tr>
<tr>
<td>Crown Zellerbach Canada Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elk Falls</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>Tahsis Company Ltd.</td>
<td></td>
<td>74.0</td>
</tr>
<tr>
<td>Seven other companies</td>
<td></td>
<td>66.6</td>
</tr>
<tr>
<td>Total allowable cuts</td>
<td></td>
<td>1,468.6</td>
</tr>
<tr>
<td>Total acreage (1963)</td>
<td></td>
<td>9,189,308</td>
</tr>
</tbody>
</table>

*Estimated by reliable sources.

By 1967 the acreage held under Tree Farm Licence had been increased to 22,019,142$^5$ and the allowable annual cut had been increased by this mechanism and by conversion to close-utilization to 3.2595 billion f.b.m. by 1969.$^6$

Of the holders of freehold and leasehold timber, Sloan said in 1945 that "... 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. ... It seems to me that the only practical solution to this problem lies in the allocation of Crown timber."$^7$

There was therefore considerable opportunity for holders of freehold and leasehold lands to augment their holdings by the addition of Crown lands, and further, to make permanent their control over leasehold lands.

There is considerable evidence to support the view that both these objectives were achieved on the coast. In coast Forest Districts some 500,682 acres held under Timber Licences and 253,322 acres of Crown Grant timber lands were contributed by the licensees, and with the addition of 1,250,435 acres of Crown lands they made up the total area held under the Tree Farm Licence.$^8$

The interior industry, however, presents evidence that leverage of this nature was not used, and here the principal assets used to secure a licence were either substantial manufacturing facilities or in the case of Celgar,
the capital to construct and operate them. According to the Forest Act it is not essential that applicants own any timber prior to the time of their application, and many licences have in fact been granted to those with no private timber holdings. In the interior, the Crown contribution totalled 2,567,001 acres while licenssee holdings, both leasehold and freehold amounted to only 32,552 acres. Of all interior licences granted to 1956 the Crown timber contribution was in excess of 99% by area. Two licences were granted to Celgar and both were very large, each exceeding 700,000 acres.

Public Sustained-Yield Units

When these regulated cutting areas were first set up in the early 1950's and in all subsequent cases where they have been set up, the Forest Service establishes an allowable cut for the entire unit. The approved cut as indicated by the Timber Sales issued may not exceed this figure, and it was thus apparent at an early date that unless a company became an "established operator" it would never have any subsequent rights to bid on timber in that unit.

In the early years of Public Sustained-Yield Units the competition for some timber sales awarded was especially keen, no doubt in reflection of the situation. This development was most noticeable in the Vancouver Forest District, where raw material supply shortages were most acute because
of heavy past utilization and the continued concentration of
plants in the lower mainland. This may be seen in the
following table.

**TABEL XIX**

**COMPETITION FOR TIMBER SALES AWARDED, VANCOUVER FOREST DISTRICT, 1953-1956 and 1961-1964**

<table>
<thead>
<tr>
<th>Year</th>
<th>No Competition</th>
<th>Less than 2x Stumpage</th>
<th>More than 2x Stumpage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>%</td>
<td>Volume</td>
</tr>
<tr>
<td>1953</td>
<td>141</td>
<td>98</td>
<td>3</td>
</tr>
<tr>
<td>1954</td>
<td>149</td>
<td>80</td>
<td>31</td>
</tr>
<tr>
<td>1955</td>
<td>139</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>1956</td>
<td>174</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>1961</td>
<td>158</td>
<td>88</td>
<td>18</td>
</tr>
<tr>
<td>1962</td>
<td>114</td>
<td>81</td>
<td>17</td>
</tr>
<tr>
<td>1963</td>
<td>138</td>
<td>88</td>
<td>18</td>
</tr>
<tr>
<td>1964</td>
<td>157</td>
<td>74</td>
<td>51</td>
</tr>
</tbody>
</table>


It is surprising in the light of known and foreseen timber shortages in the area, that even more sales were not contested. However, competitive bidding was obviously a factor in a fair number of cases, and in this connection it must be borne in mind that most sales have a term of more than one year, particularly the larger ones. With quota protection
for established operators, too, all subsequent sales to these licencees would not likely be contested, and the number of uncontested sales would increase annually. Competition would be maintained of course on Timber Sales in new Public Sustained-Yield Units as they were established by the forest service.

Opportunities for the taking of timber positions by this mechanism disappeared very rapidly. By 1960 "The seventy-two public sustained-yield units in the Province actually recorded a cut of 385,000 M cubic feet during the year, which represents 83 per cent of their combined allowable annual cut. . . ." Though substantial areas of timber were still uncommitted, many were very likely difficult of access and far from existing operations and mills.

The only alternative method of acquiring cutting rights in a Public Sustained-Yield Unit is to purchase quota from those operators already established. It should be noted that although quota has no legal status and is not recognized by the Forest Act, it is nevertheless a commodity, and has a very real value in exchange. Fundamentally, its value derives from the protected position of operators established in Public Sustained Yield Units, and of course the demand for timber in the area concerned.

The price for quota has been cited variously as $10 per m.f.b.m. per year on "up coast" quota, through $50, $70, $100, and up as high as $200 in some cases.
Many sources have commented on the widespread nature of this process, including the Truck Loggers Association, the Provincial Government, and several industry executives. In 1965 the chairman of the British Columbia Legislature's forestry committee "... expressed concern that large companies are buying out smaller quota holders ...". In 1964 some 247 new quota holders were established in the province, but 365 were cancelled out--mostly by purchases--

In recent years the concentration of the quota has been quite marked in several regions. In the Prince George Forest District, for example, the number of licensees in Public Sustained-Yield Units fell from 196 to 116 from 1961 to 1966. In the Moberly Public Sustained-Yield Unit the number of licensees fell from 24 to 2 over this period, and in the Willow River Public Sustained-Yield Unit the decline was from 24 to 14. In the Vancouver Forest District the declines were as follows:

<table>
<thead>
<tr>
<th>TABLE XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>VANCOUVER FOREST DISTRICT. ESTABLISHED LICENSEES IN PUBLIC SUSTAINED-YIELD UNITS. 1966-1970</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Dec. 31/66</th>
<th>Dec. 31/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dewdney</td>
<td>47</td>
<td>32</td>
</tr>
<tr>
<td>Kingcome</td>
<td>73</td>
<td>36</td>
</tr>
<tr>
<td>Nootka</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>Quadra</td>
<td>168</td>
<td>85</td>
</tr>
<tr>
<td>Soo</td>
<td>43</td>
<td>25</td>
</tr>
<tr>
<td>Vancouver</td>
<td>72</td>
<td>28</td>
</tr>
<tr>
<td>Totals</td>
<td>428</td>
<td>217</td>
</tr>
</tbody>
</table>

Source: British Columbia Forest Service, Vancouver.
The market for quotas is obviously very active. According to some sources, there is a very high concentration of control in the hands of a few companies, with a single interest often controlling the entire cut from a unit in the Dewdney Public Sustained-Yield Unit, for instance, 11 licensees control 28,260 m.c.f. or 95% of a licensee's total cut of 29,804 m.c.f. In the whole Vancouver Forest District, 89 quotas or 41% of the number in 1970 are for less than 100 m.c.f.

A form of control over cutting rights arises from a hybrid situation involving contract logging and the purchase of quota from established operators in a unit. Through various mechanisms, including financing, a mill acquires the production which a logger derives from his own quota. Although the extent of this use of "tied loggers" as a means to acquiring quota cannot be documented in great detail, there is little doubt that it is an extremely common practice. According to one source "Quota is the main reason why buyers finance loggers," and according to another, it is, however, I think, well established in the evidence that even now [1956] when timber sales are open to everyone a greater part of the cut from public working circles and unmanaged Crown land is in fact allocated to various conversion units through the medium of tied loggers operating thereon.

In 1956 at least two major companies each had 21 tied loggers operating in Public Sustained-Yield Units.
The trends in timber consolidation in Public Sustained-Yield Units have now been discussed, as have the various means by which this process has been effected. It now remains to outline the type of entity which was generally successful in securing control, and further, its basic reason for doing so.

By and large, the control of timber cutting rights in Public Sustained-Yield Units has passed into the hands of conversion units. Most are sawmills, but in the case of the larger companies, plywood and pulp mills also are included in their manufacturing structure. In 1955, for example, one major company drew almost 150 million f.b.m. or 45.1% of its log supply directly from company Timber Sales in Public Sustained-Yield Units. According to several industry sources many of the larger sawmills have quota equivalent to 70 to 100% of their log needs, and in many cases this means that their quota exceeds 40 million f.b.m. annually. Table XXI below details some of these developments.

**TABLE XXI**

SELECTED ESTABLISHED LICENSEES, KINGCOME AND VANCOUVER PUBLIC SUSTAINED-YIELD UNITS. JAN. 15/71

<table>
<thead>
<tr>
<th>Licensee</th>
<th>Approved Annual Allowable Cut-Not Including Close-Utilization Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay Forest Products Ltd.</td>
<td>6,152</td>
</tr>
<tr>
<td>B.C. Forest Products Ltd.</td>
<td>2,134</td>
</tr>
<tr>
<td>B.C. Forest Products Ltd. &amp; Northern Cedar Co. Ltd.</td>
<td>1,604</td>
</tr>
<tr>
<td>Canadian Forest Products</td>
<td>1,169</td>
</tr>
<tr>
<td>Crown Zellerbach Canada Ltd.</td>
<td>1,087</td>
</tr>
</tbody>
</table>
Licensee Approved Annual Allowable Cut-
Not Including Close-Utilization Volumes

McMahon Lumber Co. Ltd.  
MacMillan Bloedel Ltd.  2,542  
MacMillan Bloedel Ltd. &  
Northwest Cedar Products Ltd.  487  
McDonald Cedar Products Ltd.  4,311  
Nalos Lumber Ltd.  1,189  
Rayonier Canada (B.C.) Ltd.  1,320  
Richmond Plywood Corp.  300  
Watkins Sawmills Ltd.  137  
Weldwood of Canada Ltd.  5,400  
Whonnock Lumber Co. Ltd.  1,697  

Total 30,008

Licensees total annual allowable cut 37,127

Source: British Columbia Forest Service, Vancouver, Jan. 15/71. Mimeographed list of established licensees, Vancouver Forest District.

Thus on the basis of these figures, manufacturing firms control almost 81% of the cut in these two units. This figure of course does not include the quota held by tied loggers.

The most conclusive evidence to this effect however, is found in the decline of the open market, which at present handles only some 5% of total coast log production, the remaining 95% being produced on timber which is either mill-owned, or mill-controlled. It is important to remember too that the Vancouver log market is the only functioning open log market in the province, and that in all interior regions the mills have always been the major timber owners.
The fundamental reason for conversion plant involvement in Public Sustained-Yield Unit timber is the same as for their concern with Tree Farm Licences—to support present and future manufacturing operations. Of all inputs, capital and operating, timber is the only one which can be neither manufactured nor augmented in the intermediate or long term. The supply is limited, and unless mills have taken steps to ensure that they control their future supply, then they risk the elimination of the firm as a viable enterprise. Open competition does not occur between mills on mill-owned timber, and few mills have been slow to rate a timber position. Those who have not, for whatever reason, "... face a rather difficult future." Difficulties in respect to timber positions are reflected in the posture of financial institutions generally in respect to mill borrowing for modernization, expansion, or new smallwood processing facilities. Most are reluctant to lend to sawmills not backed by a timber position adequate to ensure full-capacity operation for the life of the new investment. Quota, too, has an intrinsic value in its own right, and "Today, quota adds value to the sawmill and it may be worth more than the replacement value of the sawmill itself." From the point of view of the mill, there are many specific aspects of their log supply other than the matter of security of needed volumes. All pertain directly to the logging phases of industry activity. Firstly, the nature
of the alienations secured has enormous impact upon the
species flow to the mill and upon the grades of log available
to it. Too, the problems of accessibility are still impor-
tant, especially on the coast, and this consideration is
directly involved with the cost of logs to the mill. Any
efficiencies of scale to be achieved by large-scale logging
operations must be supported by timber alienations of a size
commensurate with them and of sufficient reliability to
provide security for the larger investment. The locations of
the various timber holdings plays a major role in the timing
of log flows to the mill, and a great deal of flexibility can
be achieved in this way.

Once quota has been acquired by the individual firm,
then it can participate in the increased volumes awarded
on the sale areas being operated when close-utilization is
adopted. While the volume gained is highly variable,
available evidence indicates that even on the coast the
increment is substantial on most stands. This is outlined
in the following table.

<table>
<thead>
<tr>
<th>Company</th>
<th>P.S.Y.U.</th>
<th>Annual Allowable Cut</th>
<th>C.U. Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.C. Forest Products</td>
<td>Nootka</td>
<td>1,928</td>
<td>526</td>
</tr>
<tr>
<td>Tahsis Co. Ltd.</td>
<td>Nootka</td>
<td>10,930</td>
<td>3,643</td>
</tr>
<tr>
<td>Vancouver Island</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest Industries Ltd.</td>
<td>Nootka</td>
<td>2,046</td>
<td>682</td>
</tr>
<tr>
<td>Canfor Ltd.</td>
<td>Soo</td>
<td>1,355</td>
<td>452</td>
</tr>
<tr>
<td>Scott Paper Ltd.</td>
<td>Soo</td>
<td>750</td>
<td>250</td>
</tr>
</tbody>
</table>
While adoption on the coast is limited to a few operators, interior companies generally have been quick to take advantage of the increased quota available. As early as 1966, the Minister of Lands and Forests found occasion to caution interior mills that they should consider how much smallwood was available before increasing their manufacturing capacity, and in 1969 "... in some sustained-yield units ... the full allowable cut to close-utilization standards was committed."

It is not known exactly what the Forest Service intends to do with "3rd band" volumes, but it may be that it too will go for the most part to established licensees.

**Pulp Harvesting Areas**

As might be expected, the cutting rights in these areas are granted to pulp mills. In many cases these rights are sought and secured by the producers before mill construction is started, and in many cases the "... timber resources currently [1965] being granted to pulp companies in central B.C. could support pulp mills two or three times the designated capacity." As of 1965, there were 18 mills either under construction or being proposed; ten of these had been granted timber rights in support of their manufacturing facilities.
Since most of these mills are very large, the pulp harvesting rights are also very substantial. Some are detailed in Table XXIII as follows:

**TABLE XXIII**

**BRITISH COLUMBIA. SELECTED PULP HARVESTING AREAS AWARDED. 1965**

<table>
<thead>
<tr>
<th>Company</th>
<th>Annual quota MM.c.f.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandra Forest Industries Ltd.</td>
<td>60</td>
</tr>
<tr>
<td>Bulkeley Valley Pulp &amp; Timber Co. Ltd.</td>
<td>&gt;60 (est)</td>
</tr>
<tr>
<td>Northwood Pulp Ltd.</td>
<td>&gt;60 (est)</td>
</tr>
<tr>
<td>Prince George Pulp &amp; Paper Ltd.</td>
<td>&gt;70 (est)</td>
</tr>
</tbody>
</table>

Source: *The Pulp and Paper Industry... op. cit.*, p. 34, 37.

**Other Tenures**

Many of the pre-1907 tenures have remained operative through all these changes and renewed activity in the timber field in the 1950's and 1960's, although of course their role has been diminished by use of their timber resources and overshadowed by many of the newer tenures.

Crown-granted lands are still held in perpetuity.

"He (Williston) also rejected a... proposal that land grants made in the 19th century should be reviewed to provide some return to the people. Williston said that as far as
this government is concerned, no firm contracts and binding agreements, no matter when they were made, will be violated.\textsuperscript{41}

In 1955, some 95% of all Crown-granted acreage was still held in its original status and was not incorporated in Tree Farm Licences.\textsuperscript{42}

The 1967 status of these alienations and of leasehold lands is summarized in the following table.

\textbf{Summary}

\begin{table}
\centering
\begin{tabular}{|l|c|c|c|}
\hline
Tenure & Coast & Interior & Province \\
\hline
Approved sustained-yield units & 507,254 & 1,467,217 & 1,974,471 \\
(includes Pulp Harvesting Area rights) &  &  & \\
\hline
Proposed sustained-yield units & - & 382,450 & 382,450 \\
\hline
Tree Farm Licences (excluding incorporated Crown grants, including incorporated temporary tenures) & 505,293 & 120,892 & 626,185 \\
\hline
Temporary Tenures (excluding Timber Sales and those included in Tree Farm Licences) & 63,794 & 13,209 & 77,003 \\
\hline
Crown Grants & 134,777 & 75,550 & 210,327 \\
\hline
Other tenures & 19,480 & 76,281 & 95,761 \\
\hline
\textbf{Totals} & 1,230,598 & 2,135,599 & 3,366,197 \\
\hline
\end{tabular}
\caption{BRITISH COLUMBIA. TENURE STATISTICS, 1967
\(\text{Possible allowable cut to close-utilization standards in M.c.f.}\)}
\end{table}

CHAPTER V

FORESTRY SINCE 1945

Sloan said in 1956 that "Sustained-yield forestry as such, and as an industry in its own right has not yet attracted private investment in British Columbia."\(^1\) With a history of less than fifteen years, this aspect of integration is a comparatively recent development in the industry. Its rise has been closely associated with the evolution of the Tree Farm Licence.

The growing of trees as an alternative to purchasing standing timber has been adopted by Tree Farm Licensees on these lands as part of the contractual commitment surrounding these tenures. Licensees are responsible for the protection of the forest from fire, disease, and insects, and are further obliged to reforest logged-over lands.\(^2\) The cost to the licensee for implementing these programs is, however, borne by the government on the Crown timber component of the license through the mechanism of allowing deductions from stumpage appraisals for costs relevant to this activity.\(^3\)

Some industry sources have stated that forestry can be practiced only by the large and integrated firms. "With integration has come the stability that makes long term investment practical and integrated companies in British
Columbia are now investing in long-term forestry practices capable of increasing average annual growth by 30% compared with natural growth. 

The major drawback for the smaller firms, however, is that the government assumes responsibility for management, reforestation, and protection on their tenures and does not in consequence allow the deduction of forestry costs from the appraised stumpage. Secondly, and closely associated with this circumstance is the fact that in Public Sustained-Yield Units there are no holdings large enough or of a long enough term that the holder could practice both sustained-yield cutting and maintain economic harvesting and converting operations.

The cost of forestry is borne not entirely by the government however, for many companies are making an investment in Crown and private lands far in excess of the required level. Basically, these programs as carried out by MacMillan Bloedel, B.C. Forest Products, Tahsis, and others revolve around accelerated reforestation and research into improved forestry practices and superior seedlings for replanting. In the case of a few licences, too, a substantial component of the area is made up of Crown-granted lands. While the practice of forestry on Crown lands does not seem to be inherently beyond the means of many companies in the industry, some sources consider that the practice of intensive forestry at least can be carried on only by the major integrated
companies.

The non-integrated sawmill with a few logging shows is not able to justify the expense of a forest crop that would not be harvested for periods up to 100 years. 5

While it is true that many smaller firms do not have the available capital for many investments that they might make, including this one, the return from intensive forestry is by no means one which takes 100 years to materialize. Intensive forestry, by increasing the timbered acreage and by reducing the growing cycle 6 results in an increase in the annual wood production of the area and a concomitant increase in the sustainable annual cut. In the coastal forest of British Columbia a stand of fir and hemlock adds about 70 cu. ft. of wood per acre per year with no help from man.

Intensive forestry can add another 21 cu. ft. . . . 7

With the introduction of the Timber Sale Harvesting Licence three years ago it would appear that many smaller firms too will become more directly involved with integration into the actual production of timber for their own needs or for the needs of subsequent holders of tenures on the areas involved.
CHAPTER VI

HARVESTING SINCE 1945

Logging has for the most part been a capital-intensive operation since the turn of the century, and the major qualifications to this statement refer to the size of the necessary investment rather than to the essential nature of the technology of logging. The evolution of truck logging for instance was a development in the nature of an opportunity for investment in a smaller scale and more flexible technology rather than any basic change in the capital-intensive nature of logging.

The advance of the technology of harvesting has continued throughout the post-war period, and recent years have again seen a trend towards larger units of capital equipment as increased flexibility and efficiency have been sought.

As in earlier periods the need to achieve greater efficiencies and to improve the flexibility of harvesting systems has been stimulated by and indeed forced upon the industry by conditions intrinsic to the resource base. In the post-war period, too, a much greater urgency has been given to this process of adaptation with the advent of increased government participation in resource management.
In this respect, the implementation of sustained-yield cutting programs and the evolution of utilization regulations have been of primary importance. The logging phase of industry activity finds itself in consequence forced to adapt ever more precisely and rapidly to a changing raw materials base.

The dimensions of this adaptation are wider and deeper than ever before, although the themes are the same as in earlier periods. Access, typically, is still one of the major barriers to exploitation, but now the industry finds itself twenty or more miles from main transport routes rather than four or five, and timber is extracted from as high as 5,000 feet rather than 1,000 feet.\(^1\) Distances to the mill have increased greatly too, and land hauls of 100 miles or more are not uncommon.\(^2\) On the coast, companies such as Crown Zellerbach, Rayonier, and MacMillan Bloedel have for some time been barging large quantities of logs distances in excess of 500 miles from logging sites to conversion plants.\(^3\) On a somewhat smaller scale, many stands once considered marginal because of local access problems are now being operated.

In consequence of this outward and upward spread in logging activity the industry finds itself involved in much higher proportions of some species and much lower proportions of others. Hemlock, Balsam fir, and spruce species are particularly in the ascendency while the proportions of Douglas Fir and Western red cedar in the harvest have declined markedly.\(^4\) Though the major impact of this change has fallen
on conversion plant activity and through this to some extent
upon log prices, the logging phase is most directly affected
by the declining size of logs.

These changes would have come to the industry in any
event, for it has for the most part depleted the best and most
accessible timber. The real urgency and suddeness of change
has been brought about by government action.

Logging on the coast on a small scale is no longer
possible except under exceptional circumstances. The basic
rule of thumb is that the minimum volume required to sustain
a mobile spar is 1 million f.b.m. per month or about 8 million
f.b.m. annually.\textsuperscript{5} in 1955 Sloan estimated that a total
investment of $20 to $30 thousand was required to produce each
million feet of logs,\textsuperscript{6} and on this basis a minimum scale of
operation would be of the order of $175,000 to $250,000. Some
sources have estimated that the current minimal investment
is approximately $500,000,\textsuperscript{7} and on the basis of equipment
costs this would certainly be a more realistic estimate for
1971.\textsuperscript{8}

In addition to the requirements imposed by the resource
base upon which the industry operates, increased efficiency
also can be achieved by raising the capital: labour ratio,
and this too has been a major force in recent years. In 1969,
MacMillan Bloedel reported that "To combat rising costs in
every area of logging, further steps towards mechanization
were taken. . . ."\textsuperscript{9}

Nor is the necessity for capital equipment the only
major investment need in logging. Besides working capital
the cost of access is often extremely high and precedes the cash flow generated by output by as much as two years. In the case of one logging operation on the Homathko River, some 15 miles of road costing $1 million were built before a single log was produced on the operation.\textsuperscript{10} There is little doubt, too, that a complete and well planned road network adds significantly to operating efficiency\textsuperscript{11} but again the capital investment is considerably increased.

The access problem, particularly acute for smaller firms, has been alleviated in some part by the construction of forest access roads by the Forest Service. This program, initiated in 1950, was designed in fact primarily to aid the smaller logging operators.\textsuperscript{12} By 1958 over 200 miles of forest access roads had been constructed, and by 1967 this total had been increased to 918 miles.\textsuperscript{13}

The figure of approximately $500,000 is thus a minimum one, and while there are many firms presently operating with an investment in the region of this figure, the bulk of coast log production is produced by firms with an investment of $1 million or more.\textsuperscript{14} In 1969, the logging operations of MacMillan Bloedel Ltd. produced 1,878 million f.b.m.,\textsuperscript{15} 17\% of the total Provincial log scale, while in 1970 Rayonier Limited operations produced an estimated 400 million f.b.m.

The advantages accruing to large-scale logging operations are most significant, and of themselves are sufficient reason for the development of concentration in this phase of industry
operations. Fundamentally, these advantages derive from a more efficient use of equipment and men, and the ability to profitably employ both specialized machines and personnel.\textsuperscript{16} Planning, an essential adjunct of logging activity can be used with maximum effectiveness.\textsuperscript{17}

The application of new methods, the new grouping of operations and above all careful planning, enabled most gratifying results to be achieved.\textsuperscript{18}

Of particular relevance in this context in recent years have been the changes and pending changes in utilization standards in the province. Given existing investment, technology, and market conditions, the imposition of these standards has the potential at least to force the industry into uneconomic harvesting operations. "The ideal, called 'close' utilization is still economically doubtful--at least as a broad policy."\textsuperscript{19} On the coast, close-utilization and smallwood logging are not profitable, for anyone currently engaged in harvesting to this standard,\textsuperscript{20} and while interior operations in general are further advanced in this respect because of a resource base more amenable to the application of these standards in harvesting, the cost of this wood is still significantly higher than that incurred in producing 'normal' volumes. "Best estimates to date place this increase in the neighbourhood of $10 per thousand."\textsuperscript{21}

There is little doubt that efficient smallwood logging increases the need for mechanization in the woods through the purchase of specialized equipment such as tree shears and harvester-forwarders. On the coast, only one company, Rayonier, has experimented with relogging areas with special equipment for the purpose of removing close-utilization volumes. Their
investment in special mobile yarders and loaders and other specialized log salvage equipment was of the order of $1 million over a two year period. The scale of Rayonier's salvage operations were quite large and annual wood recovery was expected to reach 40 million f.b.m. In cases where existing equipment is to be used, operating costs are often increased because the equipment is not the most efficient for the removal of close-utilization volumes and further, its use for such a purpose reduces its availability for normal operations.

Success in logging to these standards requires both experience, and, it would seem operations on an extensive scale to permit efficient use of specialized equipment. On this basis, the future of logging operations lies, as it has done in the past, in increases in the scale of operations. According to one industry source "It is easier for a large integrated company to adopt close-utilization than it is for a small independent logger." Several other industry executives have expressed views very similar to this.

There are, firstly, as has just been discussed difficulties to be overcome in the production of the logs themselves. There are however two additional areas where size in general and integration are of great relevance in respect to the harvesting of close utilization volumes— the nature of 'offsetting' logging operations and the marketing of this material.

Flexibility of operation is important in regard to both close-utilization and 'normal' log volumes, and available
evidence indicates that the advantages are significant and stem from a variety of sources. The first of these has a direct bearing upon the firm's success in close-utilization harvesting. It will be recalled that much of the evidence indicated that the costs of smallwood were substantially higher than 'normal' volumes, and it is clear that if a firm is to incur extra costs of this nature then it can better bear them to the extent that it is able to offset these costs against the financially more attractive operations. The larger company, with operations working on timber in several locations is able to offset the cost of operations carried out on less profitable stands (including those with very high proportions of close utilization wood) against the more substantial profits derived from operating better stands.

Flexibility, however, has more extensive implications than this, and a number of firms have located operations to good advantage. With operations in a variety of strategic locations a company can significantly improve the utilization of its equipment and personnel while at the same time maintaining log inventories most appropriate to the needs of the conversion plants. "... the logging operations of the Company, by careful selection of high and low areas, are planned to continue throughout the year." By this means, the company concerned is able to reduce its winter log inventory to 3 months mill needs instead of the more usual 5.
By this means, too, it is possible to vary the output of logs more precisely in respect to species and volume needs of the purchasing mills, although there are a number of qualifications to this statement. One of the chief drawbacks to achieving full flexibility appears to arise from Forest Service policy in respect to adherence to logging plans made some time in advance of the actual cutting of the timber. It must also be remembered that logging efficiency depends to a considerable degree upon the successful execution of carefully-prepared plans. Roads cannot be maintained nor camps operated and shut down solely to serve the cause of mill raw material inventory needs.

In considering the marketing of this material, one finds that integration of logging and conversion serves a highly functional purpose. For the most part, the potential supply and often the existing supply of this material far exceeds demand. Prices are low and the market is not infrequently very depressed. Sloan commented in 1955 that "The market for logging waste . . . is unattractive and erratic." Today, fifteen years later, although some strengthening undoubtedly has resulted from the increase in smallwood milling facilities and pulp capacity, the market remains basically weak. In the fall of 1970, following strikes in the pulp and paper industry, the market for pulping material was extremely depressed and most conversion plants had adequate supplies from internal operations and from chip
contracts with various mills.\textsuperscript{35} The non-integrated logger thus finds it impossible to adopt close-utilization standards without considerable risk in respect to the disposal of the additional volumes.\textsuperscript{36} The integrated firms, already bearing higher costs on their own close-utilization volumes can ill afford to pay the same higher prices for the close-utilization production of others, and further cannot utilize volumes in excess of the requirements of their conversion facilities.

The achievement of both efficiencies and flexibility in logging is related of course most directly to the firm's timber position. Not only must the available volume be adequate to sustain the necessary capital investment but its continuance must be reasonably certain.

The nature of the timber position has many other implications for logging, too, beyond the need for scale and security of tenure. Flexibility is also served by the location and nature of the timber holdings—their elevation, aspect, and location \textit{vis-à-vis} the converting plants and transport axes. The form of tenure is also most important since the nature of government control varies from one to the other. In 1964, the Squamish logging operations of MacMillan Bloedel were carried out on long-term leasehold timber, with consequent advantage in respect to flexibility.
The timber, which is held in the form of timber licences owned by the Company, is not subject to any restriction by way of annual allowable cut . . . . Therefore it can be used as the Company finds it necessary to meet its requirements at any particular time. 37

Several other major benefits can flow from the selection of the timber position and while all relate directly to flexibility, each offers advantages quite apart from this. The single most important of these benefits is accessibility, for through its impact upon operating and capital costs it influences the profitability of operations more than any other feature. The species and the species mix in the holdings as well as the grades of logs play of course the major role in the determination of the value of the logs produced by the operation.

The nature of the timber upon which logging is carried out is thus the critical factor in assessing the feasibility of any logging operation. Not only does it control the efficiencies which may be achieved but through its various features determines the nature of both capital and operating costs as well as the value of the logs produced.

From the point of view of the conversion plant, the nature of the timber upon which logging is carried out influences the type of logs which are brought to the mill, and most importantly the cost of these raw material inputs. The mill cannot leave these conditions to chance--just as security and continuity of inputs are essential so are the cost and type of logs available equally critical dimensions
The individual converting plant has fairly specific needs in terms of its raw material supply and within limits cannot efficiently utilize logs below a certain grade or of a certain species. 39

Crown Zellerbach Canada Limited sort out eleven different grades and species of logs. These are normally sorted at each camp and towed to specialized mills for processing. 40

While this feature of conversion plants is closely related to the sorting and allocation of raw materials among the various plants 41 it should be noted that all grades and species of log are neither equally available nor equally desirable. The individual mill must thus ensure that it has available if not logs of a grade which it finds profitable to convert at least raw material of a high enough quality and desirability that it can be traded off to obtain the necessary inputs. 42

Close-utilization volumes for instance would have very little value in trade during most of 1970.

Not only must the mill be able to secure the necessary type of log inputs but it must also do so at a cost which permits it to make a profit after they have been converted.

Sawlogs are the most costly input of sawmilling. They exceed the value of the labour input by a substantial margin, that of all other circulating capital inputs combined, and the value of fixed capital as well. The cost of sawlogs represented about 64 per cent of the total lumber manufacturer's cost in the West Coast lumber industry in 1958. 43

In 1963-64 in the Canadian pulp and paper industry wood and wood residue costs were the largest single cost, accounting
for 24.7% of the average mill value of production.\textsuperscript{44}

Although the cost of the raw material is dependent basically on the cost of harvesting logs, the nature of supply and demand plays a major role in the case of the open market. It is in this area where the results of integration and the stimulus towards its is readily apparent. The open market for logs is an indicator of integration between timber, logging, and milling in the coast industry.

The nature of market conditions was the primary stimulus towards coast integration according to some sources, and while this may indeed be true it can certainly be added that control over production costs played a major role in its own right. Open market conditions could reasonably be considered the result of this process rather than the primary stimulus towards mill involvement in timber and logging. However, the elimination of both normal and special profits (in times of strong markets) accruing to loggers is indeed a cause served by integration.

"Some (logging) operators established themselves in a position where they could command economically unwarranted prices for their logs, calling for the mill to provide the timber and capital, requesting the mill to undertake the full risk while the logger insisted on top market price, refusing at times to pay interest on money borrowed for logging purposes. A great part of the normal milling profit had to be passed on to the logger, giving him, in some cases, profits
not commensurate with his investment and effort, while reducing the sawmill operator's profit to a 'break-even' point.

These conditions made it necessary for smaller and medium sized sawmills generally to undertake logging operations of their own and provide themselves with camps, equipment, and management."\(^{45}\)

Since the open market represents the independent logging sector, the solution to the mill's log supply problems obviously does not lie in reliance upon it. Neither appropriate costs nor security are found under all market conditions.\(^{46}\)

For a period of heavy demand, as has been the case recently, where market prices have risen dramatically, the independent [mill] finds himself paying a premium . . . in order to obtain supply . . . . The market dependent mill has little control over the input quality of sawlogs, much less the purchase price. \(^{47}\)

"In addition, as is the case today (April 1969) logs may not be available at any price."\(^{48}\)

The open market in Vancouver has declined greatly, and it has lost virtually all its former status. In 1956 only about 10% of the total coast cut flowed through the open market, 25% was marketed on a contract or a first refusal basis, and the remaining 65% was transferred through internal channels to the mills.\(^{49}\)

Open market sales seem to have declined still further in recent years. In 1970 it is doubtful that more than 5 or 8% of total coast log production flowed through the open market.\(^{50}\)
The number of independent loggers has declined with the open market, and there are today both few suppliers to it and few purchasers dependent upon it. According to one source there were between 125 and 200 independents supplying the open market in 1966, and according to others there are no longer any independent loggers but rather 'independent contractors'.

The fundamental cause of this decline of an independent logging sector lies almost wholly in the nature of the supply of timber to the industry. As one logger expressed it, the decline of independent loggers was not the result of a process of company takeovers but rather the inevitable result of a diminishing supply of timber. While this development is not the sole cause of the decline, even the other major causes are so closely linked to timber control as to be almost inseparable from it.

Independent loggers have survived in a number of areas but only under certain conditions. These conditions shed considerable light upon more general developments in the sector. Basically, these remaining independents have alienations in areas of easy access, where roadbuilding is comparatively inexpensive and volumes per acre are fairly high. Ground conditions are above average and in some cases it is not necessary to use high lead techniques. Logging equipment is in many cases quite old and the operation is not burdened with large debt repayments and interest charges. The
principal variables affected by all these conditions are the required capital investment production costs, and the value of output.

Few loggers have fared so well that they have been able to retain their independence. The basic problem to be overcome has been one of capital—capital to finance equipment, access, and operations and capital to finance timber.

Conversion plants have in many cases provided the necessary capital—for them the risk inherent in the process has been justifiable in the light of their need to control the log supply for the mill. Mill financing of loggers is very common, and invariably the logs produced are sold under at least the right of first refusal by the financing mill. In many cases the logs are sold on a contract basis to the mill concerned.

Many mills have several contractors working for them—Whonnock Lumber had 11 in 1970, Bay Lumber had 9 or 10 in the same year, and all L & K (North Shore) Lumber's Log inputs were produced by contract loggers. Over 50% of B.C. Forest Products' log production is produced by contract loggers, and in 1964 MacMillan Bloedel employed the services of 176 logging contractors. In the interior, contract loggers produce more than 50% of the log inputs for conversion plants of Northwood Pulp Ltd. and Crows Nest Industries.

According to Sloan, there were approximately 1,000 contract loggers operating on the coast in 1955, and while
he does not cite any figure for their number in the interior, it is obvious from what has just been said that a considerable number of them exist in that region also. While many (but by no means all) of the coast contractors were likely former independents, their interior counterparts had no such history.

The capital supplied by the mills takes various forms besides the outright loan of funds, and they include the assumption of both capital and operating obligations. Many mills do all the engineering and forestry work, while others finance the cost of constructing access routes. Further, when the logger has a contract for the sale of his logs he can often more readily arrange bank financing of his operations. In many cases the mills themselves make advances against production.

Of greatest consequence in the supply of capital, however, is the role played by the mills in the supply of timber for the operation. This aspect of mill-logger financial ties is closely related to the problem of access, since many alienations are in superior locations.

It is in this particular aspect of financing and capital needs that the historical development of tenures becomes most relevant. As related earlier timber control is now almost exclusively in the hands of the mills, and loggers must of necessity come to terms with them in order to operate at all.

In the division of timber which occurred before 1945,
few smaller operators were fortunate enough to secure cutting rights in the better logging areas. Contracting even then was a means of securing stands which were feasible to operate. In the division of timber which occurred after 1945 independent loggers were firstly not able to hold Tree Farm Licences, and, when quota in Public Sustained-Yield Units was sold, they were in many cases unsuccessful in establishing their cutting rights. Better financed operators who were successful in obtaining quota found themselves in a generally secure position. Not only could they continue operations as before, but the quota was, further, a saleable commodity. This opportunity to exit from the industry has been taken by a number of operators, and this occurrence has accounted for no small percentage of the consolidation of quota which has occurred. The sale of quota has not taken place entirely at the volition of the loggers, however, for in some cases the quota has been too small to sustain economic operations.

One could well ask why, under these conditions, the logger has survived at all, even as a contractor. After all, with timber control in their hands and with access to enough capital to finance at least some phases of logging, one would expect that the mills would tend to take over this phase of activity entirely. As was pointed out earlier, this has in fact happened in a number of cases, and 65% of all coast logs are produced by the logging divisions of the various mills. Contractors however, are still a very active force in logging, and this is true throughout the province.
One basic reason for their survival is the operation of the "30 to 50 per cent clause" whereby Tree Farm licensees are required to contract out this proportion of logging on Crown timber extracted from within the licence. Generally speaking, licensees have been able to adhere to this part of their contracts, and because of its operation a number of loggers are assured at least a supply of timber on which to operate.

One should not infer however that contract loggers exist solely by virtue of government edict. Far from it, for a contract logger just as any other firm in the industry must be able to operate efficiently in order to remain a viable enterprise. This touches directly upon what is probably the single most important factor in the survival of the logging sector—the abilities of management. Quite simply, there is no ready replacement for the logging management represented by this sector. Many operators have several decades of woods experience, and their skills are neither easily acquired nor easily duplicated. As was expressed several times, reliable and able contractors are much in demand.

Beyond these two principal factors, one finds a number of various reasons for the survival of contractors. Many have capital of their own and can finance a part of operations themselves. Many mills undoubtedly find this situation attractive in the light of their own fast-rising needs for capital. Then too the industry often finds itself logging widely-scattered alienations, and it is much more feasible
to have contract logging carried out than to attempt to
manage such operations from a central location. The nature
of the resource base itself must also be borne in mind, and it
has been said that the small logger will remain as long as
there is still a small pocket of timber in the province. By
all accounts, that would seem to be for quite some time to
come.
The conversion sector has, like the logging sector, been faced with dramatic changes in the nature of the environment in which it operates. In common with the logging sector, it has been forced to adapt to a changing raw materials base, and it too has adapted through new capital investment and adjustments in the scale of operations. The implications for integration have been considerable, and this matter has been touched upon already in connection with mill integration into both timber and logging. While this former treatment emphasised the perspective of the harvesting phase, this section will explore the point of view of the manufacturing phase.

The impact of changes in government resource management and the nature of the resource base is therefore by no means confined to the extractive phase of the industry. Not only are the costs of the raw material changed thereby, but processors are then further confronted with the need to develop and invest in physical plant capable of manufacturing at a cost which is competitive in international markets. This development is true particularly of sawmills, but other plants including pulp mills and plywood mills are also affected to varying degrees. In the case of sawmills, rising wood costs have
necessitated an investment in equipment to utilize former residues. The major form of residue utilization continues to be the production of pulp chips.

Another major difficulty (for sawmills in particular) has been the rising cost of labour, and this development alone has been a major stimulus to increased investment. To counter this problem, many mills have turned to a fuller use of automated equipment.

A third source of influence bearing upon sawmills has been the changing nature of market demands, some part of it originating in the nature of competition from non-wood products.

. . . the lumber producers have been faced with market demands for a higher quality product. To compete with other lumber producers, the sawmillers have had to standardize their lumber grading system and invest in additional equipment.

Major investment areas in this connection have been for dressing, drying, and packaging facilities. In many cases, too, the upgrading of product quality has been an important benefit of plant improvements.

With wood costs, processing costs, and labour costs in the ascendancy it is easy to understand the pressure which has come to bear on conversion plant operations. The situation is made more difficult by the need to increase product quality, and even more difficult by prevailing price levels for lumber in international markets. There has in fact been no secular increase in the mill price for lumber for some years, and levels were the same in 1970 as in 1956. Difficulties in respect to
this severe cost squeeze situation have been compounded by the often fluctuating nature of demand with its attendant price and volume changes. While survival depends upon increased investment, the market risks attached to such a course of action are often very high.

It would be too much to expect conversion plants of all types to accept both risks inherent in dependency upon international markets and risks incumbent in an uncertain supply of raw materials for the plant. Problems encountered in financing mill expansions not backed by an assured supply of timber have already been touched upon.

In recent years, then, these developments in the supply of wood and labour inputs and in product markets have therefore given rise to the widespread taking of timber positions by large numbers of sawmills. In the case of pulpmills, the timber position has always preceded investment.

The trend towards smaller and lower grade logs in the forest industry is not of course an entirely recent development, and some mills had small log sides as early as the 1930's. Whole-log gangmills to process small logs in quantity were introduced around 1954 and played an important part in reducing both milling costs and volumes of wood residue produced by sawmilling. Their adoption was no doubt in response to economic and regulatory considerations, for "Until the advent of the gangmill, small logs were either chipped for pulp or abandoned."
Recent years have seen a tremendous upturn in the volume of Smallwood reaching the mills and the 1967 Forest Industries Yearbook commented that

... the followers and even the diehards are either installing small log sides, or are on the verge of doing so, and must if they hope to survive in the future. 10

Many of the cost savings of new smallwood milling equipment originate in the same areas as those stemming from gangmill operations. These new saws combine a high lineal-foot productivity with low manpower requirements, and residues are reduced through low sawdust yield operations. 11 Other residues are chipped by the machine as the lumber is being produced. 12

Cost benefits are very considerable.

Estimated processing costs varied depending on the type of operation but were considered to be, at most, 50% of those for the same size of log processed in a conventional mill. In addition, the savings achieved by producing chips from what is normally sawdust volume was estimated at from $60,000 to $90,000 per year from an annual production of 25 million b.f. of lumber. 13

The investment in a smallwood milling unit is not small however, and costs are further increased by the need to upgrade all facilities associated with the equipment. When one component of the production system is improved in terms of throughput capacity, the rest of the system must be changed to accommodate the additional materials flows. 14 Since small logs have proportionately large volumes of bark and chippable residue, conveyors and chippers must have adequate volume
capacities. Debarkers must be of a type suitable for handling logs below 18 inches diameter, since larger units are quite unsuitable. "... the log handling facilities ahead of any small log unit are as important as the efficient operation of the machine itself." The cost of the debarker alone has been estimated at $55,000 and the whole system at $254,000.

In sawmilling, as in logging, the nature of economies of scale are difficult to isolate. This problem stems from the almost infinite variety of factors which affect it—the nature of the log supply, investment in log sorting, degree of automation, and of course the efficiency of the various production lines. Many sources interviewed made the point that size does not necessarily equal efficiency, and that in consequence a well-designed small capacity mill could be quite as profitable as a large one.

In terms of scale, the principal efficiencies seem to stem from labour economies of some magnitude. An efficient mill would produce 8,000 f.b.m. per man per shift, and volumes as high as 10,000 f.b.m. are possible. For an older, less efficient mill producing 3,000 f.b.m. per man per shift the labour cost would be approximately $11 per m.b.m. This figure falls to $3 per m.b.m. for a mill producing 10,000 f.b.m. per man per shift.

The investment necessary for such a mill is in the region of one to two million dollars, and though of course
the expenditure is a function of the need for many other economies also, it does serve as an indication of the typical scale of new installations. Many have been built in recent years, and they are especially numerous in the interior. Typical mills are those of Ladysmith, Forest Products Ltd. (1969 production 60 million b.f.), Bulkely Valley Forest Industries Ltd. (Burns Lake operation 1969 production 80 million b.f.), Clearwater Timber Products Ltd. (1969 production 80 million b.f.), and Merrill & Wagner Ltd., Williams Lake (1969 production 66 million b.f.).24 Canadian Forest Products Ltd., spent in excess of $2 million on modernization of the Chetwynd mill of the Fort St. John Lumber Company after its acquisition from the latter in 1964.25

In connection with further processing to meet market demands, very few of these functions are now carried on outside of the mills producing the lumber. Planing drying, grading, and packaging and associated functions are now generally performed by the individual mills.26 In lumber dressing for instance, this situation has replaced one of separate units--in 1954 some 17 planer plane mills on "planer row" in Prince George dressed 375 million feet out of 500 million feet of lumber produced by mills in the surrounding area.27

Since one of the major means of cost cutting by new milling equipment lies in high throughput capacity, the need for additional wood volumes accompanies its installation.
The need to protect the investment against a shortage of raw materials is of course a critical one, for often break-even volumes alone are as high as 80% of the line's capacity. One study estimated that a smallwood line added to a mill cutting 22 million b.f. annually would very likely double the volume of log inputs necessary to supply the mill. Another dimension to this increased need for raw materials is the specialized nature of the demand. It cannot simply be filled by any source of logs, for tolerances of much specialized equipment are often rather small. Again, this tends to increase the need for a larger supply of logs upon which to draw.

Increases in the size of the log supply under the mill's control will in all probability increase the volumes of material it specifically needs. But in addition, volumes of logs which the mill cannot utilize with existing facilities are also increased, and the mill must find some means of profitably handling these inputs. Expansion of capacity, much of which results from specialization of conversion, tends to increase the need for timber which in many cases has the reciprocal effect of increasing the need for new processing facilities. In many cases the increased volumes generated lie far below the break-even point for new investment, and the investment itself in many cases exceeds the capital capacity of the firm. The problem, in essence stems from the mixed nature of the resource base.
Specialization of function in the British Columbia forest industry is not a new development, and only the cost squeeze and the changing nature of the log supply to the industry have given it such major emphasis in recent years. Much specialization, especially that with a long history, is unavoidable and is the result of the growth and cultivation of strong markets for the products concerned. In this respect, shingles, shakes, plywood, and wood pulp are notable examples. These products cannot be produced without specific facilities for the purpose. Lumber production on the other hand was until recent years by and large the product of 'sawmills' and specialization by input and output is a comparatively recent development. The cost squeeze is such that it is not sufficient to merely make any product out of the log inputs. Mills must ensure that each log is directed into its most profitable conversion channel.\textsuperscript{31} Integration of various types is much involved with the solution to these problems.

Corporate integration, especially of large scale timber holdings and large scale and diverse manufacturing operations is clearly one major means of dealing with this problem. Scale is such that both major raw materials inflow types and major market needs can be accommodated within a single corporate unit.

In a truly integrated operation, waste from one mill is classified as that portion of the log which would yield a higher return if it were transferred to another type of plant. Under this concept it is not necessarily the most profitable thing to extract the last board from each sawlog and certainly under this concept it
is not profitable to the company or the public to consume whole sawlogs in a Kraft pulp mill. 32

Two types of manufacturing plant stand out immediately as facing difficult conditions when operated without access to a large pool of raw materials—shingles and plywood. In both cases, survival in an independent state has been directly influenced by the changing structure of access to timber resources. 33

Much shingle manufacturing now takes place within the framework of large integrated companies. "... one could say that the integrated operations now produce the majority of shingles." 34 The same is true of plywood manufacturing, and in 1967 at least 18 out of a total of 26 plants in British Columbia were operated by companies producing at least two major types of product. 35 Several are extremely diversified manufacturing operations.

The advance of corporate integration is by no means inevitable, however, for many forms of manufacturing have need of a raw materials supply which is less specialized and at the same time much more abundant on the supply side. Because of this, a timber position can be established which will coincide closely with the plant's raw material needs. This is particularly true in lumber production.

Even in this situation, however, surpluses of some species, sizes and grades of log arise with some regularity, and, with often equal regularity, deficiencies arise in the type of log which the mill is seeking. This is true of all
Log trading is practised extensively throughout the forest industry whenever distances are such that a larger gain may be achieved by trading as an alternative to processing. This practise is thus very common on the south coast where interfirm transfer costs are often very low. In effect, this development has largely replaced the sorting and allocative function formerly carried out by the Vancouver open log market. In the interior, however, use of this mechanism is somewhat inhibited by both transport costs and by a general lack of a diverse and concentrated manufacturing community. There are exceptions to this statement, however, as inter-firm transfers are possible in certain regional centers where some diversification of manufacturing has occurred such as in Quesnel or Williams Lake. The future of interior forest operations may depend more on corporate integration rather than on cooperative integration because of the consequent improved ability to locate diverse manufacturing operations to maximum advantage.

The allocation of log inputs between conversion units is not however the only functional end served by integration in the forest industry. Extremely important benefits are derived from intra and inter-firm transfers of wood residues. As was pointed out in 1955, "... sawmilling techniques on the Coast, measured in terms of mill residuals, have not changed to any degree over the past thirty years," and
although this area is receiving increasing attention in the last few years the problem has remained until the present. Sawmilling in particular generates large amounts of wood residue. "The volume of residues emanating from basic wood processing operations is staggering." 42

The profitable utilization of these residues has become imperative as sawmills have sought to remain competitive in times of rising costs and stagnating product prices. 43

H.G. Munro, speaking for British Columbia Forest Products Limited in 1956, reiterated a sentiment expressed by many sawmillers, that in 'some months it is unprofitable to sell lumber alone and if it weren't for by-products we would be cutting in the red.' 44

In conjunction with the growth of viable markets this force has been responsible for a major diversification in the forest industry—the development of sulphate pulp manufacturing. With some exceptions, 45

... the pulp and paper industry is an offshoot of the sawmilling industry. The utilization of sawmill waste provided the initial economic impetus for the establishment of the pulp industry and even today [1965] about half the wood used for the manufacture of pulp is sawmill waste. 46

The first pulp mills established specifically for this purpose were built by the well-financed companies with large scale operations generating substantial volumes of wood residue. In 1947, Bloedel, Stewart, and Welch opened the Port Alberni sulphate mill "... designed to operate solely on wood residue salvaged from the company's lumber and plywood operations." 47 This development was followed by similar
action by other major companies, and new mills were opened at Harmac (1950), Campbell River (1952), Crofton (1957). These mills were to "Utilize pulpwood chips for all or part of their raw material supplies." Mills at Port Mellon and at Woodfibre were rebuilt for this purpose and both still handle only residues from sawmilling operations.

Residues not suitable for pulp manufacture--sawdust, shavings, and bark--are utilized by the pulp mills for the generation of electricity since extremely large amounts are consumed by the various manufacturing phases.

A natural development of this process of utilization of residues has been to include as many sawmills as possible in the raw materials supply base for the pulp mills. This has occurred on a very extensive scale, and few mills operate outside this base whenever transportation costs permit economic assembly of this material. Co-operative integration in this phase of industry operations has thus been a major extension of corporate diversification and in some cases may have actually been an element in the supply base of the pulp mills from the very beginning.

This latter observation would also hold true in the interior in respect of the post-1965 expansion of sulphate pulp capacity in the interior. "Since 1965 a growing number of sawmills have started manufacturing pulpwood chips."

While the sale of chips furnishes an important source of revenue for the sawmills, their production can take place
only with increased investment in debarking and chipping units. In common with other investments fairly high break-even points are involved and the capital cost is quite high. Many smaller sawmills find the installation of these still large units both uneconomic and financially difficult.\textsuperscript{53}

In the Prince George Forest District, the number of attached barkers increased from 0 in 1964 to 43 by 1969. In the Kamloops District the increase was from 20 to 52 over this same period.\textsuperscript{54} The increase in attached chippers was equally dramatic.

The rate of attrition among small mills has been high throughout the province. As in logging, much concentration has come about through the disappearance of smaller units and the growth of larger ones rather than through mergers and outright purchase, although horizontal integration in sawmilling is not unknown. As is shown in Table XXV following, the declines have been dramatic in all districts since as early as 1947.

The mortality rate amongst smaller mills is indicated quite clearly in the following table. Secular increases in the scale of operations are clearly indicated in all Forest Districts.
TABLE XXV
BRITISH COLUMBIA. SAWMILLS OPERATING, SELECTED YEARS. BY FOREST DISTRICT

<table>
<thead>
<tr>
<th>District</th>
<th>Maximum Number</th>
<th>Year</th>
<th>Minimum Number</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>486</td>
<td>1947</td>
<td>118</td>
<td>1969</td>
</tr>
<tr>
<td>Pr. Rupert</td>
<td>345</td>
<td>1953</td>
<td>106</td>
<td>1967</td>
</tr>
<tr>
<td>Pr. George</td>
<td>730</td>
<td>1955</td>
<td>213</td>
<td>1968</td>
</tr>
<tr>
<td>Kamloops</td>
<td>788</td>
<td>1956</td>
<td>255</td>
<td>1967</td>
</tr>
<tr>
<td>Nelson</td>
<td>342</td>
<td>1955</td>
<td>149</td>
<td>1967</td>
</tr>
<tr>
<td>Totals</td>
<td>2,691</td>
<td></td>
<td>841</td>
<td></td>
</tr>
</tbody>
</table>


TABLE XXVI
BRITISH COLUMBIA. ESTIMATED AVERAGE CAPACITIES OF MILLS OPERATING AND MILLS SHUT-DOWN, BY FOREST DISTRICT. 1956-1969

<table>
<thead>
<tr>
<th>Forest District</th>
<th>Average 8 hour capacity (m.b.m.)</th>
<th>1956</th>
<th>1969</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Optg.</td>
<td>Shut Down</td>
<td>Optg.</td>
</tr>
<tr>
<td>Vancouver</td>
<td>34.2</td>
<td>3.1</td>
<td>64.7</td>
</tr>
<tr>
<td>Pr. Rupert</td>
<td>6.3</td>
<td>5.7</td>
<td>11.5</td>
</tr>
<tr>
<td>Pr. George</td>
<td>9.0</td>
<td>6.0</td>
<td>18.3</td>
</tr>
<tr>
<td>Kamloops</td>
<td>9.0</td>
<td>4.7</td>
<td>22.0</td>
</tr>
<tr>
<td>Nelson</td>
<td>11.3</td>
<td>5.8</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Source: Calculated from Annual Reports of the British Columbia Forest Service, 1956 and 1969.
It is certain that the timber position of these small units has been absorbed by the surviving mills. In cases where they simply ceased operation, the survivors took up the additional quota through the disposal mechanisms of the Forest Service. Possibly the intermittent style of operation of some was not compatible with Forest Service harvesting regulations. It seems unlikely, however, that this practice was at all prevalent in view of the value that quota has come to assume, and more typically the quota position has been sold along with the mill. In essence this practice is vertical integration but the net result is an increase in both this process and that of horizontal integration.

In speaking of sawmill consolidation, the 1967 Forest Industries Yearbook commented that "In most instances, the quest for timber was the prime reason for acquisition by established operators. . . ." As was discussed in the section on timber control, there has been an impressive amount of consolidation of quota throughout the province, and it is not surprising that sawmills as well as loggers, have been bought out primarily for their timber position. It is logical in both instances to expect that the less viable operations would find the opportunity to sell an attractive one.

In integration of this nature, there seems to be a well-defined trend towards the closure of obsolescent and poorly-located mills. Investment is channelled into centrally-located plants. In speaking of the operations of Canadian
Forest Products in Chetwynd, Mullins says "In 1964 Canadian Forest Products Ltd. acquired the mill and subsequently closed the bush mills and centralized all sawing facilities at the planing mill." Developments of this nature have been typical throughout the province. In cases where centrally-located milling facilities have been acquired, the tendency has thus been to upgrade them and to increase their scale of operation.

It is difficult to see how the horizontal integration of sawmilling units would be justifiable or explainable on grounds other than that of timber acquisition. Economies are obviously not the stimulus, for instance, in the situation where the mills are closed down, and in cases of larger and more viable units there are few discernible economies. Mills of a similar type are often acquired, and in interior regions the units are often so far apart as to render their drawing from a common log pool something probably not feasible for a number of years. Between-mill allocation of raw materials is far more possible in southern coastal regions and in some cases in the interior, however, and the acquisition of specialized conversion facilities in this case is far more likely to serve a more optimum allocation of log inputs.

The growth of a pulp economy in the interior has been a second major force in the concentration of sawmilling that has occurred in the region. Again, the primary stimulus has been towards vertical integration but developments have
manifested themselves in the form of common ownership of a number of mills. "Under the shadow of the pulpmill "explosion," many profitable and well-established sawmill firms have been absorbed by pulpmill companies during North America's first formal imposition of a pulp log 'economy over an existing sawlog economy." The stimulus again is the desire to secure raw materials inputs.

Northwood Mills Ltd. was formed by Northwood Pulp Ltd. in 1961 "... to acquire sawmills and related timber quota in the interior of British Columbia." In 1961 this company purchased Upper Fraser Spruce Mills Ltd. and Sinclair Spruce Sawmills Ltd., and in 1966 the operations of Eagle Lake Sawmills Ltd. were acquired. Shelley Sawmills Ltd. had also become part of Northwood's holdings by 1969. In 1969 the combined lumber production of these mills was 227,966,000 b.f. By 1969 Kamloops Pulp and Paper Ltd. had purchased at least four mills in the surrounding region with a total output in 1969 of 127,000,000 b.f. The ultimate disposition of the former mills is not known but according to one source, Northwood Mills Ltd. plans eventually to integrate and consolidate all conversion operations in Prince George.

In regions where there is no existing sawmilling structure, new pulp mills have installed diversified and closely-integrated manufacturing facilities from the very beginning to ensure optimum utilization of log inputs. Excellent examples of this process are provided by Alexandra
Forest Industries in Mackenzie, which is constructing pulp lumber, and plywood manufacturing facilities, and by Bulkeley Valley Pulp and Lumber Ltd. which is constructing a 270 million b.f. per year sawmill in Houston in conjunction with a pulpmill.

As in logging, however, not all the surviving industry units have been absorbed by other companies in the process of horizontal or vertical integration. Many of these units have been able to modernize and expand facilities, and as the reader will note in the following table there were still some 13 independent mills producing over 50 million f.b.m. annually in 1969. While these mills and many smaller ones were of course integrated with timber and in many cases logging, they had not to date become a part of horizontal integration. Many of the smaller mills are not strictly sawmills in that they are to a considerable extent dependent upon specialized products and often involved in the further manufacturing of lumber. As the table indicates, the bulk of British Columbia's lumber is produced by companies which have two or more sawmills in operation.
TABLE XXVII
BRITISH COLUMBIA, LUMBER PRODUCTION BY INTEGRATED AND NON-INTEGRATED SAWMILLS. 1969.

<table>
<thead>
<tr>
<th>1969 Production (million f.b.m.)</th>
<th>Companies with 2 or more units</th>
<th>Companies with a single producing mill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Output</td>
<td>Number of Companies</td>
</tr>
<tr>
<td>Less than 3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3 - 5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5 - 10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10 - 25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25 - 50</td>
<td>205</td>
<td>5</td>
</tr>
<tr>
<td>More than 50</td>
<td>4907</td>
<td>24</td>
</tr>
</tbody>
</table>

Compiled from Forest Industries, op. cit., pp. 66-68.

Approximately 50% of the total provincial lumber production is produced by the mills of the ten major integrated companies. In order of 1969 production volumes they are: MacMillan Bloedel Ltd. (1,244 million f.b.m.), British Columbia Forest Products Ltd. (484 million f.b.m.), Crown Zellerbach Canada Ltd. (406 million f.b.m.), Canadian Forest Products Ltd. (365 million f.b.m.), Weldwood of Canada Ltd. (276 million f.b.m.), Rayonier Canada (B.C.) Ltd. (254 million f.b.m.), Northwood Pulp Ltd. (228 million f.b.m.), Columbia Cellulose Ltd. (133 million f.b.m.), Tahsis Company Ltd. (129 million f.b.m.), and K.P. Wood Products Co. Ltd. (127 million f.b.m.).
Of these ten companies, all are directly involved in pulp mills.71

The pulp milling sector of conversion activity has been inherently concentrated because of the economies of scale which may be achieved. According to one study, economies of scale in manufacturing increase very rapidly up to a daily output of as high as 500 metric tons per day.72 Much of this advantage stems from economies in capital equipment, which in all processes surveyed were still possible in plants producing in excess of 800 metric tons per day.73

This phenomenon is pronounced in the instances where increased capacity is possible without increasing the number of manufacturing lines, i.e., if equipment units of high capacity are available.74

These economies have been both particularly realizable and particularly necessary in recent years as the province has seen a major sulphate pulp expansion since 1965. "Average pulp and paper mill size has likewise increased considerably. Mills producing less than 400 tons per day are the exception. Of the 18 currently producing, [December 1966] five exceed 1,000 tons per day."75 Investment in individual mills has in many cases exceeded $80 million.76

Integration of pulp and paper manufacturing in British Columbia "... presents a mixed picture,"77 and extensive vertical integration between the two phases of industry activity has not yet taken place. This is so even though the earlier referred-to study demonstrated that substantial
cost savings were possible by integration of the two processes. Some 80% of chemical pulp output is shipped from the province in an unprocessed form, the balance being converted into paper products such as "... newsprint, linerboard, kraft wrapping paper, fine and specialty paper." Part of the difficulty with further vertical integration would seem to lie with market needs for quick delivery of relatively small quantities of product with the result that "... many conversion operations need to be located close to the customers." This would tend to exclude further manufacturing in British Columbia, since the great bulk of the industry's markets are in the United States. Economies of scale in production are also "less pronounced" in integration of this type.

Groundwood production presents an exception to the general picture, and "Virtually all the ground wood pulp is converted to newsprint at the same site." This circumstance relates to significant economies in production, but also and perhaps more importantly to the more standard nature of the product and the more concentrated nature of markets.

Vertical integration into the further processing of other primary products is not widespread in the British Columbia industry, and "Further manufacturing by the same firm is still less than 5 per cent of sales, and includes laminated beams, millwork and minor products." Products such as particleboard, fiberboard, and hardboard have proven to be marketable and of considerable value in residue utiliz-
ation. MacMillan Bloedel Ltd. was the first firm in the province to develop K3 particleboard as a means of profitably utilizing quantities of cedar waste.

The reasons for this situation have not been investigated for the purposes of this study, but if a degree of speculation may be introduced, a few possible factors could be advanced. Limited economies of scale at low levels of production, combined with small domestic markets and high tariff barriers on highly manufactured goods are very likely important reasons. It is possible, too, that markets for many of these products are fragmentary by nature and any manufacturing economies would, as in the case of some paper products, be offset by high marketing costs. Perhaps most important in the analysis however is that generally good markets are accessible to British Columbia producers for primary products and the industry as a whole has achieved a very satisfactory level of residue utilization. None of this is to say, however, that further highly functional progress may not be possible in the area of vertical integration through diversification following product and market development.
CHAPTER VIII

MARKETING SINCE 1945

The subject to be dealt with in this chapter is a rather complex one. As in integration between forestry, timber, logging, and conversion the process of forward vertical integration of firms with conversion facilities into marketing has taken place for a number of different reasons. As with the other four phases of industry activity the development of integration has proceeded at greatly different rates and to different degrees in various cases. The resulting structure, too, as in the other phases is a combination of many types of integration and non-integration.

Integration into the marketing of wood products is taken up first, and the topics of market characteristics, the reasons for forward integration, and the extent of forward integration will be treated in that order. The chapter will conclude with a discussion of forward integration in the marketing of pulp.

Wood Products

1. Markets

Since the raw materials used by the industry are extremely heavy and bulky, manufacturing operations are
invariably located in close proximity to the forest resource base. To begin with there is thus often a great lack of spatial correspondence between manufacturing and markets. Finished products must be distributed over considerable distances.\footnote{1}

Markets for forest products are international in scope, and output must be distributed to a variety of destinations. On a lesser scale, markets are most often made up of large numbers of ultimate purchasers in both consumer and industrial markets.\footnote{2} The industry is characterized too by large numbers of suppliers, and competition is often intense from foreign as well as domestic producers.

The demand for many products, particularly plywood and lumber is greatly influenced by economic conditions in the various markets. Government fiscal and monetary policies, especially as they affect the construction industry play a major role in this connection in Canada, the United States, the United Kingdom, Japan, and other major market areas.\footnote{3} Difficult weather conditions and strikes in the construction industry are similarly important.

Because of the long supply lines involved, supplies to the market tend to be extremely inelastic in the short run, and this difficulty is often compounded by disruptions in the orderly transportation of products.\footnote{4} Strikes, unfavourable weather, and rail car shortages are typical sources of difficulty in this area.\footnote{5} A quotation from the British
Columbia Forest Products annual report for 1969 typifies the nature of market conditions. In speaking of the United States market, it reported that

The strong markets and higher prices for all products in the early part of the year were the result of optimism in the United States over increased housing starts and a partial lumber shortage caused by the Atlantic Coast longshore strike. This brought about the belief in the marketplace that wood products would be in short supply.

When the projected increase in housing starts failed to materialize prices dropped drastically from highs which had peaked during the first quarter and some volume items fell by as much as 40%. . . . While somewhat more stable, other world markets were similarly affected. 6

Operating in conjunction with each other, a rapidly changing demand, strong seller competition, and inflexible short-run supply thus result in extremely volatile market conditions for many products. 7 Price and volume changes are frequently very large over short periods of time as markets absorb tremendous pressures and the full impact of changes in these factors. 8

Markets for wood products are thus characterized by a multiplicity of buyers and sellers, often long supply lines, and frequently very changeable market conditions. The function of distribution is in consequence a complex one, and the industry has traditionally relied upon long and often complex channels to reach the market. 9 Usage of existing channels, like the markets they serve tends to be very flexible and subject to a considerable degree of change over both the short and long run. 10
The most prominent change in patterns of distribution has been a pronounced and fairly long-standing trend towards a shortening of channels. In many cases this change has been marked by the forward integration of manufacturing firms into the marketing of their output. The next section will discuss the major developments which have facilitated this process and some of the basic reasons for its growth.

2. Forward Integration

One of the major facilitating factors in forward integration has been the great increase in product volumes going to individual markets, and this has arisen through growth in the markets themselves as British Columbia producers have concomitantly maintained or improved their competitive position. This development has thus greatly increased the feasibility of marketing through subsidiary organizations because of the improvement in sales volume each may achieve. There is also a reduction in the risk involved in commitment of this nature in markets which may once have been marginal and transitory from the point of view of the particular producer.

Apart from market growth and the maintenance of competitive position, producing firms themselves are becoming much larger as concentration takes place in the manufacturing phase. This again increases the volumes shipped to individual markets from any one mill.
Closely related to this process is the increasing consolidation of both ultimate consumers and channels. Manufacturers can reach the market through fewer and fewer contacts with either buyers or intermediaries. Changes in this area in many cases started in the 1940's or even earlier.

One of the most significant developments among buyers has been the growth of industrial market units as large scale "mass builders" replaced small scale custom builders in the housing field. This trend became evident in many markets as early as the 1940's, and many of these accounts developed a strong preference for dealing with larger wholesalers and in many cases directly with the manufacturer himself. "A distinct preference was found to exist, among . . . industrial accounts, to enter transactions directly involving a representative of the manufacturer." Channel bypassing was thus an early development in the industry, and this trend has continued in the 1960's with the emergence of the mobile home manufacturer. This has been of especial consequence in the marketing of plywood.

Consolidation in channels is by no means a recent development either, and retail line yards such as Beaver Lumber Ltd. (280 yards) and Revelstoke Building Materials Ltd. have long dealt directly with the manufacturer. With large numbers of retail outlets, these companies traditionally purchase in quantity. Of more recent development has been the emergence of the buying groups such as Allout, Aid, and
Irly since the late 1950's. Through collective purchasing product volumes are often very large, and some traditionally fragmented markets such as those on the prairies "... now host a concentration of buying groups purchasing directly from the manufacturer."19

In other channels too, a great deal of consolidation has and still is taking place,20 and where mills formerly may have dealt with a hundred or so intermediaries they must deal now with only five or ten.21 Consolidation among wholesalers and retailers still takes place weekly in European markets.22

The reasons for consolidation among channels are of course closely related to those leading to forward integration by wood products manufacturers. One of these, the emergence of fewer and larger buyers has already been mentioned. Equally important has been the improvement in long-distance communication channels. The development of Wide Area Telephone Service is a major feature of this process and one leading to closer contact between buyers and sellers in widely separated locations.23 "The widespread use of WATS lines practically eliminated the need for double wholesaling in selling West Coast lumber,"24 and according to one marketing executive, these facilities have "made a significant difference to the way you might market."25 Much shorter channels (including manufacturer-consumer contacts) are now possible.

An increase in market knowledge is thus facilitated by these communications changes, and this leads to increased
marketing expertise on the part of producer wholesalers and manufacturers. Undoubtedly, forward integration is fostered greatly by this advancement.

There has also been a need to increase the commitment to a technically qualified selling effort undivided with competitive and competitors products. Agents in particular "...were becoming increasingly inadequate as participants in the exporter's programs to expand sales of British Columbia lumber." As might be expected, the growth of buying power at consumption and channel levels has placed great pressure on manufacturers to market output at highly competitive prices. In this respect, forward integration plays a highly functional role, as it is capable of cutting distribution costs and further means that the manufacturer will be much more aware of market pressures through closer contact with buyers. Through its ownership of captive wholesale channels, MacMillan Bloedel was able to sell to many large accounts more effectively than independent wholesalers because they were concerned only with wood products rather than with a multiplicity of lines. In addition, pricing policy could be used to great advantage in meeting competition since MacMillan Bloedel outlets were "...free to quote prices to large industrial end users on a true cost basis; as the need for separate profit margins at both the manufacture and wholesale level was eliminated. The only relevant costs affecting the price
quotation therefore were production costs and the overhead costs of maintaining the manufacturing and distribution facilities."^30 The practice of selling directly from mill to large industrial accounts, too, became an extremely common competitive device. Agents from several major firms were very active in this field.^31

A closely associated advantage of fully-integrated manufacturing and marketing is the increased ability of the manufacturer to provide market service. Much of this advantage stems from the maintenance of inventories in the markets, many of which may be two to three months away from the manufacturer.^32 "The industrial firms demanded, in addition to direct shipments at a preferred price, that a readily available source of back-up stock be carried by their supplier."^33 Continuity of supply at predictable prices is an extremely important part of purchasing for many industrial buyers who must predict costs for some time in advance of actual commitment to a project.^34 These are some of the advantages to the buyer stressed by MacMillan Bloedel, who said that

"... customers in Japan and the U.K. will come to appreciate the faster service, reduced need for inventory and finally, protection against market fluctuations and risk of demurrage changes. 35

Apart from a more secure position accruing because of a higher level of market service, the manufacturer also derives a considerable advantage in other ways. Most importantly, he can take advantage of market buoyancy in its early stages since he has inventory on hand in the market itself. In addition
By providing greater flexibility for inventory storage, and by speeding the flow of goods from the mill to distribution warehouses, it is often possible to better co-ordinate production and sales, to keep production volume at a steadier level, and to lower total production costs. 36

Since transportation has always accounted for a large portion of the cost of lumber delivered in the marketplace, it is not surprising that economy has been sought in this function. Recent developments in water transportation include the use of bulk lumber carriers and the associated bulk loading and unloading terminals. Cost reductions of up to 35% have been cited. 37 Integration into this phase of marketing has effectively removed some transportation and marketing middlemen. 38 The single point of delivery and the large volumes involved, however, create problems for distribution from that point for often no one wholesaler can utilize all deliveries. 39 In that not all marketing agencies have integrated with wholesalers in these cases, it is obviously not correct to say that forward integration into wholesaling is essential to solve this problem. Forward integration is apparently viable for those who have done so (MacMillan Bloedel), but firms who have not so far done so (Seaboard, Eacom) have also been successful in their use of bulk shipping techniques. It is probably more correct to attribute forward integration to other advantages previously discussed.

With such a trend in channel consolidation taking place, however, perhaps the most vital force leading to vertical integration is the security attached to ownership
of distribution channels. As in timber control, the assets sought may not be as available in twenty years as they are today.

3. The Extent of Forward Integration

MacMillan Bloedel Ltd.

This company is not only the largest forest products manufacturer in British Columbia, but is also the most highly integrated one in the marketing field. The organization in fact had its beginning as a marketing agency for British Columbia lumber.

In offshore markets, the company has advanced in the field of captive wholesaling in all its major markets. The pace of expansion has been particularly rapid in recent years. In the United States market the company acquired all shares of the Blanchard Lumber Company in 1968. The company is a major building materials wholesaler in Atlantic seaboard markets, and had been controlled by the MacMillan Bloedel organization since 1966. In the United Kingdom, the company combined with Montague Meyer Ltd. in 1965 to form MacMillan Bloedel Meyer Ltd., acquiring "... a network of company controlled wholesale outlets." In connection with this acquisition a new company, MacMillan Bloedel Meyer (Terminals) Ltd. was formed and is associated with the construction of bulk terminals at Tilbury, Newport, and Hull.
Similar action has been taken in other major offshore markets, and subsidiary companies include MacMillan Jardine Ltd. (Japan) and MacMillan Bloedel Pty. Ltd. (Australia). 

In Canada, the company has long had a very extensive distribution system, and in 1969 operated 18 sales offices and distribution centers in Eastern Canada and 7 in Western Canada. This network was augmented in June 1966 by the acquisition of Kingsway Lumber Co. Ltd. of Toronto, a large, aggressive building products wholesaler/retailer in Ontario markets. Although the acquired company was under considerable financial stress at the time, the acquisition was probably entirely in keeping with the company's current emphasis on forward integration.

It will be recalled that direct shipments from mill to user were often arranged by selling agencies of the major mills. This practice continues, and MacMillan Bloedel in particular has arranged some very large shipments of wood products to United States rail markets in recent years. In this field, as well as in other export activities MacMillan Bloedel handles varying proportions of the output of a number of other producers. The largest of these is British Columbia Forest Products Ltd., but MacMillan Bloedel also acts as a marketing agent for Acorn Forest Products Ltd., Canim Lake Sawmills Ltd., Kicking Horse Forest Products Ltd., Kootenay Forest Products Ltd., and Sooke Forest Products Ltd. The advantage to the other
firms lies in that they are able to derive benefit from a company with great marketing expertise in a wide variety of markets. The advantage of such an arrangement to MacMillan Bloedel is that economies in marketing and shipping may be achieved without the commensurate increase in risk which would be involved in over-dependence upon any one market. The arrangement would also allow MacMillan Bloedel to improve market service in the form of a broader product line.

In British Columbia markets, as with other mills in the province, MacMillan Bloedel sells directly to the end-user or the retailer from mill sales offices in the majority of cases. An exception does occur however in the case of higher grades of plywood where wholesalers are utilized to a greater degree. The shortness of channels in British Columbia arises principally because of the close proximity of producers to consumers and retail outlets, as well as the high degree of price sensitivity which characterizes all lumber and plywood markets.

Seaboard Lumber Sales Company Ltd.

This company functions as an export marketing agency for a consortium of approximately forty British Columbia companies, including Crown Zellerbach Canada Ltd., Canadian Forest Products Company Ltd., Weldwood of Canada Ltd., and Rayonier of Canada (B.C.) Ltd. The relationship of the company to its member mills is unique in that it is wholly-
owned by them. Its activities are confined to offshore markets, where it shares roughly equally with MacMillan Bloedel some 85% of waterborne wood products exports from the province. Seaboard has integrated with marketing channels to a much lesser degree than MacMillan Bloedel, though it too has a transport subsidiary and has engaged in the bulk transportation of wood products to all major markets served. Apart from this integration, however, the only moves in direction have been the establishment of Seaboard International (Timber and Plywood) Ltd. to replace the export agent in the United Kingdom market. Independent marketing channels are still used in this and other market areas.

The reasons for this situation are difficult to ascertain with any degree of certainty. Firstly, much of MacMillan Bloedel's forward integration in offshore markets is of recent date, and possibly the ultimate viability of such action remains to be seen. This is doubtful, however, for there are many advantages to be derived from such action, most particularly those related to the security implied by control of channels of distribution adequate to market large volumes of output. One would expect Seaboard (or its member mills) to take more definite steps in this direction if significant sectors of the intermediary sector were about to become integrated with forest products manufacturers.

Possibly part of the reason for slower integration by
Seaboard lies in the fact that it is controlled by its member mills, who undoubtedly have widely varying objectives in respect to the nature and direction of marketing effort and investment by their marketing agency. A mill which markets most or all of its output in the United States for example could hardly be expected to support heavy investment in the United Kingdom. Further difficulty could be expected in respect to market service, for example in the production of less profitable lines, the maintenance of inventory in the market, or the need to sell lumber at competitive prices at all times in particular markets.

Integration of this nature lacks what is perhaps a vital element of corporate integration—the ability of the organization as a whole and the marketing organization in particular to introduce an element of coercion in respect to production activities.

Eacom Timber Sales Ltd.

This company was formed by a merger of the East Asiatic Company (Tahsis Co. Ltd.) and Commonwealth Pacific Timber Sales, "a minor lumber exporting agency." Eacom is an export marketing company, and in 1968 accounted for approximately 10 to 12% of British Columbia's waterborne exports. Like MacMillan Bloedel it has 'captive' production facilities of considerable size, and it too markets the output of a number of other producers. These include Doman Industries
Ltd., Mayo Lumber Co. Ltd., Orion Bowman & Sons Ltd., as well as several other mills.\textsuperscript{66}

While Eacom is involved in the bulk movement of lumber,\textsuperscript{67} it has not integrated with this phase of operations and the vessels are chartered from Anglo-Canadian Shipping (Westship) Ltd.\textsuperscript{68} To date, the company has not integrated with channel intermediaries either, and independent channels are utilized, including import agents in the various markets.\textsuperscript{69}

Other Companies

As mentioned earlier, Seaboard functions only in off-shore markets. The responsibility for domestic sales thus falls upon the individual mills.

In British Columbia markets, the prevalent practice is the use of mill sales offices, and this was discussed in connection with MacMillan Bloedel.

Four major companies maintain extensive distribution facilities in the rest of Canada—Weldwood, Canadian Forest Products, Crown Zellerbach, and Rayonier.\textsuperscript{70} All undoubtedly maintain a volume of sales in the Canadian market that justify this. The Canadian market's role in the sale of plywood has of course always been extremely important. The domestic lumber market, however, was and is according to one source important mainly in its functioning as a stabilizing force upon sales and as something of a dumping ground when export markets are depressed.\textsuperscript{71}
The process of actively soliciting sales direct from plants to Canadian and United States product markets has involved these companies as well as MacMillan Bloedel, and like this company they have been actively involved in the sale of output from other producers too. Other producers have been involved in respect to both direct shipments and the operations of the wholesale/retail units of the organizing firms.  

Non-Integrated Marketing Firms  

Forward integration, extensive as it may be in certain cases has not so far taken place in the case of all companies or in all markets. All the larger mills have pursued some form of forward integration in export markets, though in the case of Seaboard and Eacom this has stopped short of the wholesaler phase of operations. While most of the larger of these mills become from time to time involved in direct shipments for themselves and other producers to the United States rail market, there has not so far been integration in either scope or forward movement much beyond the level of this occasional cooperation. In Canadian markets outside British Columbia only five major companies maintain a distribution network. Other producers, apart from a certain amount of selling through these outlets must therefore find other means of reaching the domestic market outside the province.
A general lack of integration between producers and marketer is thus characteristic of many markets. This is especially true in the Canadian and United States rail markets. The reasons for this situation will be examined next.

At the outset of this chapter, the fragmented and sometimes transitory nature of many markets was described briefly. In spite of channel and producer consolidation in some areas, the United States rail market remains a very dispersed one, characterized by rapidly fluctuating and very product- and time-specific demand. Forward integration by even a large Canadian producer would achieve a volume of sales far too small and much too volatile for viable operations. This is the case in some European markets too, and even MacMillan Bloedel has found agents the most viable channel for lumber and plywood on the continent and for plywood in the United Kingdom. In many cases markets are too small to justify forward integration, often because the strength of competition limits British Columbia producers to the sale of only a few products.

Many wood products manufacturers are not large enough to justify forward integration in other than the somewhat limited form generally practised in the British Columbia market. These companies must rely upon brokers, wholesalers, or from time to time upon the operations of major mills which have integrated into marketing. The nature of hori-
zontal integration in conversion thus has a marked effect upon the extent of forward integration.

Independent channel agencies such as brokers and wholesalers have thus survived as a link with markets which are dispersed and frequently very changeable. This is especially true where a number of independent smaller producers remain in the conversion sector. Wholesaler functions are those traditionally performed—financing, storage, distribution, and market advice, though increasingly their major roles lie in distribution and market knowledge.\(^7^5\)

The pressure on these middlemen to integrate backwards into the supply phase has of course been increasing with the consolidation of conversion and the consolidation of channels (including forward integration by producers).\(^7^6\) The pressure has been particularly intense in times of buoyant markets when supplies may be extremely difficult to secure. Backward integration by producer wholesalers, market wholesalers, and even by large retailers has been evident.\(^7^7\) A number of problems are possibly inherent in the process, however. The most difficult to overcome is the tendency to lose market objectivity and for the wholesaler to become deeply involved with sawmill problems.\(^7^8\) The firm often becomes producer-orientated and the marketing functions are abandoned.\(^7^9\) Then too the wholesaler is often confronted with the capital needs of the mill and of course in the acquisition of a mill the middleman assumes the market risks inherent in conversion.
Forward integration in offshore markets is at least partly linked with the bulk shipment of goods. In rail markets, however, economies of this nature are difficult to achieve and one would expect that the stimulus to integration from this area would be slow to materialize. In this connection one must consider again the rapidly changing nature of demand and the highly competitive situation prevailing in many rail markets.

Forward integration itself is inherently fraught with certain difficulties too, and these factors may explain the current lack of integration in some markets. One of the major problems associated with the process is conflict between company-owned and independent channels. Obviously the problem could be serious in cases where after integration the manufacturer must rely also upon independent channels to reach other market sectors in the same region. Argue mentions

... the resentment of many import merchants towards direct selling to the retailer, by MacMillan Bloedel Meyer. Many import wholesalers have sacrificed immediate delivery, and other advantages offered by control inventory yards, to remain customers of Seaboard International. 83

There are many pros and cons in respect to this problem and channel control by manufacturers.

A problem with forward integration into both wholesaling and retailing is the prevalence of product multiplicity at these levels, an especially pronounced trend in recent years.
The manufacturer must thus be prepared to accept increased demands on his capital structure and upon management. The volumes of wood products sold may not in some cases be very large in proportion to the investment required by forward integration into channels of this type.

Independent wholesalers therefore continue to play a vital role in many markets for there are many barriers to and problems inherent in the assumption of their functions by producing units. According to one source, the same or a greater percentage of softwood lumber was sold through wholesalers in 1970 as in 1930.\textsuperscript{85} Other sources have stressed the continuing functioning of independent channels in both the Canadian and United States rail markets.\textsuperscript{86}

Brokers, like wholesalers have been adversely affected by consolidation in the supply base and by consolidation of channels.\textsuperscript{87} An additional problem was created in 1961 when Canadian railways introduced a new demurrage policy, reducing the demurrage-free period from 15 days to 48 hours.\textsuperscript{88} Although the current status of brokers has not been investigated, it has been said that "... a pure lumber trader could not exist in today's competitive environment."\textsuperscript{89} Many have become in effect full function wholesalers, and some, notably Cooper Widman Ltd. and Lignum Sales Ltd. have integrated backwards into lumber production.\textsuperscript{90} Cooper Widman Ltd. was purchased by Bulkely Valley Pulp and Lumber Ltd. in June 1967 and will function as the marketing agent for the output of this company.\textsuperscript{91}
Pulp Marketing

The extension of the range of activity into the marketing of output by producers in this field is in many ways similar to that in wood products. The growth of company expertise has been a key factor in the operations of MacMillan Bloedel Ltd., for instance, and mills have in many cases switched from indirect to direct sales as a result of increased volumes sold in individual markets. In other cases the use of independent channels is the norm since the markets are not large enough to support the economies achieved by direct selling.

In many cases these economies are very great, however, and in conjunction with the rapidly growing economies of scale in production produce a great stimulus to forward integration "... economies of scale in international and especially in intercontinental, trade are very pronounced. For a worldwide sales organization a high volume operation may be even more necessary than for the manufacturing of bulk type products." The stimulus towards integration thus originates in the marketing phase of operations as well as in manufacturing. This stimulus was also discussed in respect to 'co-operative' integration in the marketing of wood products.

With the growth of larger scale production units in the pulp sector, considerable pressure is generated towards forward integration to reduce market risks.
The logical extension of these long-term contracts is captive sales to an integrated partner. Pressures to reduce the variability of sales during the recent [early 1968] soft market conditions and to reduce marketing costs generally are causing a trend toward longer-term and captive-sales. 96

Many established market pulp producers have set up their own pulp marketing agencies. MacMillan Bloedel, for instance, as of 1970 sold their own pulp worldwide except for the use of agents in some Latin American markets,97 and as early as 1963 had taken over responsibility for marketing its output in major markets such as the United Kingdom, Japan, and North America.98 In 1970 also, Canadian Forest Products sold all market pulp production from its mill at Port Mellon as well as production from Prince George Pulp and Paper Ltd., a joint venture with the Reed Paper Group.99

In the interior pulp expansion since 1965, integration of manufacturing and marketing has been almost complete. In very many cases the process had actually been one of backward integration by marketing and paper-manufacturing firms in search of raw material supplies. The foreign partners in these ventures almost invariably have extensive pulp marketing or pulp consuming organizations, and "Among the participating enterprises are both the biggest buyer and the biggest seller of market pulp in the world."100

Among the companies involved are the Bowaters Paper Corporation, the largest pulp producer in the world,
Feldmühle AG, the largest producer of paper and board in the European Common Market, Svenska Cellulosa Aktiebolaget, Sweden's largest integrated forest products company, and International Paper Ltd., "currently [1966] the largest pulp and paper company in the world."
CHAPTER IX

SUMMARY

The history of integration in the forest industry of British Columbia extends over many years. It has been a long and complex process, with stimuli originating in many sectors. The resulting structure of the industry is one of some complexity, characterized by various types and stages of both co-operative and corporate integration. Almost all operating units have involved themselves in one form of integration or another.

Forestry remains the one major non-integrated sector of industry activity, lying for the most part outside the control of the private sector. The provincial government is responsible for the bulk of this activity, and only in the case of Tree Farm Licences has it relinquished any degree of responsibility. Even in the case of these tenures, however, the British Columbia Forest Service has retained a great deal of authority. This agency establishes the ground rules for forest management on these tenures through the control of rotation periods and the guidance of harvesting activity. There has been increasing evidence in recent years that additional firms in the private sector will be permitted to assume responsibility for a larger share of forestry activity.
While forestry is the major sphere of government participation in the forest industry, it does exert direct control over the nature of timber acquisitions by the forest industry. Within the context of government timber disposal policies, though, the extent of integration is large indeed. Very few operating firms have not established control over large portions of their timber supply. Conversion units are by far the dominant elements in this respect.

Harvesting activity is similarly highly integrated. As one would expect, logging is of necessity supported by a timber position, and integration between these two phases is of the very maximum extent. As an adjunct to mill control over timber, harvesting activity has increasingly fallen within the sphere of the conversion sector. In the case of the remaining elements of the logging sector which are not corporately integrated with either timber or conversion, a high degree of integration still exists through the medium of contractual commitments in the supply of timber and the sale of output.

Conversion, at the core of much integration is thus a sector which has integrated backwards into the supply of raw materials to a very marked extent. It is in this sector, too, where a great deal of co-operative integration is found. In addition to the extensive use of contractual arrangements for the harvesting of timber, large quantities of raw materials in the form of logs and pulp chips are exchanged through the
medium of formal and informal agreements.

Horizontal integration in all these three sectors has arisen for the most part in consequence increasing ties between them. Very little horizontal integration has taken place for the advantages to be derived from the ownership of like firms. The consolidation of timber control, for instance, has arisen in large part because of mill involvement in timber positions rather than because of forces inherent in the timber control sector. The consolidation of the logging sector has developed rather from increasing large-scale mill participation in both this activity and in timber control rather than from the melding of logging firms per se. In conversion too, much concentration of activity has arisen in consequence of attrition among the less viable units accompanied by internal growth of the survivors. Much of the horizontal integration in conversion has resulted from a search for raw materials.

Vertical integration within the conversion sector has been rather more prevalent, and the primary stimulus to this, apart from the acquisition of wood fibre has been the optimum utilization of raw materials. This force has been important in the integration of pulpmills, sawmills, plywood mills, and shingle mills. It has for similar reasons been a major stimulus to horizontal integration in the sawmilling sector in recent years with the growth of specialized processing facilities.
Vertical integration between manufacturing companies and marketing activities is in total perhaps the most complex aspect of industry structure. As in the case of other phases of industry activity, direct links in this area have a long history of development. One of the very earliest examples of the process involved in fact the backward integration of what was a marketing company.

All offshore wood-products marketing activity involves a major element of integration, either co-operative or corporate, though only the major firm in the latter category has extended the scope of its activities into channel control.

In Canadian wood-products markets, forward integration is much more pronounced and directly involves a number of major forest products manufacturers. While co-operative integration is not totally absent, the bulk of this integration is of a corporate nature. Many of the smaller producers still rely upon independent channel intermediaries to a large extent. In the British Columbia market, almost all producers are involved in direct sales to local markets.

The nature of United States rail markets is such that corporate integration has not taken place to date. Apart from occasional examples of co-operative integration, marketing in this area is still carried on through independent (albeit consolidating) channels.

In the marketing of wood pulp, production is almost entirely integrated with marketing agencies. In this area,
backward integration by marketing and pulp-using firms has been conspicuous since 1965.

The British Columbia forest industry may thus be characterized as highly integrated, though a few elements of non-integration still prevail in some areas. The largest of these is of course forestry. Truly non-integrated entities are very much in the minority and exist in only a few cases in the spheres of timber control, logging, conversion, and marketing. In export markets there are numbers of non-integrated middlemen, though they lie presently somewhat outside the pale of the British Columbia forest industry.

The most common form of integration is by far that existing between timber control and conversion activity. Logging is in consequence highly integrated also and even the surviving firms involved only in this phase of activity have become linked to conversion plants through the medium of contractual commitments.

In spite of a great deal of consolidation that has taken place in the sawmilling sector since 1950, a substantial number of single-mill entities remain. Multi-unit corporate integration has not so far included all viable operations. Cooperative integration in respect to log trading and pulp chip sales, however, is extensively practiced by even the largest companies. With few exceptions, plywood, shingle, and pulp manufacturing are carried on within a single corporate structure.
Corporate integration between production and marketing is practiced on a worldwide scale by only the newer pulp manufacturing ventures and by MacMillan Bloedel Ltd. Apart from integration into wood-products marketing in Canadian markets by several of the larger companies, the great majority of sawmills in the province rely upon either some form of co-operative integration or upon independent middlemen to reach their markets. Seaboard is the major marketing agency involved in consortium selling in export markets. This company has grown out of what is probably the most extensive form of co-operative integration in the industry in any sphere of activity.

Pressures leading to integration have originated in many spheres. There is, firstly, the nature of the raw material base, characterized by great regional variation and by a mixture of tree species, grades, and sizes. Access has traditionally been the most difficult problem to overcome. These features have meant that a great deal of importance has been attached to the location of timber cutting rights, for the viability of both logging and conversion depends in large part upon the cost of raw materials production. Given the state of technology at any one period in time, control over a rather small percentage of the province's timber resources has placed enormous leverage in the hands of those able to control these stands.

The nature of the resource has meant, too, that
logging is and always has been a capital-intensive activity. Even small-scale operations must invest a very substantial sum in equipment.

The mixed nature of the resource has had far-reaching impact upon conversion activity, especially in view of the rising costs of raw materials and the strength of competition in the great majority of forest products markets. Pressures have been great for a fuller and more optimum use of log inputs. As in logging activity, manufacturing has been compelled to diversify and to increase the scale of operations. The growth of co-operative and corporate allocation of log inputs has also been a direct result of the character of British Columbia forests.

The provincial government has been a major force in the British Columbia industry since the 1880's. While its earlier activities were for the most part restricted to the issue of timber rights, it has become very actively involved in forest management since 1945. In recent years, its role shows signs of growth rather than diminution. At all times its activities have exerted a profound influence, directly or indirectly, upon industry structure.

There was, firstly, the comparatively uninhibited issuance of cutting rights through the medium of Crown and railway grants and Timber Licences and Leases. Combined with the terms of issuance including, variously perpetuity transferrability, and renewability, this legislation allowed
free rein to forces active in the industry before 1945. As we have seen, the ultimate ramifications have still to be determined, for some of these tenures remain active even today. Their influence on the subsequent issuance of Tree Farm Licences is somewhat difficult to ascertain, but it would appear that they did play a part in the granting of these tenures. Most importantly, the nature of these pre-1945 tenures allowed the early development of a great deal of consolidation in timber control, logging, and conversion as well as a very significant amount of vertical integration between these three sectors.

In the post-war period, the implementation of sustained-yield has placed great pressure on firms to integrate into timber control. The vehicles for large-scale, long-term, and secure control of resources were provided, too, --the Tree Farm Licence, the Pulp Harvesting Area, and the Timber Sale quota system. Conditions surrounding the issue of cutting rights in Public Sustained-Yield Units have been of particular consequence for industry structure since they govern the disposal of in excess of two thirds of available cutting rights. These tenures have created the scale and security of timber control which is an essential element of any large-scale investment in the industry. Through government edict, the disposal of many of the larger alienations has been linked directly to conversion activity.
In recent years, increasing pressure has been placed upon the industry by utilization regulations. Facing a resource base already deteriorating by almost every economic criterion which could be applied, the forest industry has been forced to adapt to the forest far more precisely than ever before. In earlier days the industry would not have survived without the freedom to high-grade and without timber worth high-grading. Today it has neither the freedom nor the timber.

The impact of these changes has fallen, and will continue to fall first upon the logging sector. The cost of operating many stands has risen a great deal without a compensating rise in the value of output, and indeed with a decline in many cases. In conversion, the resulting impact has been hardly less demanding of the industry's ability to cope with change. Tremendous increases in investment have been called forth in two major areas—smallwood milling, and residue utilization. The present and future viability of small-scale, non-integrated firms in both logging and conversion has in consequence fallen to levels which have seen no precedent.

It would, therefore be difficult to underestimate the impact of the search for secure raw materials supplies by conversion plants. Of itself, this process has been the single most influential factor in both horizontal and vertical integration in the areas of timber control, logging, and conversion. With superior capital resources and facing a great upsurge in their demand for logs following World War
II, coast mills rapidly and effectively eliminated the independent logging sector by outbidding them for available timber supplies. In the interior, where logging, milling, and timber control were always intimately associated, the process has varied slightly in that horizontal integration is often the trend in evidence. Vertical integration by interior pulp mills has served simultaneously to secure and augment their wood supply and to improve the utilization of the log inputs.

In post-war integration, these two foregoing developments have been outstanding. The disappearance of the independent logging sector on the coast was largely complete by the mid-1960's. Consolidation of sawmills in the interior, the parallel in that region, is of a rather more recent origin. The process started in the mid-1950's and accelerated rapidly in the following few years. It continues until the present, and has accelerated somewhat in the past two years as many mills, burdened with high interest charges on new investment have faced cash flow problems created by depressed lumber markets.

In the area of integration between manufacturing and marketing, both major developments have taken place essentially since 1963. The first of these developments was the vigorous movement of MacMillan Bloedel into a degree of channel control in all its major offshore markets for wood products. The second has been the extensive growth of interior pulp manu-
facturing, almost all of which has been corporately linked to either pulp-using companies or to pulp and paper marketing concerns.

Some form of integration into wood-products marketing in export markets has been necessary since the early 1900's. The earliest form of this activity took place largely in response to needs for a more direct representation of the interests of British Columbia producers in foreign markets and for transportation arrangements more conducive to effective market service. These needs are still present today.

The integration of producing units seeking export market access is essential if economies in the marketing function are to be achieved. Few producing mills are large enough of themselves to support a marketing organization in any one market, and further, to do so without market alternatives would expose the producer to a substantial element of market risk inherent in such a process. Corporate or co-operative integration has proven to be the most viable course, and some 97% of all waterborne wood-products exports presently flow through three major marketing companies in the British Columbia forest industry.

There are two major sources of risk for all conversion plants in the British Columbia forest industry. The first, a shortage of raw materials is effectively kept at bay by existing tenures and by a rapidly changing technology of
harvesting and conversion. The second major element of risk lies in the marketplace.

International and Canadian forest products markets are highly competitive and are subject to substantial swings in demand over the short and intermediate term. Depressed demand conditions and periods of oversupply are as characteristic as buoyant demand and short supply. Participation in them is never without its perils. Dependence upon them is unavoidable for British Columbia producers.

Forward integration into marketing is essentially a device for reducing these risks to a minimum level, particularly those originating in the competitive setting. This applies to consortium and corporately integrated marketing activity as well as to the process of increasing channel control.

Integration by and within the forest industry offers three fundamental advantages. Without their benefit the industry would never have achieved the viable status it now holds in international and domestic markets.

The first major series of advantages is derived from control of the raw material supply, constrained as this control may be by the role of the provincial government. The major functions of this control lie in the nature of log inputs for conversion—their cost, the capital investment necessary for harvesting, and qualitative aspects of log flows to conversion plants—species, size of log, and grade of raw
material. These dimensions of the raw material supply have great implication for the competitive position of the firm in product markets. In addition, given the rather rigorous limitation upon the availability of wood fiber in the province, timber control is essentially the only mechanism by which the firm can protect its future supply of raw materials. This is an essential adjunct to any large scale commitment in manufacturing capacity or in forward integration into the marketing phase of operations.

The second series of advantages lies in the ability of integration in conversion to profitably utilize maximum proportions of log inputs. Each grade and species of log can be processed in a manner most conducive to maximum profit. Maximum recovery and profitable conversion of wood residues can be effected. Stemming from both these functions is the added advantage of a multi-product product operation and a reduction in market risks.

The third major area of advantage from integration lies in marketing. For many markets, direct representation for the firm and scale economies are possible only with some form of integration. Security of market access is improved by integration into channels, but this too is feasible only for firms with a very large and relatively controllable manufacturing base. Perhaps most importantly, forward integration into the field of marketing builds expertise in the area and thus its point of view becomes a more major
source of influence upon the productive processes. The competitive position of British Columbia producers vis a vis both competing producers and competing products is more keenly felt, and adaptation to the market should be more precise because of this.

One major sphere of productive processes remains largely outside the control of the forest industry—forestry. Another, the planning of harvesting activity is still largely controlled by forces outside the industry. The agency responsible for these functions is of course the provincial government. In the past three decades the industry has in fact been forced to produce to the raw materials base as determined largely by this institution.

The future role of the forest industry in this area has not by any means been set out in a definitive manner. It may well be that a more vigorous and competitive industry would result from increasing involvement in this area. Decision-making and investment in the forestry phase of activity by private enterprise would be a very logical extension of integration. It would permit a freer production to market needs. It would remove from the industry at least part of the burden of operating with all the inherent weaknesses in the raw materials base. It would eliminate the problems resulting from non-industry control of what are very integral phases of its activity. It would allow the industry to realign itself more precisely to present and future market needs.
The industry is forced to cope with a number of artificially-created restraints in the area of forestry and in the execution of harvesting. Inadequate public reforestation can only impair the present and future viability of the industry. Accelerated utilization regulations force the industry to operate even closer to the boundaries of feasibility, and a more optimum scheduling of close-utilization could be introduced, a schedule more in step with technologies, investment, and world market conditions. The removal of arbitrary cutting restrictions would result in the scheduling of log flows to the mills in accordance with market conditions rather than as dictated by the terms of the tenure.

The environment in which the forest industry operates is far from static, and until it becomes so the structure of the forest industry will remain equally changeable. All the major sources of influence that have operated in the past still bear on the industry today.

The raw material base is destined to become steadily less accessible and less desirable as far as the qualitative aspects of the harvest are concerned. As ever, the industry will have to adapt to the resource.

Government is less predictable. Its actions have in the past and will in the future have extensive implications for the forest industry. Notable in this respect are the future course of utilization and harvesting regulations. Tenures, too, are not fixed for all time, and action in this
area will be closely followed by the industry. The next major development in this respect will be the award of 'third-band' wood volumes. The growth of private forestry will be a function of an essentially governmental decision, as will the continued operation of the 30-50% clause.

Most changeable of all, however, are the markets for British Columbia forest products. Developments in this area will in all probability play a part in determining industry structure in future at least as large as that played by resource control in the past. Most important in this respect is the price structure, for it determines the present and future viability of all operations in the British Columbia industry. Competition from non-wood products and from new wood products has tremendous potential for forcing all forest industry firms to adapt. Developing trends in channel control have far-reaching implications for market access.

Stagnation in the environment in which the forest industry operates thus appears to be a highly improbable development. Integration has proven itself in the past to be a most effective adaptation to change. It is highly improbable that the process would cease in an era in which its environment shows every sign of increasing change.
FOOTNOTES

CHAPTER I


3. Loc. cit.


10. See, for example, Maps of the Canadian National Topographic System, 1:50,000 Kingcome Inlet Sheet #92 L/16 E, Harrison Lake, Sheet #95 H/5 W or P. Robinson, "An analysis of logging. . . ." op. cit.,

11. J.A. MacIntosh, Forest Products Laboratory, Department of Forestry and Rural Development of Canada, Vancouver, B.C. Interview with the author, Feb. 8, 1971.


17. There are minor differences in Continuous Forest Inventory and Forest Industry Statistics data.

18. British Columbia Forest Service, Forest Surveys and Inventory Division, Provincial Forest Inventory Maps. See, for instance, Key Map or 93F/NW or 92K/SW.


31. *Loc. cit.*, Conversion factors of 6 (Coast) and 5.75 (Interior).


33. *Continuous Forest Inventory*. . . *op. cit.*, p. 70. Based on sound-wood volumes in trees 10" d.b.h. and over.

34. i.e. the 'true' firs.


42. Best, op. cit., p. 206.

43. Loc. cit.

44. Hardwick, op. cit., p. 56.


47. Clear-cutting is the principal logging technique in most cedar regions.


49. From data provided by Williams Logging Ltd., Spuzzum, B.C.

50. Continuous Forest Inventory, op. cit., p. 61.


52. Guthrie and Armstrong, op. cit., Appendix B.


54. Best, op. cit., p. 58.


57. Ian Mahood, Vice-President, Council of Forest Industries of B.C., British Columbia's Future..., op. cit., p. 7.

58. Ibid., p. 8.

59. Continuous Forest Inventory..., op. cit., p. 127.
FOOTNOTES

CHAPTER II


2. A. Milton Moore, Forestry Tenures and Taxes in Canada, Tax Paper No. 11, 1957, B.N.A. Act, provinces are given authority over resources.


8. H.N. Whitford and R.D. Craig, under the direction of C. Leavitt, Chief Forester, Commission of Conservation, Forests of British Columbia, Ottawa, 1918, p. 82.


11. Although land bearing mature timber could not now be permanently alienated from the Crown, it was still possible for reforested and logged-off lands to pass into the hands of private holders since it escaped the statutory definition of 'Timber lands.' The process was eventually halted by legislation passed in 1947.
13. Ibid., p. 21.

15. Besley, op. cit., p. 28.
17. Loc. cit.
20. Sloan (1957) op. cit., p. 27.
22. Sloan (1957), op. cit., p. 28.
23. Loc cit.
27. Ibid., p. 90.

34. Mulholland, *op. cit.*, p. 35.
42. Whitford and Craig, *op. cit.*, pp. 87, 90.
45. Department of Lands and Forests (Maps), *op. cit.*
46. See page 38.
48. Sloan (1957), *op. cit.*, p. 27.
50. Sloan (1957), *op. cit.*, p. 27.
56. Ibid., p. 33.
57. Ibid., p. 34.
58. See Annual Reports..., op. cit., 1912-1920.
60. Loc. cit.
61. Ibid., p. 29.
62. Ibid., p. 38.
63. Ibid., p. 131.
64. Whitford and Craig, op. cit., p. 331.
67. Loc. cit.
68. Whitford and Craig, op. cit., p. 184.
70. Hardwick, op. cit., p. 50.
71. Sloan (1945), op. cit., p. 81.
72. Mulholland, op. cit., p. 35.
73. Whitford and Craig, op. cit., p. 91.
74. Whitford and Craig, op. cit., p. 90.
75. Loc. cit.
76. Best, op. cit., pp. 100-103.
77. Whitford and Craig, op. cit., p. 91.
78. Easton, op. cit., pp. 51, 52.
80. Ibid., pp. 73, 74.
81. Ibid., pp. 71, 72.
82. Ibid., pp. 85, 86.
84. Ibid., pp. 13, 14, 16.
85. Ibid., p. 16.
86. Hardwick, op. cit., p. 18.
87. Lawrence, op. cit., pp. 159, 160.
88. Ibid., p. 161.
89. Ibid., p. 91.
90. Calculations based on Sloan (1945), op. cit., pp. 79, 80.
91. Ibid., p. 80.
92. Mulholland, op. cit., p. 41.
93. Though on the other hand, holding charges were much lower, and smaller investors could likely maintain these holdings for long periods of time.
95. Sloan (1957), op. cit., p. 440.
96. Sloan (1945), op. cit., p. 81.
97. This section is heavily orientated towards coast operations. The interior industry was not of major significance in the provincial context until after 1945. The north-central interior industry before 1940, while not entirely representative of the interior, was character-
ized as "... an undercapitalized, marginal type of industry."


98. See Best, op. cit., p. 25. The Alberni mill closed in 1864 because the technology of logging at that time would not allow the assembly of raw materials on an economic basis.

99. Unterreiner, op. cit., p. 73.

100. Ibid., pp. 77, 78.


102. Best, op. cit., p. 29.

103. Ibid., p. 106.

104. Carrothers, op. cit., p. 250.

105. Best, op. cit., p. 61.

106. Hardwick, op. cit., p. 50.

107. Best, op. cit. p. 75.


110. Ibid., p. 18.

111. Ibid., pp. 18,19.


117. Whitford and Craig, op. cit., p. 170, see also Mullins, op. cit.
118. Hardwick, op. cit., p. 18.
119. Loc. cit.
120. Best, op. cit., p. 140.
122. Ibid., p. 62.
123. Best, op. cit., p. 76.
124. Ibid., pp. 34, 35.
125. Ibid., p. 129
126. In 1945 74% of the total Provincial log scale originated in the Vancouver Forest District. Best, op. cit., p. 203.
129. Lawrence, op. cit., p. 159.
132. The MacMillan case is a special one and will be dealt with in the next section.
133. Lawrence, op. cit., p. 86.
134. Ibid., p. 172.
139. See Lawrence, op. cit.
140. Unterreiner, op. cit., p. 60.
141. Carrothers, op. cit., p. 252.
142. On the basis of a 200 day year.
143. See for example Unterreiner, op. cit., pp. 26, 36.
144. Hardwick, op. cit., p. 17.
146. Lawrence, op. cit., p. 108.
147. Ibid., pp. 111, 112.
149. Loc. cit.
150. Lawrence, op. cit., pp. 123, 124.
153. Edgett, op. cit.
155. Lawrence, op. cit., p. 123.
156. Dickson, op. cit., p. 17.
157. Lawrence, op. cit., p. 159.
158. Clyne, op. cit., p. 15.
159. Loc. cit.
160. Ibid., p. 16.
161. See page 59.
162. Clyne, op. cit., p. 15.
FOOTNOTES

CHAPTER III


2. Loc. cit.


5. McKee, op. cit., p. 175.


8. Jones, op. cit., p. 73, Forest Act, Section 36(8).


Sloan (1945), op. cit., pp. Q143, Q144.


11. Ibid., p. 91.

12. Forest Management Licences were renamed Tree Farm Licences in 1958.


15. Ibid., p. 94.

16. Ibid., p. 224.


23. Ibid., 1969, p. 66. This figure includes the cut from all lands included in the licences regardless of original status.


25. Moore, *op. cit.*, p. 15. Up to 1955 only four of these long-term timber sales had been issued.


27. The interior had never really participated in the timber staking activity before 1907. See Report of the Forest Service 1945 to 1969, "Total Scale of all Products Billed, by Land Status and Forest Districts."


29. Ibid., p. 124.


34. Dr. R. Haley, Faculty of Forestry, University of British Columbia, Interview with the author, Feb. 4, 1971.


36. Province of British Columbia, *Forest Act*, Sections 17(1a), 17(3a), 18(1), 18(2).


43. Haley, *op. cit.*

44. Shebbeare, *op. cit.*, p. 73.


50. Haley, *op. cit.*

51. *Loc. cit.*, and Jones, *op. cit.*, pp. 72, 73.


55. Jones, op. cit., p. 74, Forest Act, Section 17A(1).


58. Manning, op. cit., p. 86.


60. Confidential.


FOOTNOTES

CHAPTER IV


3. Loc. cit.


9. Ibid., p. 91.

10. Ibid., p. 106 (Data as of 1955).


12. Dr. R. Haley, Faculty of Forestry, University of British Columbia. Interview with the author, Feb. 4, 1971.


16. Including Mr. R.R. Johnson, Logging Manager, L & K Lumber (North Shore) Ltd., (Interview with the author, Jan. 29, 1971) and Mr. J.F. Parks Logging Manager, Whonnock Lumber Co. Ltd., Whonnock (Interview with the author, Nov. 5, 1970).


22. Confidential.


24. The difficulty in this respect is similar to that prevailing regarding quota control through corporate links. Investigation is "... almost impossible because new companies could have links with large firms that would not be apparent without considerable investigation.""Timber Bid Fees. . . ." op. cit., p. 13.


26. Sloan (1957), op. cit., p. 188.

27. Ibid., pp. 158, 188.

28. Ibid., p. 158.

29. Confidential. On the basis of seven interviews.

31. Mr. W.C. Deans, Assistant Manager, Log Supply Department, Canadian Forest Products Ltd., Vancouver, Interview with the writer, Nov. 24, 1970.

Mr. R.B. Fisher, Woodlands Manager, L & K Lumber (North Shore) Ltd., Interview with the author, Jan. 29, 1971.


33. The pressures on sawmills to upgrade their capital investment will be discussed in more detail in the section on conversion.

34. Fisher, op. cit.


35. Manning, op. cit., p. 20. Several industry executives expressed a similar view and that the only real value of a sawmill was the timber position it held.

36. This area will be discussed in detail in the section on logging. Implications for industry structure are very great.


40. Ibid., pp. 34-39.


42. Sloan (1957), op. cit., p. 111.
FOOTNOTES

CHAPTER V


5. Loc. cit.


7. Hemmingsen, op. cit., p. 64.
FOOTNOTES

CHAPTER VI


Mr. I. Stewart, G & F Logging Ltd., Hope, interview with the writer, March 1970.

Mr. G. Laaback, Williams Logging Ltd., Spuzzum, interviews with the writer, Nov. 1969 and March 1970.


7. Johnson, op. cit.

8. See Robinson, op. cit., p. 49.


J. Dobie, Research Officer, Canada Department of Forestry and Rural Development, Forest Products Laboratory, Vancouver, "How chipper headrigs reduce small-log processing costs," Canadian Forest Industries, Vol. 87, No. 8, August 1967, p. 60.


24. Though one source considered that much could be done to improve the efficiency of existing equipment through modifications in techniques of use. It would seem that changes in both techniques and equipment will eventually be used to control smallwood costs.


27. The reader will recall the nature of resource variations, particularly on the coast.


32. Dunbar, op. cit.


34. Sloan (1957), op. cit., p. 375.

35. Mr. W.C. Deans, Assistant Manager, Log Supply Department, Canadian Forest Products Ltd., Vancouver. Interview with the writer, Nov. 24, 1970.

Mr. K.E. Phillips, Log Broker, McKay & McCallum Logs Ltd., Vancouver. Interview with the writer, Nov. 27, 1970.

36. As was discussed, Forest Service regulations specify that an operation must have a contract for the sale of this material before he will be allowed to log to close-utilization standards.
38. See p. 12.

Dobie, op. cit., p. 65.

Mr. R. Round, Supervisor of Quality Control, Crown Zellerbach Building Materials Ltd., Fraser Mills Division. Interview with the author, Nov. 18, 1970.


41. To be discussed later.

42. Fisher, op. cit., Deans, op. cit.

Mr. J.E. Parks, Logging Manager, Whonnock Lumber Co. Ltd., Whonnock. Interview with the author, Nov. 5, 1970.


48. Ibid., p. 32.


54. Mr. K. Reid, telephone interview with the author, Nov. 12, 1970. Mr. Reid was formerly an independent logger. He also logged under contract for two years.

55. Mr. G. Paterson, Logging Manager, Bay Forest Products, Ltd. Interview with the author, Jan. 28, 1971.

Johnson, op. cit.

56. Ibid.


58. Sexton, op. cit., p. 77.

59. Parks, op. cit.

60. Paterson, op. cit.


65. Sloan (1957) op. cit., pp. 157, 158.

66. Contract logging was common before the turn of the century.


68. Parks, op. cit.


70. Mr. G.R. Barwell, Hope. Interview with the author, Jan. 23, 1970. Mr. Barwell was formerly a contract logger.
71. Parks, op. cit.
72. Laaback, op. cit.
75. Mr. Oliver Bowman, President, Orion Bowman & Sons Ltd., Sardis. Interview with the author, Oct. 16, 1970.
76. Hardwick, op. cit., p. 18.
FOOTNOTES

CHAPTER VII


Mr. W. Pasteleur, Assistant Manager, Forano Ltd., Western Division, Vancouver. Interview with the author, Feb. 3, 1971.

2. Dr. R.W. Wellwood, Faculty of Forestry, University of British Columbia. Interview with the author, Feb. 3, 1971.


4. Pasteleur, op. cit.


6. Pasteleur, op. cit.


12. Ibid., p. 60.
16. Ibid.
20. Ibid., Wellwood, op. cit., Gregory, op. cit.
22. Calculated at $4 per hour.
23. Pasteleur, op. cit.
26. Ibid., p. 56.
27. Ibid., p. 42.
29. Heath, op. cit., p. 70.
30. Loc. cit.

Mr. L. Wilson, Supervisor of Production Planning, Crown Zellerbach Building Materials Ltd., Fraser Mills Division. Interview with the author, Nov. 18, 1970.


34. Guest, op. cit., p. 91.


36. Mr. K.E. Phillips, Log Broker, McKay & McCallum Logs Ltd., Vancouver, B.C., Interview with the writer, Nov. 27, 1970.

Mr. W.C. Deans, Assistant Manager, Log Supply Department, Canadian Forest Products Ltd., Vancouver. Interview with the writer, Nov. 24, 1970.


Mr. G. Dunbar, Manager, Log Supply Division, MacMillan Bloedel Ltd., Vancouver. Interview with the author, Feb. 11, 1971.

38. It should be pointed out that this process is also a means whereby single-unit, specialized manufacturers can survive—provided of course that they have a timber position of their own and/or the needed log supplies are available from those producing them but who do not have the appropriate processing facilities.


Gregory, op. cit.
41. Sloan (1957), op. cit., p. 382.
42. Marra, op. cit., p. 4.
43. Mr. E. Sonner, Vice-President, Bay Forest Products Ltd., Interview with the author, Jan. 28, 1971.
   Dunbar, op. cit.
44. Hardwick, op. cit., p. 42.
45. Notably Powell River.
   See also Sloan (1957), op. cit., p. 354.
49. Hardwick, op. cit., p. 43.
50. Dunbar, op. cit.
51. Mr. R. Round, Supervisor of Quality Control, Crown Zellerbach Building Materials Ltd., Fraser Mills Division, Interview with the author, Nov. 18, 1970.
52. Mullins, op. cit., p. 67.
53. Dr. R. Haley, Faculty of Forestry, University of British Columbia, Interview with the author, Feb. 4, 1971.
56. Loc. cit.
W.G. Hughes, Forester-in-Charge, Management Division, B.C. Forest Service, "Mill Capacity in British Columbia - Present and Planned," British Columbia's Future in Forest Products Trade in Asia and the Pacific Area, Trevor

57. Mullins, op. cit., p. 55.

58. Mr. Paul Plant, Ralph S. Plant Ltd., Vancouver. Interview with the author, March 4, 1971.


60. Mullins, op. cit., p. 58.

61. Loc. cit.


63. Loc. cit.

64. Loc. cit.

65. Mullins, op. cit., p. 58.

66. Pasteleur, op. cit.


68. Mr. C. Widman, President, Widman Industries Ltd., Guest Lecturer, Commerce 466, University of British Columbia, Sept. 22, 1970.


71. The Pulp and Paper Industry, ... op. cit.


74. Eklund, op. cit., p. 19.


76. Guthrie & Armstrong, op. cit., pp. 120, 121.
77. Reed, op. cit., p. 12.
79. Reed, op. cit., p. 12.
80. Eklund, op. cit., p. 18.
81. Loc. cit.
82. Reed, op. cit., p. 12.
83. Mr. J. Greg, Vice-President of Manufacturing Services, Crown Zellerbach Canada Ltd., Guest Lecturer, Commerce 466, University of British Columbia, Nov. 3, 1970.
84. Reed, op. cit., p. 12.
86. At least one major firm (MacMillan Bloedel) has established paper manufacturing on a large scale in the U.K.
FOOTNOTES

CHAPTER VIII


5. Mr. D. Butterworth, Manager of supply and sales, Bulkely Valley Pulp and Timber Ltd.
   
   Guest Lecturer, Commerce 466, University of British Columbia, Sept. 30, 1970.


10. Dee, *op. cit.*


13. Ibid., p. 190.

15. Ibid., p. 44.
17. Dee, op. cit.
19. Ibid., pp. 64, 65.

22. Loc. cit.
25. Dennis, op. cit.
26. Ibid.
27. Mr. J. Tullidge, Formerly Vice-President Marketing, Weldwood of Canada Ltd., Guest Lecturer, Commerce 466, University of British Columbia, Oct. 20, 1970.

29. Ibid., p. 46.
30. Ibid., p. 52.
33. Argue, op. cit., p. 33.
34. Plant, op. cit.
35. Argue, op. cit., p. 133.


38. Ibid.


43. Argue, op. cit., p. 132.


45. Dee, op. cit.


47. Ibid., 1966, p. 12.

48. Tullege, op. cit.


50. MacMillan Bloedel handles all export sales and all sales in Canada outside British Columbia for this company. See BCFP 1969, Annual Report, p. 7.

51. Gregory, op. cit.


53. Edgett, op. cit.

54. Ibid.


56. Ibid., p. 69.

57. Ibid., pp. 67, 69.

58. Edgett, op. cit.

60. Argue, op. cit., p. 126.

61. Ibid., p. 134.

62. Loc. cit.

63. The status of the independent wholesale/retail sector in major markets has not been investigated in detail. Many major United States forest products firms have taken action similar to MacMillan Bloedel in United States markets.

64. See Robinson, op. cit., for a discussion of this complex problem. Information and perspectives for this section have been obtained from interviews with four industry executives, none of whom have been cited.


66. Loc. cit.

Mr. Oliver Bowman, President, Orion Bowman and Sons Ltd., Sardis. Interview with the author, October 16, 1970.

67. Argue, op. cit., p. 130.

68. Ibid., p. 135.

69. Loc. cit.

70. Ibid., pp. 59, 117.


71. Argue, op. cit., p. 117.

72. Ibid., p. 125.

73. Plant, op. cit.

74. Dee, op. cit.

75. Mr. C. Widman, President, Widman Industries Ltd., Guest Lecturer, Commerce 466, University of British Columbia, Sept. 22, 1970.

Butterworth, op. cit.
Plant, op. cit.
76. Plant, op. cit.
(As in the case of Triangle Pacific, for example).
78. Plant, op. cit.
79. Widman, op. cit.
80. Plant, op. cit.
81. Ibid.
82. Argue, op. cit., pp. 54, 55.
83. Ibid., p. 134.
85. Plant, op. cit.
86. Widman, op. cit.
87. Argue, op. cit., p. 118.
88. Ibid., p. 116.
90. Loc. cit.
91. Widman, op. cit.
92. Dennis, op. cit.
93. Mr. R. McDonald, Canadian Forest Products Ltd., Guest Lecturer, Commerce 466, University of British Columbia, Nov. 17, 1970.
94. Suderman, op. cit., p. 68.
96. Suderman, op. cit., p. 68.

97. Dennis, op. cit.

98. Ibid.


100. Eklund, op. cit., p. 22.

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