LUMBERING--SUPPLY AND DEMAND

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FOR DEGREE OF BACHELOR OF ARTS
HONOUR POLITICAL ECONOMY

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INTRODUCTION

The lumber industry is, and always has been one of the most important basic industries of Canada. The Dominion is acknowledged to be one of the greatest lumber producing countries in the world, even though the total annual production is small, compared with that of some other countries. The highest lumber production in Canada has been approximately five billion board feet per annum, while that of the United States of America has been thirty-three billion board feet per annum. The home consumption of lumber in the United States is, however, proportionately large so that relatively little surplus is left for competition in trade circles. In Canada, the home market consumes only about two-thirds of the annual production. There is, therefore, a relatively large surplus for export to foreign markets.

As one of the Forest Industries, lumbering has been superseded in recent years by the rapidly developing Pulp and Paper Industry, both in annual output and in value of this output. Even so, the Lumber Industry holds a position of some consequence in Canadian Economics.
In any industry there are two fundamental problems; supply and demand. It is the purpose of this thesis to present the problems of supply and demand in the lumbering industry and, where possible, to offer suggestions which, in view of the findings, seem apparent to the writer. The problems of supply will be discussed in the first three chapters. In the first, an attempt will be made to show where the forest resources are situated in Canada and the percentage of these available for use. In the second chapter, the existing methods of regulation and control will be studied with certain emphasis placed on the inherent weaknesses of the system. In the third chapter, the rates of increment and depletion will be discussed, illustrating their effects on the total supply of forest resources in Canada. The suggestions for the improvement of the situation in Canada, both in regard to depletion and total supplies presuppose close association with and reference to the two chapters previously discussed.

With this rather brief presentation of the problems of supply for the lumber industry, a discussion of the demand factor will follow. In chapter four, the growth of demand for Canadian lumber will be described, with reference made to the effect of this growth both on the total supplies and on the rates of increment and depletion.

In the final chapter, the possible future demands of
the lumber industry will be considered; the effects which
such demands might have on the supplies of forest resour-
ces and on the rates of increment and depletion; and, in
view of this, the change in the form of regulation and con-
trol necessary to assure that the supply will be sufficient
to meet the demands.
CHAPTER I.

THE FOREST RESOURCES OF CANADA.

A discussion of the forest resources of Canada must necessarily be inadequate because of the limited statistical and survey material available. There seems to have been an extreme reluctance on the part of governments and some who are interested in the forest products industries to admit unfavourable conditions with respect to the forest resources, and the result is much confused public thinking and a lack of important information. Administrative statements which have purported to list the available supplies and the reserves of timber and to state the degree of good forestry practices being applied have in the past been very often coloured almost to the point of falsity. Few, however, were in a position to prove that this was the case. The only possible clarification of this situation is the establishment of a complete national inventory, kept up to date from year to year, with its implications translated honestly to the public. Such a scheme has, in fact, been introduced into Canada but progress has been persistently delayed, the feeling being in many quarters that many difficulties have been thrown in its path by both provincial authorities and individual lumbermen who have ulterior motives. As a result, an adequate published survey seems to have been made only for British Columbia, with a limited amount of work done in some of the other
provinces. For information regarding these other provinces we must, then, rely on their own publications regardless of how accurate they may be.

One of the difficulties of a general survey of Canada's forest resources is that of precise definition of terms used in classifying the various forest regions. Although all of the provinces use the same terms, there seems to be no uniform and exact definition which they all can follow. In order to compare forest statistics of the various provinces, it would thus become necessary to review their interpretation of the terms "productive", "merchantable", and "accessible". One could argue that because of the personal element involved in making decisions in regard to classification in accordance with these terms it would be impossible ever to arrive at complete uniformity. But this turns to an argument favouring the continuation of the Dominion Government's National Survey for only by having the inventory collected by the same group can we arrive at a reasonable degree of accuracy. Stripped of the ability to pad the figures through a different understanding of the terms, the provinces would no longer be able to fool the public by trying to create a favourable impression of the government in power.

The generally accepted meaning of the term "productive forest" is that forest area which is growing under climatic and soil conditions that will permit the timber
to attain sizes useful to trade and industry. The remaining area carries forests of value either because of their influence on water control, climatic conditions, game conservation, or by reason of their attraction to tourists. But, because of unfavourable growth conditions, these forests at present are considered non-productive from a commercial point of view.

The dictionary meaning of accessible is given as "capable of being approached"[^1]. This is the definition generally used in forest surveys—capable of being approached both economically and physically. In the latter sense, accessibility is based on the actual distance from waterways, roads, or railroads for use in entering the field and transporting the lumber. Even if the area is favoured with some nearby means of transportation, the cost of getting the lumber to the consumer must be considered. For this reason, the actual distance to the market and, in the case of some particular localities, the amount of wood which is present are, also, used in making the survey. The last mentioned consideration depends on the fact that where a large quantity of wood is to be found, it may be worthwhile to go to considerable expense to improve the existing means of transportation, since the capital expenditure will be spread over a large volume and the cost per unit will not be greatly increased. In the case of a small quantity of wood, such expenditures might be quite out of the question.

From the above explanation, the difficulties involved in attempting to arrive at a degree of uniformity by the separate provinces can easily be seen. True, their individual definitions will be more detailed, but this does not make the statistics any more accurate for comparison.

Within the productive forest area, the classification between merchantable and non-merchantable growth must be made. As the name implies, merchantable growth is the timber which has reached such a size that it can be of immediate use. Non-merchantable growth consists of the young growing trees which, although of little value now, will reach a merchantable size in the future. This young growth may be taken to represent the potential merchantable timber when due consideration has been made for the percentage which may be expected to be destroyed by fire or disease before reaching maturity.

The total land area of Canada is estimated to be 3,466,556 square miles. Of this, the forested area covers approximately 1,220,405 square miles. The ratio between these two figures is perhaps seen more clearly when it is stated that 35 per cent of the land area of Canada is covered by forests, and if we limit ourselves to the nine provinces, we find that, in them, the forests occupy 58 percent of the land area. It should be noted
that, as they stand, these figures represent all forest lands of every type in Canada and, therefore, serve only to misguide readers as to the future position of the woods operations of the lumbering industry.

The figure 1,220,405 square miles, representing the total forest land in Canada should first be divided into productive and unproductive forests. The productive forests are said to cover 770,565 square miles with the remaining 449,840 square miles representing unproductive forests. Within this productive area, classification must next be made between merchantable and non-merchantable timber. Of the productive forest land area, approximately 361,515 square miles are considered to be merchantable timber and 289,050 square miles non-merchantable.¹

As was mentioned previously, it is much more difficult to ascertain the area of the productive forests which is accessible for lumbering purposes. In its pamphlet, "Canada's Forests, 1943", the Dominion Bureau of Statistics offered an estimation that 430,000 square miles of the productive forests could be considered to be accessible. This figure, of course, includes both merchantable timber and young growth, no estimates being available as to the area of accessible merchantable timber alone. Perhaps no such figure could be hazarded due to the uncertain-

¹ Department of Mines and Resources - Canada's Forests, 1943.
ties involved. However, of interest to the lumbering in-
dustry is the statement relating to the relative amount of
saw-lumber in the stands of accessible merchantable timber.
About one-quarter of this timber should be large enough for
saw material and three-quarters suitable for pulpwood, fuel-
wood, posts, mining timber, etc. Much of this smaller tim-
ber would, in time, attain saw-timber size if allowed to
grow another 30-50 years, but there are some stands large
enough for pulpwood which cannot be expected to produce
saw logs because of adverse site conditions.

In giving a more detailed survey of the forest regions
of Canada, reference will probably be made to the hardwood
and softwood species of trees. It is not the purpose of
this thesis to delve into the various special traits of the
various species of trees found in these general groupings.
Let it suffice to note that there are over 150 different
species of trees in Canada of which some 55 are of com-
cial importance, 23 of these being softwoods and 32 being
hardwoods. At times, certain reference may be made to
species which are of special interest to the lumbering
industry. Generally speaking, the production of hardwood
lumber is more expensive than that of softwood owing to
difficulties in logging, driving, and manufacturing and
the market for the manufactured product is more restricted.

1. Dominion Bureau of Statistics - The Lumber Industry,
On this account, the hardwoods do not form a large proportion of the lumber produced even in eastern Canada where approximately 30% of the stand of timber is hardwood. The lumber produced in British Columbia and the Prairie Provinces is almost entirely of the softwood group, poplar being the only non-resinous tree cut in any considerable quantity.

The following table has been set up to put the information and statistics already given into graphic form for greater ease in comprehension:

THE FOREST AREAS OF CANADA

<table>
<thead>
<tr>
<th>Forested Lands</th>
<th>Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productive forests:</td>
<td></td>
</tr>
<tr>
<td>Softwoods:</td>
<td></td>
</tr>
<tr>
<td>Merchantable</td>
<td>222,465</td>
</tr>
<tr>
<td>Young Growth</td>
<td>175,310</td>
</tr>
<tr>
<td>Mixedwoods:</td>
<td></td>
</tr>
<tr>
<td>Merchantable</td>
<td>68,790</td>
</tr>
<tr>
<td>Young Growth</td>
<td>141,600</td>
</tr>
<tr>
<td>Hardwoods:</td>
<td></td>
</tr>
<tr>
<td>Merchantable</td>
<td>20,260</td>
</tr>
<tr>
<td>Young Growth</td>
<td>72,140</td>
</tr>
</tbody>
</table>

Total Productive forests 770,565
Non-productive forests 449,840

Total Forested Area 1,220,405
Total Land Area of Canada 3,466,556

Taken as a whole, Canada has a climate and soil
conditions which are favourable to more rapid new growth of timber than any other country in the world excluding the Scandinavian countries of Norway and Sweden. This, in itself, helps to lighten the gloom of pessimism which many writers cast over the future of our timber resources.

In making a survey of the forest resources of Canada, it is essential to bear in mind the geographical configuration of the country and to accord separate treatment to each geographical region. Otherwise, the figures as to the extent and durability of supplies are misleading. For this reason, we shall study the forests of Canada in three regions—British Columbia, The Prairie Provinces, and the area known as Eastern Canada. Although, to be exact, these three divisions do not actually coincide with a division made on the basis of forest species and growth, for our purposes this is the most satisfactory division.

British Columbia is the first of the three divisions which we shall survey. It is made into a separate geographical division of Canada as a result of the Rocky Mountains which physically bar it from the rest of Canada. There is a marked difference in the climate on the west of the Rockies to that on the east of them. The prevailing winds sweep inland from the ocean, crossing the mountain ranges and creating alternating wet and dry belts.
The coast belt, which has a mild even temperature and a precipitation from 60-100 inches, produces the most important forests in the province. With its mild temperature and heavy rainfall, this region has a more rapid rate of new growth than any other section of Canada. The other important wet belt is on the western slopes of the Rockies. It produces a similar type of growth, but because of greater extremes of temperature, this growth is not as rapid as in the coastal districts. In the intervening area between these two "wet belts", are the so-called "dry" belts. Here the stands of timber are much lighter and the lumber is of a lower grade. The dry belts are very often undervalued as a source of lumber in the face of the luxuriant growth in the two wet belts.

Because of the variation in the types of growth existing in these different regions of British Columbia, separate statistics are given for a number of zones. But for our comparison, these various zones have been grouped as coastal forests and interior forests.

The following table gives the forest classification of British Columbia: note that no mention is made of the accessibility of the timber. At the time when statistics were gathered for this table, the productive forest lands included 3,200,000 acres of accessible mature timber in the coastal region and 5,076,000 acres in the interior.
FOREST CLASSIFICATION OF BRITISH COLUMBIA\(^1\)
(in acres)

<table>
<thead>
<tr>
<th>Timber of Productive Quality</th>
<th>Coastal</th>
<th>Interior</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature Timber</td>
<td>7,880,000</td>
<td>14,776,000</td>
<td>22,656,000</td>
</tr>
<tr>
<td>Immature Timber</td>
<td>1,253,000</td>
<td>31,062,000</td>
<td>32,315,000</td>
</tr>
<tr>
<td>Not reforested</td>
<td>918,000</td>
<td>12,134,000</td>
<td>20,052,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10,051,000</strong></td>
<td><strong>64,972,000</strong></td>
<td><strong>75,023,000</strong></td>
</tr>
</tbody>
</table>

| Timber of Non-Productive Quality | 30,613,000 | 124,065,000 | 154,678,000 |

| Agricultural                 | 495,000    | 4,207,000   | 4,702,000   |

| **TOTAL AREA OF BRITISH COLUMBIA** | **41,159,000** | **193,244,000** | **234,403,000** |

Practically all of the immature timber on the coast is considered to be accessible as it is usually found in cut or burned-over areas. 4/5ths of the annual cut is made in these coastal forests. In the interior, it is estimated that of the 3,062,000 acres of young growth only 7,334,000 acres are accessible. The fact that it is estimated that there are approximately 22 million acres of mature timber in British Columbia should not cloud the fact that, of this, only approximately 9 million acres are considered accessible under present conditions. When the element of accessibility is brought into account, this Pacific Slope region does not appear to be in so favourable a position as it is acknowledged to have only 9% of the total accessible stand of Canada. In all fairness, however, it should be noted that because of the high quality of these acces-

\(^1\) Dept't of Lands, B.C. Forest Service - The Forest Resources of British Columbia, 1937.
sible stands, British Columbia has 44% of the accessible saw-timber of Canada. It is this last figure which is of special interest to us as it makes British Columbia, because of its resources, the most important single province with regard to the future of the lumbering industry.

From the standpoint of abundance and usefulness, the most important species of timber found in British Columbia are the Douglas Fir, Hemlock, Western Red Cedar, Spruce, and Balsam Fir. It is significant that all of these are widely cut into sawn lumber although the smaller Hemlock, Spruce, and Balsam may be used to make pulpwood. The high ratio of the making of lumber to the making of pulp and paper and to all the other forest industries of British Columbia, as shown in the following chart, takes on special meaning when compared with similar ratios of other regions:

**Estimated Value Including Loading and Freight Within the Province**

<table>
<thead>
<tr>
<th>Product</th>
<th>Ten-year Average 1935-44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber</td>
<td>$51,581,800</td>
</tr>
<tr>
<td>Pulp and Paper</td>
<td>20,476,300</td>
</tr>
<tr>
<td>Other Forest Industries</td>
<td>24,842,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$96,900,300</strong></td>
</tr>
</tbody>
</table>

With this brief survey of the Forest Resources of British Columbia, we shall next glance at the resources of the other regions. As was mentioned previously, no national inventory has been published for these regions as

1. Dept' of Lands, Province of British Columbia - Report on the Forest Branch, 1944, p. 27.
yet. Therefore, with due regard for the integrity of the Provincial Governments, their publications may be biased in their favour. This is dangerously true in regard to forest surveys as no immediate check-up can be made on the figures published.

Ever since the settlement of the Canadian West, wheat growing has been of such overwhelming importance as to hinder the growth of other industries. To this extent, the development of lumbering as an industry has not progressed as rapidly as one might expect. Although it is realized that because of climatic restrictions, the Prairie Provinces will always be basically agricultural, in recent years, more attention has been given to the existing timber supplies available. This is especially true of regions where wheat farming has become less profitable and the workers have been looking to other fields of employment. A glance at the figures for the production of lumber in the Prairie Provinces will substantiate this statement. The production has been increasing for the last ten years until at present the production of sawn lumber for the district as a whole is very little less than 1/10th that of British Columbia.

The three Prairie Provinces have two distinct types of forests. One is very similar to the forests of British Columbia while the other resembles the forests of Eastern Canada. This first section is a continuation of the for-
ests of British Columbia into Western Alberta. As the climate is much more severe and the annual rainfall less than in British Columbia, the growth is not equal in quality nor in size but it is, nevertheless, of sufficient calibre to warrant cutting commercially. One of the deterrents to lumbering is that much of the timber is relatively inaccessible, being in the northern parts of the province. In keeping with this, we must note the distance to any large markets for sawn lumber. Despite this, Alberta has become the largest lumber producing area of the three Prairie Provinces.

The second type of forest found in Alberta, Saskatchewan, and Manitoba is an extension of the forests of Eastern Canada. The edge of the forest, which covers northwestern Ontario projects a short distance into the province of Manitoba. The dividing line between woodland and prairie runs to the northwest from a point not far west of the Lake of the Woods. In the south-east, therefore, the province has a narrow belt of forested land along its eastern boundary which gradually widens to the north and emerges into the wooded lands of the lake region. This eastern forest strip furnishes much of the timber used in Manitoba.

The same type of forest continues from northern Manitoba across northern Saskatchewan into northern Alberta. The growth is generally of a fairly high quality in Mani-
toba but in Saskatchewan, because of more severe climate and less precipitation, the timber is of a lower grade. For this reason, the forests of Saskatchewan have been little developed, the total annual production being about one-third that of Alberta. It is also illustrative of the existing situation in Saskatchewan that eighty-five per cent or more of the total lumber cut is now being from an area approximately ninety miles square situated on the eastern boundary of the province.

Except in a time of emergency or to fill the needs of the immediate home market, the lumbering industry of Saskatchewan will not be developed in the future. The high cost of transportation to any reasonably large outside markets coupled with the relatively lower quality of the lumber prohibits further expansion of the industry. Under the stress of the last war, the lumber production increased rapidly and many less accessible areas were used. With the end of this artificial demand production may be expected to decline as private business will be unwilling to pay the extra cost of using less accessible timber. In future, industry will probably be carried on by small portable mills supplying little more than the local market.

The province of Manitoba has a total area of 251,832 square miles of which 53.3 per cent is inaccessible to commercial forest operations. Of the 105,130 square miles which are accessible, only 22.3 per cent consists of pro-
productive forests and 4.3 per cent of merchantable forests. These figures were taken from the national inventory made of this province as of British Columbia and thus may be assumed to be relatively accurate. Although there is evidently an abundance of aspen throughout the southern part of the province, it is of little commercial value being soft, weak and of very poor durability when exposed to weather.

There is a vast tract of forests in the north of the province but, as is shown by the above figures, only a small part of this is accessible. Although this inaccessible region has not as yet been adequately surveyed, it is quite possible to conclude that the severity of the climate would make the wood of low commercial value. Information that has been gathered seems to indicate that this untapped region is covered with extremely poor timber.

In the Prairie Provinces, therefore, there are only two forest areas of commercial value; the forests of western and northern Alberta and the extension of the eastern forests diagonally across Manitoba and northern Saskatchewan. In this region the temperature is often extremely low in winter and high in summer and there is insufficient annual rainfall in much of the district, with arid periods occurring every few years. In view of the perpetuation of such an unfavourable climate, it is doubtful that any great expansion of the existing commercial forest areas may be expected in the future. Also noteworthy is the fact that

1. Dep't of Interior, Canada - Forests of Manitoba, 1934.
that three-fifths of the land lying north of the prairie belt may be properly left out of serious consideration from a timber production standpoint at the present time owing to its remoteness from any system of transportation, the indifferent quality of its timber, and the high percentage of muskeg and rock that it contains. The development of the resources which may lead to improved transportation facilities may make these lands a factor in the future timber production of the province. This region must be classed as a possible "future reserve" so that it will not be confused with the existing available supplies.

Since similar species of trees exist in all of the eastern provinces, these can be taken as one group for purposes of study. In the past, lumber has played a predominant part in the economics of this general region, with the result that lumbering has been developed to a greater extent than in any other part of Canada. Even so, except in terms of broad generalities, there seems to be little knowledge of the size of the forests in this region, let alone an accurate classification of the forest areas into productive and accessible areas. The Forest Service of Canada, spoken of previously, is at present carrying on its work in Quebec. Although the inventory which it is making of the forest resources of this province are not yet completed, a few figures have been made available. It
is assumed that all forest lands north of 52 degrees latitude are actually inaccessible as are all the forests south where the means of access are too difficult for economic exploitation, such as the regions of Labrador. Using this as a basis, the approximation may be arrived at that, in the total area of the Province, 594,534 square miles, there are about 150,000 square miles of accessible, productive forest lands. Probably similar approximations could be made for the remaining Eastern Provinces but these figures, resting as they do on such wide generalities, would be of little value.

In the absence of inventory figures, the annual Estimate of Forest Production will at least help to give some basis for comparison with the other regions:

**Annual Estimate of Forest Production, 1943**

<table>
<thead>
<tr>
<th>Region</th>
<th>Production (in M cubic feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>593,075</td>
</tr>
<tr>
<td>Prairie Provinces</td>
<td>315,047</td>
</tr>
<tr>
<td>Eastern Provinces</td>
<td>2,171,660</td>
</tr>
<tr>
<td>Canada</td>
<td>3,079,732</td>
</tr>
</tbody>
</table>

From this table the important position which the Eastern Provinces hold in annual forest production relative to the two other areas, British Columbia and the Prairie Provinces, is forcibly realized. There is, however, a sharp distinction between "forest production" and "lumber production". Forest production includes not only

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the annual lumber production but also the annual pulp production. As the Eastern Provinces have become sub-
stantially greater producers of pulp than of lumber, the 
foregoing table may be misleading if thought of in terms 
of lumber production alone.

The Eastern Provinces are said to have 80% of the 
total accessible stand of timber of Canada and 50% of 
the accessible saw-timber.\(^1\) The difference is due to 
the fact that much of the accessible forest has, at some 
time or other, been cut or burned over, the existing tim-
ber as a result being smaller in size and, therefore, 
more suited for the making of pulp than of lumber. The 
types of trees found in this belt—Spruce, Pine, Balsam, 
Cedar, and some hardwoods such as Maple and Birch may be 
used as saw-timber when of sufficient size and quality— 
but they are also all valuable for making pulp. The de-
cisions determining whether the timber is to be used as 
lumber or pulp very often rest on the size. In estima-
ting the standing timber in Quebec, it was assumed that 
all timber of 10 inches D.B.H. or more would be classed—
as sawn lumber. Using this as a basis for determination, 
it was found that the volume of accessible standing tim-
ber suitable for sawn lumber was 11,102,000 cubic feet 
and the area of accessible pulpwood 53,505,460 cubic 
feet.\(^1\) This is approximately in the ratio of 5 to 1.

1. Dept't of Trade and Commerce, 1943 Operations in the 
Woods in Canada.
Such a classification is not readily available for the other provinces but in view of the similarity between their forest resources, it may well be assumed that the average ratio between pulpwood and saw-lumber in the Eastern Provinces would be about 5 to 1. Pulpwood production is, therefore, readily seen to be of far greater importance in this area than lumber production.

Whereas the previous table showing the estimate of Forest Production in Canada was given to illustrate the comparative size of the forests in the three regions under discussion, the following table gives the comparative production of lumber in these regions:

<table>
<thead>
<tr>
<th>Region</th>
<th>Estimate of Lumber Cut—1943 (in M ft. b.m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANADA</td>
<td>4,363,101</td>
</tr>
<tr>
<td>British Columbia</td>
<td>1,941,966</td>
</tr>
<tr>
<td>Prairie Provinces</td>
<td>371,915</td>
</tr>
<tr>
<td>Eastern Provinces</td>
<td>2,049,220</td>
</tr>
</tbody>
</table>

Although British Columbia produced only about 20 per cent of the total forest production of Canada in 1943, she produced almost 50 per cent of the lumber cut in the same year. Similar relationships may be drawn from these two tables for the other two regions under discussion, corroborating the statements already given regarding the type of production found predominant in each of these three subdivisions of Canada.

Lacking more accurate figures for detail, it may simply be stated in conclusion that the forests of all the Eastern Provinces still play a very important part in their economies whether in the form of pulp and paper or lumber and its products. The climate and soil conditions are very favourable to the growth of timber in all of these provinces, accounting for the fact that at one time practically this whole region was covered by forests.

The obvious inference which may be drawn from this chapter is that there is a definite lack of a consistent estimation of forest resources throughout Canada. Realising this, the Dominion Government attempted to set up a commission whose purpose would be to make a reasonably accurate inventory of the Canadian Forest Resources, province by province. Even with the fullest cooperation, it was realised that this would be a great undertaking requiring many years for its completion. The action of the commission was found to be thwarted and hindered at almost every move, cooperation being at a minimum. True, the provinces themselves were in a position to make their own inventories but, as has been mentioned, this would be insufficient unless all agreed on the exact limits of each classification. A single body, following a uniform policy would be best able to determine the forest resources with results comparable throughout the Dominion. Strong action
may be necessary to ensure the commision of the fullest cooperation in the future so that its great and necessary work may be accomplished as soon as possible. Until a report of its findings has been published, no definite conclusions regarding the resources of Canada may be accurately drawn and the country will have to be satisfied with the inferences brought forth by the approximations.
CHAPTER 2.

CONTROL AND MANAGEMENT OF FOREST RESOURCES

The control and management of the forests of Canada was originally a purely local concern. Each isolated community developed its own system of management of its local forest resources. Then, as the population grew, new stronger governments took over control. In each section the variations in supply and importance of local demand for forest products, along with individual differences in management caused the development of diverse systems of superintendence of forest lands and their products.

At the time of Confederation there were, then, two reasons for leaving control and management of these forest resources in the hands of the provincial governments. It was felt, logically enough, that since the forests were one of the natural resources, a gift of nature, any revenue or expenditure connected with them was strictly the concern of each province. This point was made doubly important by the fact that each province was economically dependent to a different degree on its timber resources. Their apparently inexhaustible magnitude left no room for argument on the basis of possible mismanagement on the part of the governing authorities. Even though there were a few who might still have favoured greater central-
isation of control in the face of these arguments, their objections were overpowered by a second group in favour of leaving a divided control of the forests.

This second influence lay in the strikingly dissimilar patterns of control already created by the provincial authorities. To make an attempt to develop a centralized unification of control satisfactory to all would have been a difficult task even then. Provided it could have been accomplished, the Fathers of Confederation had no desire to arouse antagonism over an issue which might hinder their main purposes.

Control over the natural resources by the provinces chiefly concerned with the lumber industry involved not only the development of special instruments for the control of roads but also the elaboration of regulations for the exploitation of forests. Revenues were collected by the provinces from those engaged in carrying on the lumber industry. The strength of private firms, particularly firms accustomed to American methods of alienation of forest land, which were engaged in lumbering operations on land owned by the crown and the difficulties of developing effective regulations facilitated charges of corruption. Because of the importance of lumbering, its more or less centralized control within the province, and the comparative weakness of agriculture, there devel-
oped a type of structure leading to corrupt governments.

To-day the realization is rapidly spreading that the forest resources of Canada are no longer strictly a local matter. For some time, complaints of mismanagement on the part of governing authorities to suit their own purposes, have been raised in nearly all of the provinces across Canada. Of course, it is very seldom that any actual proof has been brought to light to substantiate these claims since the Party Governments, in order to avoid scandal, have usually been able to cover up the fraudulence of any of their members. Sufficient proof has often come to light to show that all such assertions are not entirely fictitious. We need not look very back into the history of Ontario to find cases of fraudulence at public expense.

With the realization that our forests are no longer limitless, the public has taken an increased interest in Canada's forests, raising protests against unseemly practices. Sometime in the near future it is hoped that the new, complete, classified inventory of Canada's forest resources will be completed so that it may be placed before the people and studied by those in control. In view of just these two facts, it may be felt unlikely that such flagrant abuses as occurred in the past will occur in the future. Even so, one cannot help but wonder if there might be some basis for the accusation made by some lum-
bermen regarding the lack of assistance given to the national inventory of the federal government which has now been attempting to progress for over fifteen years.

Along with jurisdiction over their forest resources, the provinces were given control of the export trade of the forest products. Even in this field it is felt that there should be greater Federal authority. The controversy has often been aroused in various provinces over the exporting of saw logs to foreign countries. It is of direct interest to the lumbering industry throughout the country. Why should we not export the manufactured or semi-manufactured product rather than the raw material?

In the past Ontario and the other older provinces were fairly successful in limiting such exporting to their own satisfaction. British Columbia, at the beginning of the war, had still been unable to prevent such trade. Finally, in view of the intensified national war needs, the Federal Government took the matter into its own hands and put a complete stop to the exporting of unmanufactured saw logs, much to the chagrin and amazement of some of "our neighbours to the south".

At the conclusion of the war, most of these federal controls were abolished. The question now arises, will the provincial governments be sufficiently strong to successfully compete with the pressure of outside man-
kets in preventing the revival of an export trade in
unmanufactured logs, especially if such trade is still
felt to be detrimental to the country as a whole? Many
feel that it should be of interest to all in Canada that
they do so.

As the timber regulations of the provinces are con-
tinually being revised to meet the latest needs, the fol-
lowing is submitted not as a list of regulations as they
are now but as a statement of the general policy for com-
parative purposes. The over-all picture across Canada
shows that in all of the provinces except one or two, 90
per cent of the forest land is still the property of the
Crown, the lumbermen having been granted cutting rights
only. The one important exception is Nova Scotia.

In Nova Scotia, with its early settlement from New
England and the initial primary importance of the fish-
ing industry, lumbering seemed less important. No defi-
nite forest policy was established with the result that
the forest areas became alienated from the Crown. The
realisation of the difficulties of such a system grows
as the years go by. Through these years, the accessible
growth has nearly all been cut over with new growth or
vacant lands taking its place. The amount of accessible,
merchantable timber in the province has become relatively
small and the demand for it great, with less and less free
land being available for sale.

Even though the greatest area of her accessible forests has been alienated from her, Nova Scotia has managed to establish a few controls. A sliding scale was set up stating the lowest diameter of each type of tree which would be allowed to be cut without special arrangement. To pay for the costs of management, she charges stumpage dues, a land tax, and a fire tax. Although the subject of fire controls will not be fully discussed at this point, it is perhaps significant to mention that in not owning the land, the province loses a great deal of power in trying to enforce fire regulations. To a certain extent, equipment for fire control is supplied by the province but the remainder must be supplied by the owners; these owners are requested to cooperate closely with the provincial fire service. While there may be this merit in such a system, that the individual owners will take more care of their own property, it is doubtful if this offsets the disadvantage of not having an efficiently co-ordinated province-wide service.

In the field of trade, Nova Scotia is able to regulate her exports as well as the other provinces for there it is no matter who owns the land. At the period for which these facts were compiled, there were quite definite restrictions on the exports; in fact, only wood cut
on licenses issued prior to a set date could be exported.

This type of control and management for Nova Scotia differs more markedly from the other provinces than do the controls of any other province. The other three eastern provinces which have large forest resources, namely Ontario, Quebec, and New Brunswick, are quite similar in their treatment. In all three, the ownership of the land is not passed on but the timber on the land is leased or permits are issued to cut it. These licenses for timber cutting are usually renewable every year. In this way, the province is, supposedly, able to keep a very close check on its resources, preventing greater cutting in certain areas by refusing to extend the lease.

The cutting regulations differ in the three provinces in detail but not in their general purpose. Usually, a system of standard species diameter limits is used, i.e. no sound butted, growing tree having a stump diameter smaller than those specified may be cut by any licensee. Similar variations of these specifications form the basis of control in each province. The Quebec ruling, also, leaves an opening by saying that cutting may be regulated in certain circumstances by carrying on operations in the woods under tentative plans. As in Nova Scotia, the licensees are charged stumpage dues on the amount of timber cut. To ascertain this figure, "scalers" working for the governments attend the different camps while operations are be-
ing carried on. At the same time they see that the regulations are being complied with.

Aside from revenues obtained from their own Forest Reserves, the provinces charge rent, stumpage dues, and a fire tax along with the revenue received from the actual sale of the timber license.

In Quebec, much of the responsibility for the control of fires is left in the hands of the timber operators. These operators are required to maintain sufficient equipment to protect the timber which they have licensed. To this end, most of them join fire prevention associations. The provincial authorities are obliged to provide the fire prevention service for the rest of the timber lands. At the same time, they keep a close check on all fire associations and publish statistics of the associations in their annual report.

Before the war, in all three provinces, no export of saw logs was permitted. In Quebec, this restriction extended also to pulpwood. In New Brunswick, the stipulation was made that saw logs could be exported where it seemed to be clearly in the public interest. Although this may seem to be a very arbitrary ruling, the general practice for the last few years has been to limit export of saw logs completely.

Until comparatively recently, the natural resources
of the Prairie Provinces were still under the control of the Dominion Government. In 1930, this administration was passed over to the provinces themselves. As methods of disposing of timber tend to conform to the practice previously established by the Dominion Government, the present-day regulations of Manitoba, Saskatchewan, and Alberta are very similar to one another. In view of the relative differences in importance of the forests to the economies of these three provinces, such differences in management as exist may be said to be negligible. The following are the regulations for control and management of the forest resources common to Manitoba, Saskatchewan, and Alberta:

1. Except in cases where the land is to be cleared for settlement, timbered areas are not sold outright.

2. Rights to cut are disposed of, limited to specified areas and for definite periods of time, but title to the forest land itself remains with the Crown.

3. The timber licenses may be renewed for a definite number of years, with operations under the supervision of the provincial authorities.

Even at its height the total lumber production of the Prairie Provinces little more than satisfied the requirements of the local markets. Usually, the amount of lumber produced has seldom met these home requirements.
Thus no large export trade with its associated problems has arisen and no such legislation as found in most of the other provinces regarding limitation to this export trade has been necessary.

In the early days of British Columbia, much forest land was alienated from the province for special purposes, chiefly to encourage the construction of railways. Some of these areas have become reinvested in the Crown; some have passed into private hands. Aside from such cases, the forest lands are owned by the province, being leased for cutting timber.

The sources of revenue and the cutting regulations of the province are very similar to those in the older eastern provinces. Due to the difference in the species of timber and the amount of merchantable forest lands available, the actual specifications in the legislation are, of course, quite dissimilar. In view of the fact that these accomplish the same purpose and follow the same principles of general policy, it is not felt necessary at this time to point out the relatively slight differences in detail.

British Columbia had developed a reasonably large trade in the export of saw logs to foreign countries before the war. Whether she was beginning to earnestly desire a limitation of such trade or not, she was finding
it quite difficult to make such action effective. As mentioned previously, it was the direct action of the Federal Government during the war which stopped this trade. There will be great pressure to start the export of saw logs again as soon as possible. Many American companies followed the practice before the war of leasing Crown timber lands in British Columbia, cutting the timber, exporting it to their own mills in the States, and manufacturing there. After 1942, the Canadian Timber Controller felt that in view of the demands on the industry and the limitations on the annual cut brought about by the labour shortage, it would be necessary to keep all the saw logs in Canada to be processed. The American lumbermen fought such a ruling as well as they could but, in view of the special circumstances, they were bound to concede Canada's right to do so. Now that the period of wartime emergency is over, British Columbia will have to decide whether she wants to re-open such trade with American lumbermen or enforce the present restrictions, unless it is decided to continue the policy of vesting control of trade in the hands of the Federal Government.

Such a brief comparison of the control and administration of the forest resources by the provinces cannot give in detail the content of legislation. It does show,
however, that in general principle there is a great deal of similarity. This similarity is not so great as to warrant the taking over of complete control by one power: the actual differences in administration, timber regulations, and trade regulations are too varied. This brings out the full significance of provincial ownership. How varied are the controls even where there seems to be some similarity! But this should not defeat the proposals mentioned at the beginning of the chapter. Too often plans are thrown aside because they are viewed too superficially; the dazzling multitude of minor points camouflages the plausibility of the general theme.

If Canada intends to make the most of her resources, greater co-operation within and between the provinces will be necessary. This brings to the fore Dominion-Provincial relations. The Dominion Government has, for some time, maintained a Forest Service which has limited its duties mainly to research, realizing only too well the difficulties incumbent upon co-operation and administration.

It has been found in the past that two bureaucracies, attempting close co-ordination, often tend to become rival centres of power, rather than eager co-operatives for a grand national purpose. There is always a powerful incentive for Provincial officials to try to extend their authority as far as possible over any disputed
borderline between themselves and Dominion officials. The only guarantee against this is that the officials at the top of the two services which are required to cooperate should have the same conception of ends and means and should be eager, above all, to promote those ends.

The rapidly rising costs of acquiring and maintaining the most modern machinery and methods for fighting forest fires and disease have caused some of the provinces to look for aid to the Dominion Government. The province of Saskatchewan voiced such a suggestion in her annual report of 1944. Although such requests have not been voiced by the other provinces, we can expect that some demands will come close upon the heels of Saskatchewan's, especially from the provinces whose timber resources are relatively limited. Such a request brings the whole question to the fore. It may easily be sidestepped by giving grants of aid but these have quite definite disadvantages.

Would not this, then, be an opportune time to link greater powers with some central body such as the Forest Services? It is quite possible to conceive a system in which the actual management, collection of revenues, and payment of expenditures could be left in the hands of the Provincial authorities, while the formation of the nation-wide policies concerning conservation, trade, and
the giving of financial support if necessary would be left to a central body. This financial support could really serve as the whip hand to ensure the functioning of its suggestions, if that should ever become necessary.

It may be argued that financial aid would be the same as a subsidy and would thus have all the undesirable associations attached to subsidies. In fact, it would not be a real subsidy as it would benefit the forest industries only in the long run. The financial support would be "earmarked" for the special purpose of purchasing and maintaining fire-fighting equipment and establishing the newest methods of pest and disease control. Society as a whole would benefit equally with the forest industries.

A real subsidy reduces the cost of the industries involved in some definite manner. This is not so with the proposed financial support. The operating costs of the forest industries could conceivably be slightly reduced but not by any appreciable amount. The financial support would, rather, be expended in the improvement of existing services and the establishment of new special services with a view to benefitting the whole of society, not just the various forest industries.

A centralized body would be able to view impartially
the statistics on a nation-wide basis and to formulate a policy which would benefit the country as a whole. Co-operation of this kind is not impossible. It has been done in the past and can be done in the future.

The problem is concisely put forth by Professor J. A. Corry: "The chief administration problem raised by concurrent powers is due to the tendency for the Dominion and Provincial departments to stake out claims for itself on territory which the other thinks—either at the time or some later date—should belong to it. . . . . . . . this difficulty can be avoided to a great extent if, from the very inception of concurrent jurisdiction, a clear understanding is maintained between Province and Dominion as to the appropriate activities of each within the field."

It is felt by many that it would be best, and undoubtedly easiest, to continue the policy of "non-interference" and let things continue as they did before the war. Conceding that, the decision of the policy which it would be best to advance really rests on the outcome of the present conference on Dominion-Provincial relations. Although the control and management of forest resources is not under discussion at this conference, the general trend of the decisions will afford sufficient basis for determining what action should be taken. In any event,

it is the consensus of opinion of a great number of lumbermen and others interested in the resources of the whole of Canada, that a policy of non-intervention would be merely a postponement of the issue. In answer to this, the proposers of non-intervention believe that the results would come about through a more gradual co-operation between the provinces themselves. They are able to point with doubtful pride to the Interprovincial Conference held in 1943. The following was a summary of the purpose and results of this conference: "The first Interprovincial Conference on Forestry met in Toronto, on May 5, 1943, to consider the subject of a joint appeal to the Dominion Government for financial aid to all forest-owning provinces to assist in forest fire prevention and in general to promote the welfare of the forests. As a result of this conference, a committee prepared a general brief and presented it to the Minister of Mines and Resources in Ottawa. No immediate action was promised, although the Minister stated that he generally agreed with the recommendations presented." The success of this type of action still remains to be seen. In answer to this there has been procured the following statement by Mr. A. S. Nicholson, former timber controller for Canada: "It is the firm conviction of those engaged in and students of the industry that a national forest policy that would
protect from fire and disease, control the cutting, and promote reasonable reforestation and create a forest consciousness in the minds of Canadian people would in the end double our production to at least 10 billion feet of sawn lumber on a perpetual yield. The hesitancy of developing a national forest policy seems to be because the forests are controlled by the provinces. This is, of course, where the actual control should be but it is no justifiable reason for lack of a forest policy which will give assistance and have a measure of overall authority and direction."

The control and management of the forest resources of Canada is of vital interest to the lumbering industry all across the country. The future of this industry rests in the pursuance of a sane, far-seeing policy not only for small areas but for the Dominion as a whole and a policy that cannot be manipulated for private gain or for political power.
CHAPTER 3
INCREMENT AND DEPLETION.

Probably the most familiar topic in relation to forestry is the destruction of good forests by fire. Through the increasingly widespread efforts of most of the provincial governments, the public is being made more and more aware of the vast areas of timber which are wasted annually by fire. What is more important, they are beginning to realize that a large percentage of these fires could have been avoided by greater carefulness. Fires do not by any means constitute the whole of the wastage. Insects and disease, also, play an important part in making timber unfit for use, but little blame can be laid on the public doorstep for this. The only method of combatting wood diseases lies in research and the careful following of the best methods of modern silviculture.

Fire and disease constitute the destroyed timber, the annual cut constitutes the timber used, and all three make up the total annual depletion of the forests. On the opposite side of the ledger, we have the annual increment including both natural and artificial reforestation. In a far-sighted forest policy, the rate at which the second growth becomes merchantable must be correlated with the rate at which the virgin stands are depleted; the
former is the increment. Otherwise there is bound to ensue a hiatus, or at least a serious diminution in production with consequent stagnation in previously prosperous forest industries.

The actual natural increment cannot be definitely known; only an approximation may be arrived at for the annual rate of growth. It would seem that Canada is in a relatively favorable position in that her climate and soil conditions sponsor relatively rapid new growth in most areas. For this reason, Canada will never be faced with the necessity of carefully seeding her forest lands to replace them. In many European countries, the depleted forests must be augmented mainly by scientific reforestation which, as can easily be seen, would be a costly and arduous task if carried on on a very large scale. Although in comparison with such countries the Canadian forest resources seem to be in a very favorable position, it should not instill an opinion that growth is at its best. There are countries which are in a comparatively better position with regard to growth.

In Canada, the estimated annual increment is about fourteen cubic feet per acre, while in Norway, Sweden, and Finland for the same type of timber, in the same latitude, and with soil conditions similar, the increment is reported to be twenty-eight cubic feet per acre. A large
part, but by no means all, of the credit for this difference may be said to be because of more favourable climatic conditions; but Canada could benefit much by observing and following the methods used in these Scandinavian countries for aiding nature. A policy of judicious thinning in accessible areas in itself has been proven to speed up the growth. The natural stands can be weeded of undesirable or useless growth in order to give full privileges of light, air, and food to the best trees. Under certain circumstances, the trunks of individual trees can be pruned of their limbs to produce clear, knotted material. By these means, young forests of non-descript character can be converted into stands of good timber in a fraction of the time required by nature unaided. It must, also, be remembered that the conducting of forest improvement means the ability to restore to earliest use the most valuable trees of commerce; whereas natural processes unaided in the struggle to repair fire and cutting ravages will, for the next several generations, supply mostly the poorest species. In view of these considerations, it would seem possible for Canada to follow a policy of aiding nature to the fullest possible extent so that both the rate of natural growth and the quality of this growth will be improved.

It is well known that even the most optimistic esti-
mation of the natural increment would not be sufficient to keep pace with our speed of use and destruction. In the over-mature stands the increment little more than balances the decay. The compliance with improved methods of forest management might conceivably increase the annual increment so that the growth rate necessary to the maintenance of forest industries on the present scale could be achieved. This statement is, of course, made under the assumption that, with improved methods of forest management, there will be a drastic reduction of wasted depletion in losses by fire and disease.

The difficulties involved in attempting to ascertain the annual increment are immense. At best, the figure arrived at can only be an estimate based on general considerations. The mere statement of an annual increment leaves much to the imagination. In the first place, the average person would take for granted that the new growth was similar to the old growth it is replacing. But such is not the case. Especially noticeable in the Eastern Provinces is the fact that the soft wood timber which was cut is being replaced by a high percentage of hardwoods. Even though we assumed that the annual increment was sufficiently high, we would thus still find an annual decrease in the species of timber for which there is the greatest demand. Unless we may expect a change in the demands of
the forest industries, it is imperative that a more intensified program of national forest planning be put into force to insure a future supply of that type of timber for which there is most likely to be a demand.

In order to understand when the young growth of today will be sufficiently mature for woods operations, we must know the approximate age at which each species of timber matures as well as the annual rate of growth. The length of time it takes for a tree to become of merchantable size varies with each species. Some trees take 100 to 120 years to grow, e.g. the Douglas fir. We must take into consideration that the lumbering industry may not want or require trees as large as that to suit their purposes, a sixty-year-old tree being equally desirable. The importance of deciding the required age is illustrated by the figures published for British Columbia. It was found that as the assumption was made that the trees would only be mature when 100 years old, the accessible forests were being overcut 100% but if it were felt that 60-year-old trees would be good enough for the next generation, the coast forests were only being overcut by 40%. As far as can be ascertained, it seems quite possible that in future smaller trees will prove to be equally satisfactory in view of the recent developments on processing.

The effect of lowering the age of maturity for this
or any other reason would be to cast all figures regarding exploitation in a much more favourable light as it brings large number of reserves into immediate play. For comparison, one could say that the lowering of the required age limit of timber would have much the same effect on the amount of supplies as has the reduction of the amount of gold for each dollar on the total supplies of currency in a country on the gold standard. If there is a good basis for such a change in standard, such an action cannot be censored, provided that the provincial authorities do not take advantage of these added supplies to allow unwarranted exploitation. This increase in supplies of merchantable timber brought about by lowering the standards would prove of great use in instituting a policy of sustained yield management, wherein the attempt is made to regulate cutting so that it coincides with the annual increment.

In conjunction with the natural reforestation, there is the much-talked-of "scientific" reforestation. So much emphasis was given at the introduction of this plan into Canadian forestry practices that an uncalled for optimistic view of its merits is held by the public. As a supplement to natural reforestation there is no denying the importance of the development of a scientific reforestation system but it should never be thought of as
widely applicable. The costs of planting and raising trees are prohibitive except under special circumstances where it is felt that the benefits received warrant it. It is usually felt that the cost of planting is not sufficiently offset by the future potentialities of the wood for cutting purposes. Not only must the original cost be taken into consideration but also the relatively high mortality rate of the trees planted before they reach maturity. As a sole method for building up our resources to insure future supplies for the lumbering industry and other forest industries, artificial reforestation must then be discounted because of its cost.

The special cases referred to in which scientific seeding is advisable may be classified into several main groups. It has been found that in areas burned over two or more times, the natural regrowth is very slow as the humus layer has been destroyed. In order to speed up growth, it may be necessary to seed and plant small trees in the area. Research has proven that the judicious planting of young growth in a badly burned-over area will soon encourage and accelerate natural growth in that region. Usually, however, an efficient method of silviculture will most economically increase the rate of growth to a satisfactory level.

The other uses of artificial reforestation lie in
building up areas which, because of their effect on drainage and erosion should never have been cut down. There are many areas throughout Canada where the destruction of timber areas has resulted in rapid erosion of the areas. Forests act much as a sponge soaking up excess water and allowing it to gradually leak out into the surrounding areas. With the destruction of these areas the water, having nothing to hold it back, flows swiftly in a wet season, but dries up in a dry season. In order to regulate the flow of water and to reduce the ravages of flood and arid periods, reforestation is well justified. For replenishing farm woodlots, making windbreaks, and beautifying residential areas, there is no other recourse but to transplant trees from nurseries to the new sites, but for purposes of large scale forestry it is too costly. The lumber industry must look to the natural re-growth for continuation of the future supplies and encourage the establishment of a policy that will ensure a sufficient supply of the required quality and species to meet future needs.

As a direct opposite to increment there is depletion. If it were possible to establish the annual rate of increment, the rate of depletion being known, it would be possible to discover by how much an area was being over-cut. Definite action could be taken to increase the rate of
increment where possible and to decrease the rate of de-
pletion until both balance. British Columbia, being
more dependent on lumbering than the other provinces,
has compiled a great many statistics on her resources
and published a chart designed to show the relationship
between increment and depletion. (see p. 47a) As this
chart was made up for the year 1936, the statistics them-
selves do not apply to-day. This chart is only shown to
illustrate the method used in the absence of a more re-
cent publication. Although the absolute accuracy of
such a report is questionable because of the many esti-
lations necessary, it is a step forward and more satis-
factory than the mere suppositions made by many of the
provinces regarding whether their resources are being
overcut. Such a chart as this also shows which form of
depletion is in greatest excess, whether in cutting or
in disproportionately large losses through fire and dis-
ease. It is to be sincerely hoped that all Canada fol-
lows this method of putting the forest resources, their
increment and depletion, into figures from which anal-
yses may be drawn far more accurately than from the per-
sonal estimation of authorities. Probably this latter
method would be favoured by those who are only interest-
ed in exploiting the field to its utmost in order to
make the greatest "quick" profits.
### CAPACITY FOR SUSTAINED ANNUAL YIELD IN BRITISH COLUMBIA

(Million feet board measure)

<table>
<thead>
<tr>
<th>Region</th>
<th>Standing Mature Timber</th>
<th>Rotation Maturity Second Crop (years)</th>
<th>(2)+(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
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<td></td>
<td>(1)</td>
<td>(2)</td>
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<tr>
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<td></td>
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<td></td>
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<tr>
<td>Total</td>
<td>155,129</td>
<td>100-120</td>
<td>1535</td>
<td>10</td>
<td>1525</td>
<td>275</td>
<td>1800</td>
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<tr>
<td>Accessible</td>
<td>76,108</td>
<td>100-120</td>
<td>761</td>
<td>9</td>
<td>752</td>
<td>245</td>
<td>997</td>
<td>2190</td>
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</tr>
<tr>
<td>Interior</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
<td>993,370</td>
<td>100-180</td>
<td>846</td>
<td>394</td>
<td>452</td>
<td>1325</td>
<td>1787</td>
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<td>Accessible</td>
<td>33,630</td>
<td>100-180</td>
<td>280</td>
<td>100</td>
<td>180</td>
<td>380</td>
<td>560</td>
<td>351</td>
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<tr>
<td>Whole Province-</td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>254,499</td>
<td>100-180</td>
<td>2381</td>
<td>404</td>
<td>1977</td>
<td>1610</td>
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<td>109</td>
<td>932</td>
<td>625</td>
<td>1587</td>
<td>2541</td>
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</table>

Increment in mature stands is balanced by ordinary pathological loss due to over-maturity; column (5) includes average annual loss by fire during the years 1927-36 inclusive.

Forest depletion includes losses through the annual cut, fire losses, and losses from insects and fungus diseases, the latter two representing the amount of depletion wasted. The relationship between these three constituents of depletion is shown in the annual summary publication of the Dominion Forest Service of Canada, a condensation of which appears below:

**FOREST DEPLETION**
Annual Averages, 1933-1942

<table>
<thead>
<tr>
<th>Thousands of Cubic Feet of Standing Timber</th>
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</thead>
<tbody>
<tr>
<td>Timber used</td>
</tr>
<tr>
<td>Timber destroyed:</td>
</tr>
<tr>
<td>by forest fires</td>
</tr>
<tr>
<td>by insects, disease</td>
</tr>
<tr>
<td>Total annual depletion</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

71% of total depletion was used, 29% wasted.

The spectacular destruction caused by forest fires represents a far greater economic loss to the country than is usually imagined. On an average for the past five years, it has been found that for every 100 feet of timber cut we burn 50 feet. In some sections the loss is not as high as this but in others, such as Saskatchewan, there was slightly more timber destroyed by fire in the last ten years than was cut and used. In terms of value, it is estimated that the average annual loss from forest fires in Canada is nearly five million

1. Dominion Forest Service - Canada's Forests, 1944.
dollars. This does not cover all losses by any means, as it is impossible to estimate in dollars and cents loss in destroyed young growth, loss in soil fertility from repeated fires, loss in scenic value, etc. What is outstanding is that most of these losses need never have occurred! The largest percentage of them was brought about through carelessness. In the absence of statistics for a break-up of the causes of fire in Canada as a whole, such a chart for Manitoba is submitted. These percentages do not represent the conditions in all of Canada but on an average the comparisons are relatively similar.

**AVERAGE YEARLY CAUSE OF FOREST FIRES.**

1930-1943 Inclusive
Province of Manitoba

<table>
<thead>
<tr>
<th>Causes</th>
<th>Per Cent Non-Preventable</th>
<th>Per Cent Preventable</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp fires</td>
<td></td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Incendiary</td>
<td></td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Settlers</td>
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<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Smokers</td>
<td></td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Lightning</td>
<td>12</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Railways</td>
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<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Operations</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Public works</td>
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</tr>
<tr>
<td>Unclassified</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>15</td>
<td>85 100</td>
</tr>
</tbody>
</table>

This chart shows graphically that the only non-preventable fires are those caused by lightning and about one-half of the "unknown". In view of this fact—that about 85% of the forest fires were preventable—it would

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1. Department of Mines and Natural Resources - Manitoba Annual Report, 1943.
appear that a sound system of public education, such as is now being advocated in many provinces, would help to reduce fire losses considerably.

Under present conditions, the action taken against those who start forest fires is usually limited to a warning or nominal fine. Legislative steps must be taken, as people who will not obey reasonable requests will be more careful in the face of coercive powers. As mentioned previously, the methods of protecting against fire differ in various provinces. In all of them, some penalties are provided for and in some a permit system is put in force during the dangerous period under which none may enter into, or set fire in, the forest for any purpose, unless he has a permit to do so. The more effective enforcement of such regulations in all of Canada is necessary to reduce the number of our fires.

The great benefit to be derived by the use of aircraft in observation is well realized but, because of the high cost in purchasing and maintaining an air-service, only Manitoba and Ontario maintain their own air-craft divisions for this work. The other provinces hire aircraft from commercial companies as required. In asking for some aid from the Dominion government, these provinces had in mind the establishing of their own air services. Without a doubt, the increase in aerial opera-
tions brought about by the war will have far-reaching effects on both the observation and fire-fighting techniques.

A summary of the normal losses due to forest fires presents a situation which is decidedly bad. A more efficient system for observation and control of fires developed on a nation-wide basis, would limit the spread of fires and reduce the losses considerably. The public must be made aware of the cost of its carelessness by strong legislative action against the offenders. The fire losses in Canada are far higher than they should be. If they are cut sufficiently, the lumbering industry will be better assured of sufficient resources in the future.

The wasteful depletion of our forests brought about by insects and disease differs from fire losses in both cause and control. As far as can be ascertained, destruction brought about in this manner has not been increased appreciably since the advent of commercialized woods operations. Doubtless some insects have been carried across from Europe to ravage our forests since settlement began in Canada. The research divisions of the forestry departments of the Provincial governments and the Dominion Forest Service have been studying the possible methods of control. Because of the general lack of knowledge of forest insects and diseases until
comparatively recent times, the work is not very far advanced although, in all fairness, we must say that some departments are making great efforts to study the situation.

As has previously been advocated, a complete and accurate forest inventory for Canada, kept up-to-date by periodic revision and including a knowledge of the composition, age, and density, etc. of the forests is indispensable in the determination of insect hazards. In conjunction with this we must have an adequately organized, country-wide survey. There is a beginning in this field in the "National Forest Insect Survey" but there is still ample room for improvement and great expansion within it.

The chart given on page 47a of this chapter illustrates graphically the great losses through insects and disease. All attempts must be made to reduce this form of depletion considerably in order that the lumber industry will be able to flourish and will not be hampered by a lack of suitable resources.

The actual cutting of the timber is the only depletion of timber over which we have absolute control. With the realisation that in the past there has been definite overcutting in most of the areas of accessible merchantable timber in Canada, the Provincial governments have
been making attempts to control woods operations in order to prevent undesirable exploitation. At the present time, as has been shown by general observation and by concrete statistics where possible, the relation between increment and depletion is still far out of line. It is all very well to give the hopeful assertion that the reduction of wasteful depletion will be sufficient to bring these two in line but until this is actually done or until some definite indications can be given to prove the merits of new systems of protection, it would seem wise to enforce more stringent regulations on cutting. No longer may we think only of the present day and its demands. The lumbering industry has proven itself a definite asset to the country and as such it must be assured of a permanent basis.

It is obvious that too drastic regulations with regard to utilization would result in a serious dislocation of the existing forest industry and would undoubtedly be impractical. In view of this, it would seem advisable to advocate more severe regulations only in regions where it would seem to be absolutely necessary for the immediate improvement of very badly depleted resources. A more intensified search for methods of reducing the national losses through fire and disease, if conducted efficiently, would probably have sufficiently
encouraging results.

The regulations for cutting should provide that only the timber of a merchantable size may be cut, so that wastage will be at a minimum. They should provide, also, for adequate removal of slash, both so that the second growth will be able to develop more rapidly and so that one of our biggest fire hazards will be removed, as fire spreads rapidly through dead remnants lying on the ground.

The subject of increment and depletion cannot be dismissed until the problem of the cost of exploitation to the producer and to society and the returns from exploitation have been discussed. If we are able to determine the relationship between these two, we can determine the point of net social advantage and the point of net advantage to the lumberman. In order to do this, we must consider the component parts of each and from the effects of these, the marginal returns from and the costs of exploitation.

For purposes of study let us assume that we have a parcel of virgin forest land. The use of one unit of exploitation will bring a relatively high return to society which will benefit by the new lumber products. With the addition of each unit of exploitation, the marginal return will be less until a point is reached where-
in the addition of another unit of exploitation will bring about only a very slight increase in the marginal return on that unit. Thus, a curve drawn on a graph which had "units of exploitation" on the X ordinate and "units of social advantage" on the Y ordinate would be a concave curve, sloping down to the right of the graph.

\[ \text{UNITS OF EXPLOITATION} \]

\[ \text{aa'} - \text{returns from exploitation} \]
\[ \text{bb'} - \text{costs of exploitation to society} \]
\[ \text{p} - \text{point of net social advantage} \]

For ease of understanding, the cost of exploitation may be subdivided into direct and indirect costs. The direct costs are those relating to the actual costs of cutting the timber. These consist mainly of labour costs and transportation costs which are linked up with accessibility of the timber. As successive units of exploitation are used, the marginal cost will increase for
each unit as the timber becomes less accessible. The use of a very large number of units of exploitation which would be, in effect, indiscriminate exploitation would add costs which although not immediately seen must be entered as direct costs to the lumberman; he will have to go still farther afield for future cutting as there will be little second growth available for use. If there were vast supplies of forest resources on hand these marginal direct costs would increase per unit of exploitation very slowly but where the supplies were limited, these marginal costs would increase relatively rapidly.

The indirect costs of exploitation which were referred to are those not directly associated with the lumber industry but which represent the cost to other industries brought about by exploitation of the forest resources. We refer to the widespread drought, sudden floods, and rapid erosion which follow in many regions which have been heavily exploited. Here again, these costs of exploitation are much more apparent where the supplies are limited but they do exist under any conditions.

When both direct and indirect costs are brought together, it is seen that the marginal cost of exploitation must increase for each added unit of exploitation. When only a few units of exploitation are used, the marginal cost will be low as compared to a situation in which a
large number of units are used. If a curve were drawn to show these marginal costs of exploitation on such a graph as was previously shown, we would probably have a concave curve moving upward to the right. The actual position of this curve on the graph and the determination of how rapid will be the rate of increase will depend on the size of the available resources. Under our assumption of a large virgin forest land, the curve representing the costs of exploitation would be far to the right of the graph; conversely, were we to assume that the resources were few, this curve would be farther to the left, rising more rapidly with fewer units of exploitation than it did under our first assumption.

![Graph showing social advantage and units of exploitation]

- aa' - returns from exploitation
- bb' - costs of exploitation to society
- cc' - costs of exploitation to lumbermen
- p₁ - point of net social advantage
- p₁ - point of net advantage to lumberman
In this graph, let the vertical ordinate represent the units of social advantage and the horizontal ordinate the units of exploitation. The curve $ad$ represents the marginal social returns from exploitation. For each added unit of exploitation which is used the marginal return on that unit will decrease. The curve $bb'$ represents the marginal costs of exploitation to society. For each added unit of exploitation used, the marginal cost to society in using that added unit increases. That is, for each added unit of exploitation the cost to society through drought, erosion, etc. and through increasing and increased cost of cutting is greater. It follows that the point at which these two curves cross will be the point of net social advantage for at this point, the returns from and the cost of exploitation coincide. If any number of units are used before this point, the returns from exploitation will be greater than the costs of such exploitation. Conversely, for any units of exploitation used after the point of Net Social Advantage has been reached, the costs of exploitation will be greater than the returns from making use of these added units of exploitation.

Up to this point, we have only been considering the costs of exploitation to society; we must, also, note the costs of exploitation to the lumberman. These latter
costs will not be so great as the lumberman may be said to be only seriously affected by the "direct" costs. The indirect costs—flood, erosion, etc. add little to the lumberman's costs of exploitation. Because of these lower costs, a curve drawn to represent the lumberman's costs of exploitation will fall to the right of the curve bb'.

Let this new curve be represented by the curve cc' on the graph. The point at which cc' cuts aa' will be the point of net advantage to the lumberman. As the curve cc' represents the direct costs of exploitation, that space between the curves bb' and cc' must represent the indirect costs of exploitation.

In a competitive economy the lumberman would use added units of exploitation until he came to the point of net advantage to himself. A reference to the graph will bring to attention the fact that at this point, so far as society is concerned, the costs of exploitation are higher than the returns from such exploitation. Therefore, society must find some method of preventing the lumberman from using any units of exploitation beyond that at which the point of net social advantage has been reached. The only feasible method of doing this seems to be by government legislation. The continued need for government regulations designed to prevent exploitation beyond the point of net social advantage is made apparent
by this graph.

There is no doubt that any costs of regulation are in the long run offset by the benefits enjoyed in reducing damage through flood and drought, although this benefit may not be so perceptible in the short run. In the short run the enforcement of regulations may increase the lumberman's cost of operation but in the long run this will be offset—first, by the benefits which he indirectly receives in that the material available for use in the future will be of higher quality than it would otherwise have been; and second, in that the economic structure will change, taking these added costs into account.

The curves as illustrated on this graph represent conditions for only one short period of time as the position of the forest resources is in a continual state of flux. If we were to assume that the forest resources were being used in such a manner that the average depletion were greater than the average increment, then the curves bb' and cc would gradually be moved to the left to represent the new cost of exploitation. As the total supplies of the forest resources diminishes, the point of net social advantage will be arrived at sooner and the new curve will represent the new cost to society. A curve drawn to represent the old cost to society would
fall to the right of the curve bb as the total amount of available resources on hand would be greater.

![Graph of social advantage vs. units of exploitation]

**UNITS OF EXPLOITATION**

- aa' - return from exploitation
- bb' - present cost of exploitation to society
- mm' - old cost of exploitation to society
- nn' - new cost of exploitation to society

Under conditions in which depletion is greater than increment, the above chart represents the present costs, the estimated new costs and the old costs to society. As the returns from exploitation are little affected by changes in the amount of supplies on hand, the curve aa may be assumed to represent the marginal returns from exploitation for all of these cases. The curve mm' has been drawn to represent the estimated new cost of exploitation to society and the curve mm' to represent the old cost of exploitation.
In the early days of Canada, because of the vast supplies of virgin forest resources, the curve mf was far to the right. It follows that a very large number of units of exploitation could be used before the point of net social advantage was reached. There was, therefore, little apparent need for many restrictive regulations concerning cutting. With the gradual decrease in the timber supplies, this curve has been moving to the left so that the point of net social advantage has been arrived at with the use of fewer and fewer units of exploitation. This explains the necessity for making the regulations more restrictive from time to time in an effort to keep exploitation in line with this moving point of net social advantage. It is easily seen that such a policy makes no effort to improve the situation. Would it not be better to establish a system of management designed to equalize increment and depletion and so stop the movement of the curve bb', stabilizing the point of net social advantage? Such a policy for the whole of Canada is termed a "sustained yield management".

In the successful application of a policy of sustained yield management, the curve bb' would remain stable. After this had been accomplished, it would be possible to alter the policy somewhat to allow for an annual increment. This would shift the point of net social advantage
gradually back to the right, thus permitting increased exploitation in the future for an expanding lumber industry.

From the inventory given in Chapter I, it can be seen that for the whole of Canada, with perhaps the exception of some parts of British Columbia, the forest resources have been allowed to decrease too far both in actual area and in quality. Only now is it being well realised by interested parties that some time ago the policy of attempting to keep pace with the movement of the point "p" should have been discarded in favour of a policy stabilizing this point of net social advantage. As time goes on, it becomes increasingly imperative that a system of sustained yield management be instituted immediately.

The advocacy of such a policy is made on the basis of conditions for the whole of Canada, with full realisation of the existence of a few isolated regions of accessible forest lands, notably the interior forests of British Columbia in which the number of units of exploitation used have not apparently yet reached the point of net social advantage for that region. An efficient management would realise that, in the case of such exceptions, the marginal returns to society from exploitation being greater than the marginal cost of this exploitation, there is no
necessity for adding the costs of more restrictive regulations. In these areas, the position of the point "p" will make the use of a greater number of units of exploitation permissible. The addition of the cost of more restrictive measures would only be a detriment to society in that it would hinder the establishment of forest industries in newly accessible regions.

One other consideration which must be made is the actual cost of maintaining a sustained yield management. Is there any reason to believe that the benefits which will be derived from this policy will offset the cost of its maintenance? Let us assume that by instituting a policy of sustained yield management the curve of \( bb' \), which represents the present costs of exploitation, will remain fixed. The maximum number of units of exploitation which can be used before reaching the point of net social advantage may then be determined. This will not be at the point \( p \) but must be somewhere to the left of this point as the cost of instituting and maintaining this new policy must be added to the cost of exploitation. This new point has been represented on the graph as the stable point "q". According to our theory of the movement of the curve \( bb' \), the point \( p \) under ordinary circumstances would be moved farther to the left. In the short run the institution of a sustained yield system of manage-
ment would, then, be more expensive as it would increase the costs both to the lumberman and to society. In the long run, the actual length of time depending on the amount which annual depletion surpasses increment, it would prove to be quite beneficial both to society and to the lumberman. This is corroborated by the fact that in the long run the point p would have moved well past the stationary point q.

It is quite probable that any policy of forest management devised along a plan of sustained yield would be such as to allow a total annual increment in our forest resources. In this case, any detrimental effects which the new policy might have in the way of added costs would be more rapidly offset.
In the first chapter, a brief inventory of the present forest resources of Canada was given showing the amount of available timber and the position of the forest resources which may become available some time in the future. Canada can be said to have arrived at the third stage in the development of commercial forestry. The first stage was that of unlimited exploitation of the surplus growth of centuries; it was necessary for the development of an infant industry and wasteful because production for distant markets must be cheap. The second stage was that of protection and regulation as the resources became more limited and more valuable. The methods and policies of this type of regulation in Canada were discussed in Chapter Two. With the realisation that regulation is not enough comes the third stage, that of sustained yield. By this policy, the forests are managed according to plans to secure reforestation, regulate the cut, provide sustained annual yields, and stabilize forest industries. Then only by close attention to this policy can Canada's future be optimistically viewed.
CHAPTER 4

THE GROWING DEMAND FOR LUMBER; ITS EFFECT ON FOREST RESERVES.

Demand and supply may be regarded as the two sides of a ledger. Having reviewed one side, supply, it is now imperative that the other side, demand, be studied. Before any approximations regarding probable future demands can be made, brief historical reference should be made to the growth of this demand so that the type of demand which has been encouraged in the past and the effects which outside influences and trade policies have had on its growth may become known. The reader will, in all probability, become increasingly aware that external trade has been a factor of some consequence in the growth of demand on the lumber industry.

The first step in the settling of Canada was, necessarily, the clearing of the land. At first, the supply of lumber which this produced greatly exceeded the local demands, with the result that the settlers were often forced to burn the logs in order to get them out of the way. As the settlements increased in size, and greater inroads were made into the surrounding forests, the demand increasing and the available supply decreasing, lumbering gradually developed as an industry.

Except during a period of war, there were in the early days of Canada remarkably few external forces try-
ing to stimulate the development of a timber trade. The bulky characteristics of lumber make the unit transportation costs relatively high at any time but this was even more noticeable when ships were smaller and the nearest large markets were across the Atlantic. A more important influence in retarding the trade was the necessarily one-sidedness of the trade. European ships could find little to fill their holds on the outgoing voyage to Canada, with the result that the total selling price of the lumber in Europe was quite high. It must, also, be remembered that Europe did not have a highly developed demand for Canadian lumber as many of the countries still had adequate available supplies. Those countries which did not have sufficiently large forest resources of their own could rely on the readily available sources of Norway and Sweden.

In the seventeenth century, France found in the Canadian forests a source of material for the masts and spars of her ships which far exceeded the European supplies both in size and quality. For some time, the best oak and pine were earmarked for France which country was willing to pay the extra cost to procure this superior type of timber. Britain, after having conquered Canada from the French, found it advisable to encourage such trade in order to obtain the best timber for the masts
of her ships.

At the beginning of the nineteenth century, Napoleon made an attempt to reduce the sea-power of Great Britain by cutting off her source of raw materials for ship-building. To do this, he rather successfully blocked trade between Great Britain and the Scandinavian countries. Britain was forced to look elsewhere for lumber supplies. The most probable place to find these was in her western colony, Canada. Realising that some method must be found to facilitate trade, Great Britain placed an Imperial Preference on Canadian timber in the year 1808, the effect of which was to reduce the relatively high tariff costs. Stimulation of the export of Canadian lumber rising from this began to arouse interest in the growth of the industry, while at the same time it laid the foundation for the beginning of the great export trade from Canada to Great Britain.

More and more settlers now found it profitable to enter the field. As the industry gained momentum, most of the young men in outlying settlements gave up farming to take up lumbering as an occupation. Had they stopped to think about it, the people of the time might have realised that the lumbering industry was expanding far beyond the bounds that the situation warranted. Great Britain did not intend to carry on this trade after the elimination of Napoleon's blockade as she would then be
able to turn to the nearby resources of Norway and Sweden; the preferences granted were of a purely temporary nature. Canadians on the other hand, not wanting to believe that there might be a sudden cessation of these preferences, tended to develop the lumber trade on a permanent basis.

When Great Britain finally decided that it would no longer be to her advantage to continue the treaty and took steps to repeal it, Canada found that a large part of her economy had become dependent upon trade in lumbering, with the result that any retardation of this trade would affect the whole Dominion. Using this as a basis for argument, British North America fought a losing battle in an attempt to force a continuance of the Imperial Preferences. With all hope lost, Canada then turned to the United States of America for a new market, welcoming the Reciprocity Treaty of 1854. By the terms of this treaty, Canada was to be given free trade in coal, fish and farm and forest products, in return for which America was given certain privileges in Canadian waters.¹

The advantages given to the industry by this treaty caused the exports of lumber to shift to the U. S. A. with considerable ease and to expand rapidly. Trade was also fostered by the adjacency of and ease of transporta-

¹ D. G. Creighton - "Dominion of the North", page 268.
tion to this new market. In the eastern States the growth of industry and the large metropolitan centres, combined with the expansion of her trade, continued to create ever increasing demands for lumber.

When the previously agreed length of time for which the treaty was to operate came to an end, it was found that the U. S. A. was unwilling to agree to a renewal. The abrogation of this Reciprocity Agreement of 1854, however, had little visible immediate effect on the export of lumber from Canada to the U. S. A. as the demands which had been built up by America for Canadian timber continued to overcome the new tariffs for a few years.

In an attempt to keep her own saw mills fully employed, the U. S. A. was not long in imposing tariffs on sawn lumber, thus favouring the export of logs rather than sawn lumber from Canada to the U. S. A. To meet this, the Canadian governments placed export taxes and embargoes on Canadian logs which action, it was hoped, would compel the American mills to migrate to the Dominion. To a certain extent, this action was successful, although the fact that these embargoes were imposed by the provinces and were under only limited federal direction lessened the effectiveness of this restrictive action.

At this time, it might perhaps be advisable to ex-
amine this problem of the exportation of logs, which came to a head following 1870, a little more closely. It is known that as early as the year 1851 there existed a certain amount of exporting of saw logs to the U. S. A. As time went on this trade increased, although the provinces were able to curtail it in varying degrees of effectiveness. By the 1880's, the exporting of large booms of logs across the Great Lakes had expanded to such a degree as to cause a great deal of criticism.\(^1\) Canadian sawyers objected to the American manufacture of Canadian lumber behind a high tariff wall, especially since this manufactured product served to compete with the exports of Canadian manufactured and semi-manufactured lumber products. The general feeling was predominant that Canadian raw material should be manufactured in the home country. The total force of these criticisms displayed its power in the strong encouragement given to the establishment of Canadian export duties on lumber products. In the long run, it is seen that these duties had the effect of an added impetus to the gradual movement of the American sawmills to Canada.

The rapidly increasing production of lumber both for use in Canada and for the export trade, was even at this time, beginning to have a noticeable effect on the available supplies of standing timber. Greater inroads were

being made on these supplies especially in Ontario and Quebec. In 1881 it was noted in the Sessional Papers of Quebec that the lower limits of the forests of Quebec were becoming "pretty much stripped" of the bulk of their most valuable timber, supplies having to be drawn from the more remote forests.

Although the abrogation of the Reciprocity Treaty had had little immediate effect on the lumber industry, it probably took its place as one of the multitude of reasons for the sharp decline in the trade of lumber products during the depression years of 1874-1878. The staple products of any country are always the most severely affected during a depression but lumbering has an added disadvantage in its great bulk. During the period of this economic crisis, Canada's exports were cut nearly in half. Even during this time, however, America still remained the largest importer of Canadian lumber.

As the urbanization of the States increased and the amount of their resources diminished, attempts were made by the Americans to lower the tariff on lumber until by 1913 it was admitted duty free. There is no doubt that in ordinary times the effect of this action would have been portrayed in the development of the eastern lumbering industry, but any such rise was counteracted by the war of 1914-18. Because of the scarcity of labour in
this period, the lumber industry was compelled to decrease its production despite the increasing trend in demands. A large percentage of the lumber which was produced at this time was directed into war channels; a large number of back-orders for civilian use was gradually built up. As one might expect, the end of the war was closely attended by a widening labour market and an increase in availability of some of the other factors of production. Lumber production thus began to increase quite rapidly in 1919.

As do all important economic crises, so did the depression of 1921 have an effect on this basic industry. Production began to fall off considerably, reaching the lowest production point since 1908 early in 1921. With the general betterment of the economic condition as the industries became entirely reconverted to peace-time production, the lumbering industry again began to increase production to meet the new demands of both the home market and the export market. However, the industry in the eastern provinces seemed to be past its zenith for in the relatively prosperous period of 1925-1929, it failed to expand as rapidly as one might expect in considering the demand and the economic conditions throughout the country.

In 1929, the total production of lumber in Canada
had reached approximately 4,750 million board feet but in the ensuing years of the depression production fell rapidly, reaching a low of 1,809 million board feet in 1932. The first reaction of the United States to the depression had been to pass the Hawley-Smoot tariff in 1930, the effect of which was to limit imports of Canadian lumber to the best grades. This great restriction compelled Canada to look for export markets other than the U. S. A. for her sawn lumber. But it proved to be a rather difficult step to take as economic conditions throughout the world were not conducive to initiating trade with countries with which no such trade had been previously established. Many of the countries had increased their tariffs in attempts to encourage the development of their own sawmills. Despite provincial bounties, comparatively little trade was developed with these foreign countries. In view of this, at the Ottawa Conference of 1932, Canada insisted upon and succeeded in having the Imperial Preferences revived.

In helping the lumber industry to develop its export trade with Empire countries, the Imperial Preferences were basically responsible for turning the tide of production as can be seen by the movement of the graph. The industry received an added impetus as a result of the three-way trade agreements of Great Britain,
the United States, and Canada in 1835, which agreements were designed to foster more trade between the countries by reducing tariff barriers. As a result, demands and Canadian production of lumber continued to increase rapidly, being given an added impetus by the outbreak of war with production reaching an all-time high in 1941. Following this, production began to decrease, not because of decrease in demands but rather because of the labour shortage. As the labour policy of the country became more highly organised, production gradually increased until by 1944 it had reached 47 hundred million board feet which was some 60 million more than in 1943 with all indications pointing to a new peak in production.

The commercial lumber industry began in the eastern provinces of Canada - New Brunswick, Nova Scotia, Quebec, and Ontario. This study of the nature of the growth of the demands of the lumber industry has, therefore, been principally concerned with its development in these provinces. Now let us study the development on the Canadian Pacific Coast. Through a different set of stimuli and with a different supply of natural resources on hand, the British Columbian trade developed along different lines. The sawmills of the Pacific coast were advantageously situated near tide water under conditions which would permit year-round production.
The climate in Eastern Canada is such that the cutting and hauling of logs can usually be carried on most economically during the autumn and winter months, so that the logging industry is largely seasonal. In British Columbia, on the other hand, the scarcity of drivable streams and the greater size of the logs has given rise to methods of operation that are more or less independent of frost, snow, or freshet and are carried on more uniformly throughout the year. Long slides are built on suitable slopes to bring down timber from the upper hillsides, the logs are hauled and assembled by donkey engines and different cable systems or by trucks and tractors. Logging railways are used extensively to carry logs to the mills, lakes, or large rivers where they can be assembled in booms and taken to the mills. Such differences in logging methods added to the differences in markets brought about by the geographical separation of British Columbia from the rest of Canada by the Rocky Mountains, led to the development of the Pacific Coast Lumber Industry along a pattern different to that of the Eastern provinces.

The Pacific Coast lumber industry advanced most rapidly in response to the demands arising from the gold rush in the late "fifties". During this period, increased lumber requirements for the building of houses, ware-
and for shipping etc., stimulated both domestic and export demands. Ships bringing in the "gold-digging" population took lumber as return cargo. Production continued to increase until it reached its pre-war peak in 1910. The shortage of available labour and the relatively poor war-time transportation facilities had an adverse effect on the industry with production being greatly reduced.

Soon after the conclusion of the last Great War a variety of conditions gave a boost to lumbering. These were: first, a reduction in ocean freight rates predicated upon increased tonnage; second, certain increases in demand for exports from the Pacific Coast area by the eastern States; and third, decreases in cost arising from the opening of the Panama Canal. This trade to the eastern States increased very rapidly until be 1923, British Columbia shipped by water to the Atlantic seaboard 248,611,600 board feet of sawn lumber out of a total water-borne export trade of 521,707,000 board feet.\(^1\)

During this period, British Columbia began, also, to develop trade with other countries such as China and Japan. The trade with China was of a sporadic nature, with the result that the total trade was relatively small. The situation was different with Japan, as this country, being in a state of general industrial expansion, had very great de-

1. Province of British Columbia - Consolidated Statistical Tables of the Forest Branch, table #3.
mands to be met. This trade with Japan continued to expand reaching a maximum in 1928. The decline following this year was, no doubt, partly due to a greater Japanese demand for logs than for sawn lumber while actually, at this time, the Pacific Coast industry was more interested in exporting the latter.

In accordance with her general policy of the time, the United States passed the U. S. Revenue Act of 1932, which raised the tariffs on the import of Canadian lumber. It was in anticipation of such a move that British Columbia had fostered trade with foreign countries, so that she would not be forced to accept the conditions imposed by the United States. At the Ottawa Conference of the same year, the preference given to Empire timber by Great Britain was sufficient to give to the British Columbia industry all that part of the British market formerly shared with the Pacific Coast States of Washington and Oregon. Under the influence of the preferences, the United Kingdom soon became the most important market for British Columbian timber, with Australia rapidly increasing in importance as an importer, also.

If it were not for the preferential treatment, British Columbia would have had great difficulty in competing with Oregon and Washington for, in spite of the fact that British Columbia labour costs are lower and stump-
age dues are less, the total costs are greater because of the greater cost of equipment and supplies. As the demand for such equipment is small in Canada, she cannot benefit from large scale production. In addition, the tariff which must be paid in importing this equipment from the United States greatly increases the costs. The fact that the British Columbia lumber industry, in competition with the industry in Washington and Oregon, has attained a relatively strong position in some export markets is not due to lower logging and milling costs but to certain preferential tariffs in many lumber importing countries which give Canada important advantages in trade.

One interesting feature of the lumber exports of the Pacific Coast which has been mentioned previously is the export of logs. In the Eastern provinces, such export was limited and finally prohibited in some provinces but there has been no such legislation in British Columbia. The result has been the development of a fairly large trade in logs. It has already been noted in a previous chapter that such trade was halted during the recent war. For many reasons, it seems reasonable to assume that some trade in saw logs will be carried on again but it is doubtful if it will ever be allowed to reach pre-war proportions.

1. Notably Ontario in 1880.
A second important fact to note is that lumbering did not suffer to such a great extent during the depression in British Columbia as it did in the Eastern Canadian Provinces. The youthful industry on the coast seemed better able to stand the blasts of the depression than the more decadent industry in the east. Already greatly assisted by the British Preferential treatment from 1932, the Pacific Coast industry was the chief beneficiary of much of the export trade arising from the Reciprocity Treaty of 1935. With this help, this industry continued to expand until the outbreak of the second World War in 1939.

A reference to Chapter One will show that the Prairie Provinces have never been favourably situated with regard to forest resources. The available quantity has always been quite limited and at the same time, the quality of the timber is generally not sufficiently high to warrant exploitation.

The war years in Canada were outstanding: greater imperative demands than ever before in the history of Canada were made on it with the result that production reached a record peak. Factory buildings, government extensions, buildings for the armed forces, and direct war needs for the manufacture of weapons took prior claim on the greatest part of the production. A glance at the
production figures shows that it rapidly increased, reaching an all-time high of approximately 5,870 million board feet in 1942. Then production dropped comparatively, for the next three years even though the demand remained unprecedented. There were many economic reasons for such a decline, one of which may have been the policy of the government in taxing excess profits without making adequate provision for certain deductions. This, however, is quite a provocative theory and as such has not as yet been generally accepted by the authorities. The expository remarks given by these officials laid full blame for this decrease on the shortage of available labour. Undoubtedly, the tightening labour market did have a very marked effect on lumber production, adequately serving as an explanation of the situation. With the greater availability of labourers at the conclusion of this war, production began to climb. It has been unofficially estimated that production for the present year, 1946, will be from five billion to five billion-two hundred million board feet.¹

Slightly more than three-fifths of the production was used in Canada itself. The approximate annual consumption of three and one-half billion board feet has surpassed the largest of pre-war expectations. At the same time, exports to some of Canada's foreign markets has in-

¹ Estimation made by the former Timber Controller, Mr. A. S. Nicholson.
creased. Prior to 1941, Canada exported approximately four hundred and fifty million board feet to the United States. During the year 1941, this figure was increased to almost one billion, four hundred million board feet, and in 1942, it reached one billion, five hundred million board feet. The question may well be asked: "Why, if her home needs were so great, did Canada allow such an increase in exports to the United States? The answer to this lies in the Canadian need for offsetting entries in the balance of trade to help balance the inflated purchases. Many of the officials seemed to feel, also, that an increase in exports was necessary to ensure a strong system of price control of lumber in Canada. The lumber trade with the United States has decreased since then, although it is still at about twice its pre-war figure.

During the war period, Canada managed to export one billion board feet of lumber to Great Britain, also, gradually increasing this to one and a quarter billion board feet.

This brief history of lumbering in Canada has been such as to show only the important steps in the development of demands on the industry. It will be noted that Canada, although generally rated as one of the great lumber producing countries of the world, has developed remarkably few large export markets. Great Britain and the
United States have been the only lasting large markets throughout the development of the Canadian Lumber Industry. A considerable trade with a few other countries has been managed, especially within the last two decades. Australia has proven to be a substantial market and, as far as can be ascertained, it, along with the West Indies, will become a permanent market in the future. Trade, lasting only a few years was at times developed with other countries, as with Japan. It is now realised that at that time Canada was supplying Japan with the tools of war. Perhaps, in the future, Canada will supply Japan with lumber to help in reconstruction following this war.

Many great industries have, in their infancy, been sheltered and nurtured by favourable trade agreements. The lumbering industry was one of these. Because of the nature of the product, it is quite probable that, in order to flourish, favourable trade agreements will be a prerequisite. It is concluded that it is an absolute necessity for Canada to develop a far-sighted national policy with regard to her exports of lumber.

Apart from the cyclical fluctuations, the demand for Canadian lumber has, in the long run, been steadily increasing.

Woods operations have been augmented with the rate of depletion either directly by cutting or indirectly
through fire losses increasing. At the same time, there has been relatively little done to increase the rate of growth. Canada has, then, in the past has a set of conditions in which the annual rate of depletion has been higher than the increment. The folly of allowing such a situation to continue was discussed in the previous chapter. This holds true for Canada, especially to-day when she is preparing to meet the stupendous world-wide demand for lumber. The demand is increasing; let us make sure that the supply is so managed that it will increase proportionately. In this way, Canada will not, in the future, be faced with the problem of having only limited resources available.
CHAPTER 5

THE FUTURE OF THE CANADIAN LUMBER INDUSTRY.

"Future", in itself, may be used to express all time from the following instant to infinity. If the word is to have any real value, definite or at least approximate limits must be given to its meaning. The further one prophecies into the future the less accurate can the result be, as many unforeseen events will greatly change conditions. In this chapter, therefore, unless where specifically stated, the word "future" is meant to represent the next decade, beyond which there is no basis for developing rational conclusions with regard to the lumber industry.

The future of any industry falls into two brackets—Demand and Supply. Demand may be logically subdivided into demand on the home market and demand in the foreign market. The home consumption of lumber has, during the war, reached an all-time high. As the greatest percentage of this was used either directly or indirectly during the war, peace-time orders were allowed to accumulate. There is, therefore, every reason to believe there will be no reduction for at least the next decade in Canada. It would be impossible to fulfill the needs of new peace-time industries along with the needs of the average citizen within a shorter period of time. The enormity of
this demand is made doubly clear by the recent statement that the Prairie Provinces alone require one billion of board feet of lumber per annum to fill their needs. If this were to be taken as an indication of suppressed demand across Canada, it would seem that a production of four and one-half billion board feet would be required for home consumption alone. Regardless of any outside markets, there appears to be sufficient built-up demand in Canada, itself, to keep the lumber industry very active for the next decade.

Throughout the history of Canada, Great Britain has been the greatest and most important importer of Canadian lumber. It is seen that even during the war, Canada was allocating one billion board feet of lumber for export to Great Britain. Now, for purposes of reconstruction, her needs are greater than ever before. Canada must make some attempt to fill her needs. It would be far from sufficient to export only that which is left over after home needs have been satisfied; yet this would happen were no government controls left on trade. There is, therefore, definite need for a continuation of federal supervision.

It seems quite probable that Great Britain will require five billion board feet of lumber per year. Some of this she will be able to get from the Scandinavian countries, Norway and Sweden, and about one-half a billion
from her own resources. During the war, Canada was able to export between 1 and 1 1/4 billion board feet to Britain. Using this as a basis, provided the policy of control of distribution were enforced, Canada could reasonably be expected to export 1 1/2 billion board feet to Great Britain per year. In view of the demands of other markets, this would probably be the maximum which would be allotted unless there were a rise in production in Canada.

The other nation with which the lumber industry has traded most is the United States. This country, however, is far more favourably situated with regard to its own lumber resources than Great Britain and it is felt by many experts in forestry that within a relatively short time the forest policies being followed will ensure a sufficient production to meet their own needs. The Canadian Government in foreseeing this, has realized that the United States will probably never develop into a great importer of Canadian lumber. As the demands for lumber have increased, Canada has, therefore, allotted less and less to the United States. During the war, it was reduced from 9 hundred million board feet to 75 hundred million board feet. It is very difficult to state what the expected shipments to the United States will be in future but there is every reason to believe that, at least for the next
few years, this figure will be reduced.

Besides these two great markets, Canada has some other obligations which she should try to meet. Both Australia and the West Indies have become rather permanent markets. Indeed, Australia has no other source unless it be the United States. In view of the policy of Imperial Preferences, which has been followed, the United States has offered little opposition in this market. The suggestion that a relatively large amount of exports be sent to Australia presupposes a rapid increase in the lumber production in Canada. If we do not make this assumption, it must be realised that, in view of the aforementioned demands, there will be relatively little to send to Australia. Yet this minimum must be allocated to her, as the potential position of Australia as an export outlet must not be forgotten.

Great Britain, United States, Australia, and the West Indies—these are the main markets with which Canadian officials are concerned and will continue to be for the next decade. During this period, there will doubtless be many demands which cannot be met unless some unforeseen variations in production develop. Japan has never been a permanent market. It was seen, however, that, especially for three or four years in the thirties\(^1\),

1. See appendix.
a certain amount of export trade was developed from Canada to Japan. It is easily seen now that Canada was really supplying Japan with tools for war by stocking up her reserves. Similarly, the Dominion may be expected to take a hand in helping to supply Japan with the lumber to repair the ravages of war. This is a demand which Canada will make no attempt to meet for the next decade. Yet this will remain in potential demand to be filled at a later date when the pressing needs of better markets have been allayed.

As the demands became greater during the war, it became more and more forcibly realised that supervision of distribution from a central body was absolutely essential in order to obtain maximum benefits from resources. If this was necessary when the demands were great during war-time, it follows that this should be necessary in view of the tremendous demands of peace-time. A central body is in a better position to view all markets and to decide what to allocate to each so that the maximum gain in the long run may be procured. There is, naturally, a desire on the part of the people to remove most of the exacting restrictions necessary in war-time as soon as possible but this is one control which should be continued and it is one control which the majority of the lumber producers in Canada favour. As a whole, they have
begun to realise that such a policy will benefit them in the long run. As the Canadian lumbermen have become rapidly more united through their Associations, they have been able to voice their desires more. The government has been following a policy of keeping in close contact with the lumbermen's Associations across Canada, discussing with them their problems and attempting to arrive at decisions acceptable by all. The continuation of such a policy of co-operation will ensure the attainment of all the benefits of a centralized control which is sensitive to the desires of Canadian lumbermen.

Having glanced at the problems of demand, it is necessary to review those of supply. What resources has Canada to meet the immense demands? In the first chapter, it was seen that the resources appear to be vast but upon classification it was found that the resources which are merchantable are quite limited and it is only these resources which have any real value. There are relatively few areas which are accessible and have not as yet been explored. It would be pure folly to attempt to meet these demands without some form of centralized policy. Regulation in itself has served its purpose but now one step forward must be taken and it is a step which will benefit not only the country as a whole but also the individual lumber industries.
In a previous chapter, it was noted that policy of regulated cutting alone must become more and more restrictive in order to keep pace with the vanishing supplies. In Canada, adequate proof is available that the increment is less than the depletion. In Chapter Three it was noted that under such a set of circumstances, the cost of exploitation curve will gradually shift to the left. The only known method of retarding this is by the institution of a sustained yield system of management.

Already British Columbia has unofficially established such a system. In this province, it is only a matter of time until it will be fully empowered by legislation. It is not sufficient that one province alone enforce the Sustained Yield System; all across Canada it must be made to yield its benefits. It may even be necessary for the federal body to use what influence it has, either directly or indirectly so that all areas across Canada will be following the policy of Sustained Yield Control. The federal government has indirectly been receiving benefits to the sum of 200,000,000 a year. The provinces, finding the new costs of protection and control almost overbearing, have asked for financial aid. By granting this aid, the federal government will have the necessary power to demand that the new system be followed. The actual control and management should logically be left in the hands of
the provinces. This is not a field which would be better taken over by the federal government. With regard to resources, the federal government should, therefore, reserve its powers for two main purposes--first, that of ensuring the establishment of the policy of Sustained Yield Management in all provinces and second, that of viewing the conditions of the country as a whole, making suggestions and conclusions which would not be obvious to the provincial authorities. Superficially it would appear that a large amount of federal control would be suggested but, basically, that is not the case. The added powers which the Dominion Government would receive are mainly those of supervision of forest policy and the decisions regarding the allocation of the products to the different markets with close co-operation between the individual markets and the lumbermen's Association.

Aside from these federal government duties, it has other duties which it should perform. These may be mainly classed under the heading of research; research into the best methods of preventing and fighting forest fires, research into the control of insects and disease, research into the newest uses of lumber. The first two have been carried on to a certain extent by the Dominion Forest Service; this research should be extended so that the problems arising all across Canada may be dealt with. The
Provincial Governments have, in the past, carried on a lot of their own research. The embodiment of all these research departments into one would not only reduce costs but would allow the country as a whole to become acquainted with and benefit by the findings and decisions of research departments. The third suggested research department, that of finding new uses for lumber is relatively new; its importance is forcibly portrayed by the many scientific discoveries. In the German search for substitutes, methods of treating lumber so as to produce material with which to make clothes were perfected. The newly developed glues have been proven to bind plywood together so that it is as strong as steel. These discoveries have shown that we are only on the threshold of finding many possible uses of lumber. Not only does this signify greater use of our lumber but it also allows more economical use of our researches as a smaller variety of trees and woods previously considered to be too soft and too weak are now of greater value.

The demand for Canadian lumber seems, thus, to be almost limitless. Apart from the immediate postwar requirements both in Canada and abroad for the following decade, there are arising demands brought about as a result of the innumerable discoveries for new uses for lumber. In the long run, the demands portrayed by the
production figures can be expected to increase. In the short run, this increase may not be very apparent due to the high sensitivity of the demand for lumber to the business conditions; hence the close approximation of lumber production figures to the business cycles of the country. No longer is lumbering an exploitation industry; it has a permanent future. In view of this, more and more attention must be given to the conservation of the supplies of forest resources. A national forest policy that would protect from fire and disease, control the cutting, promote reasonable reforestation practices, and create a forest consciousness in the minds of the Canadian people would conceivably double the production to at least ten billion feet of sawn lumber per annum on a perpetual yield basis. Supply and demand may thus be kept proportionate. Society would gain from the continuation of a large basic industry and the lumber producer would benefit from the guarantee of sufficient resources to establish and enlarge his business on a permanent basis.
### Review of Lumber Production, 1908 to 1939

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*# The figures for 1940-43 are approximations based on wood operations and, as such, are not strictly comparable to the preceding figures.*

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