

1908

46 AN ANALYSIS OF CANADA'S
TIMBER WEALTH



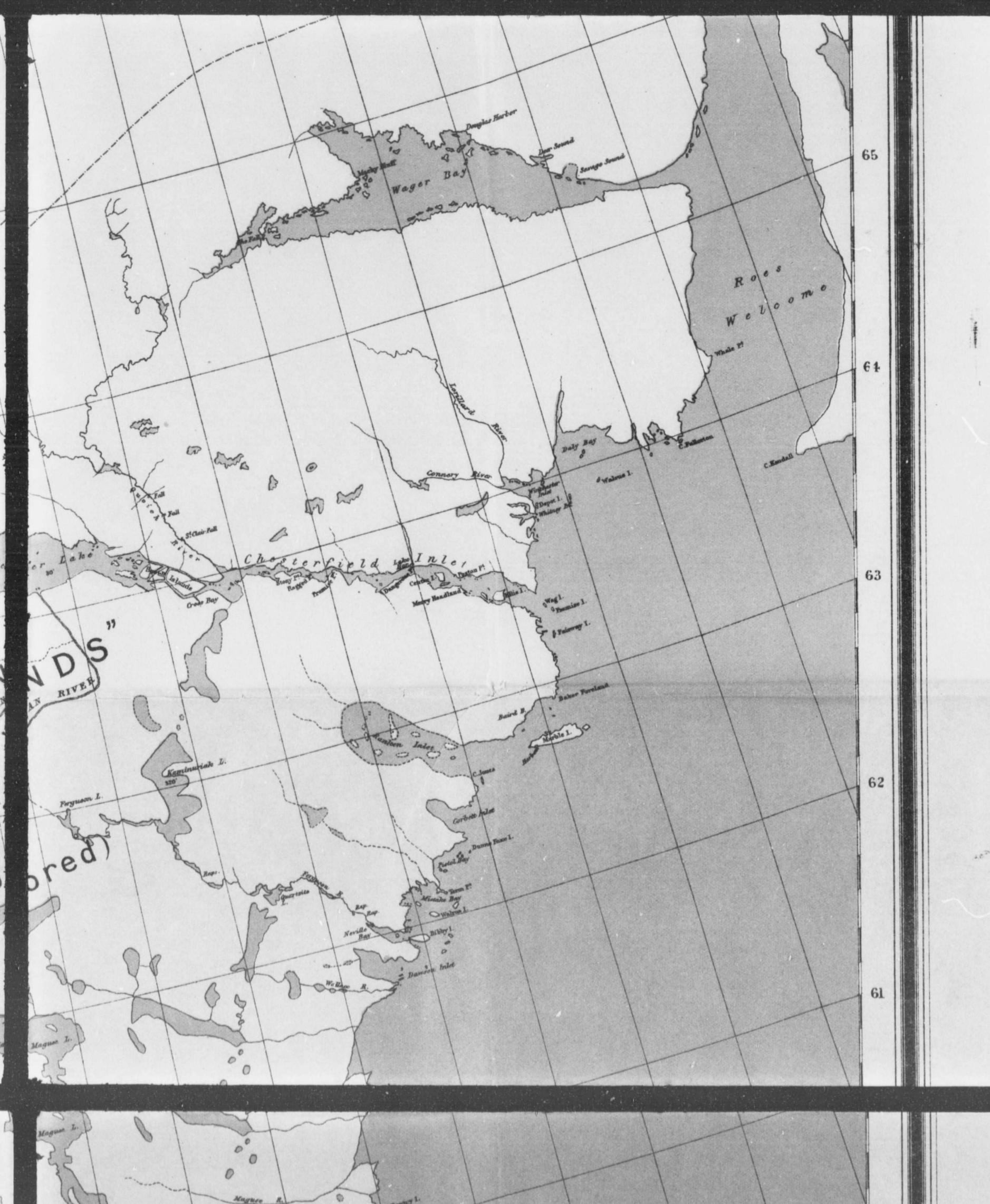
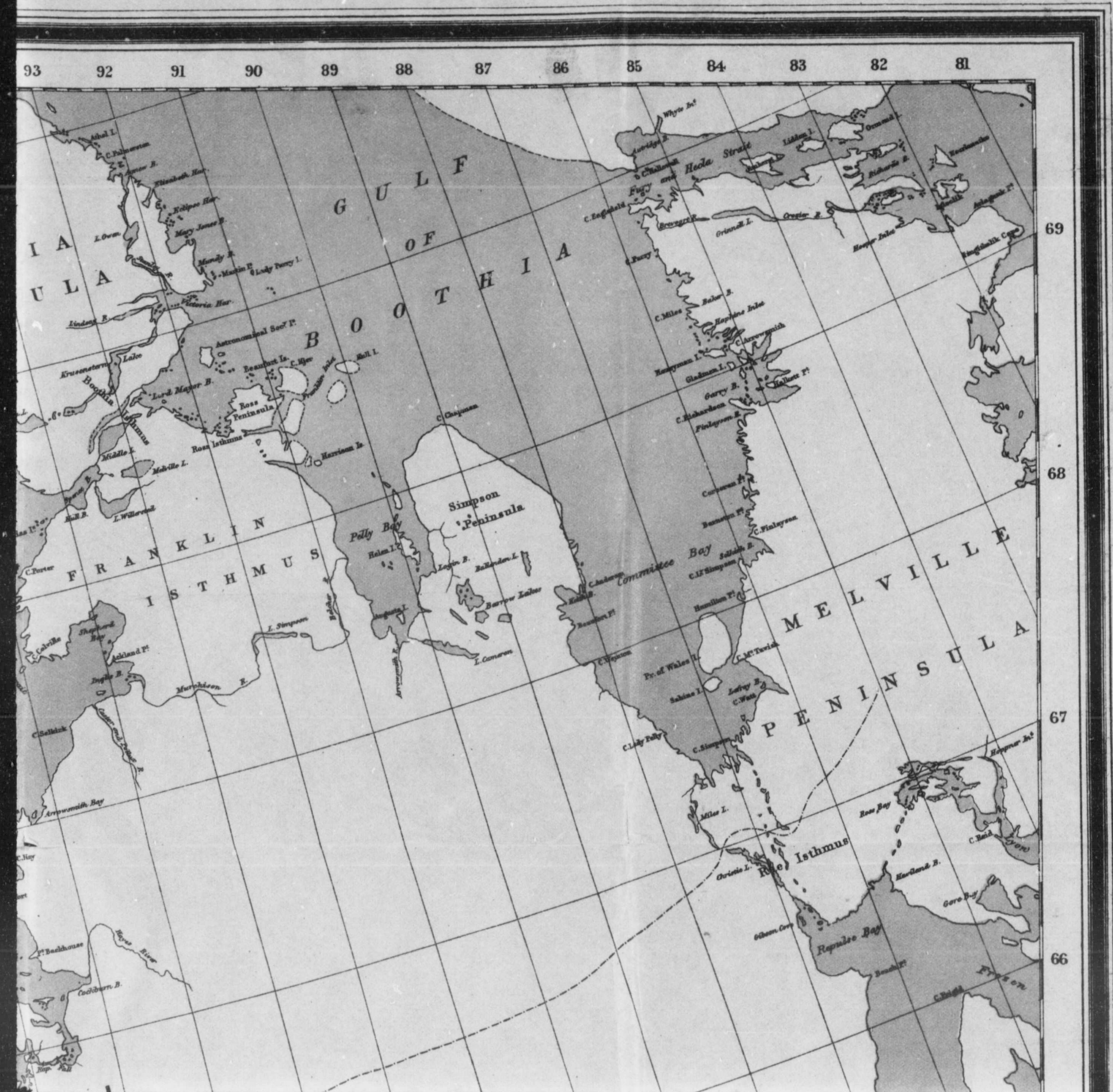
A Preliminary Study

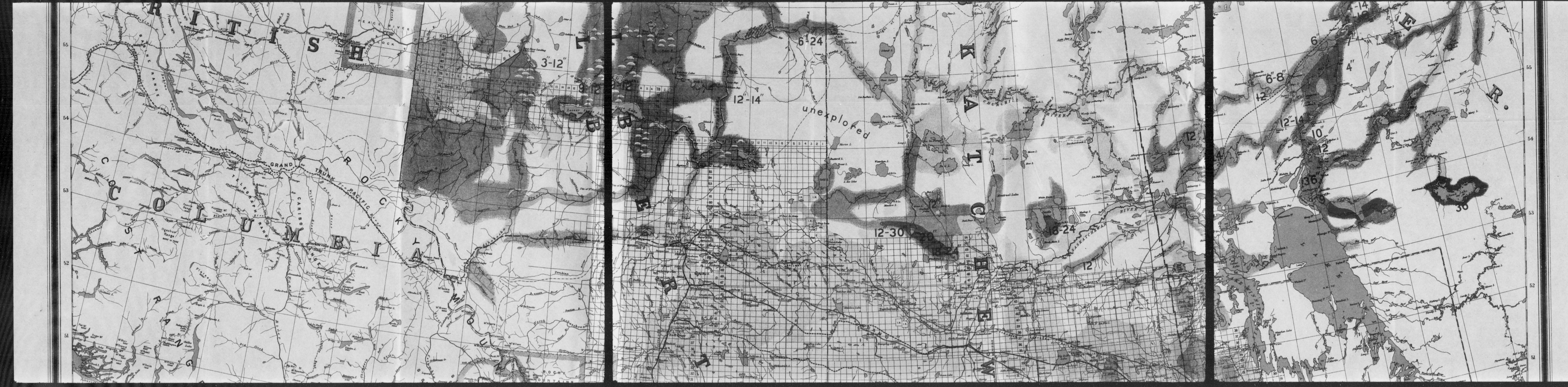
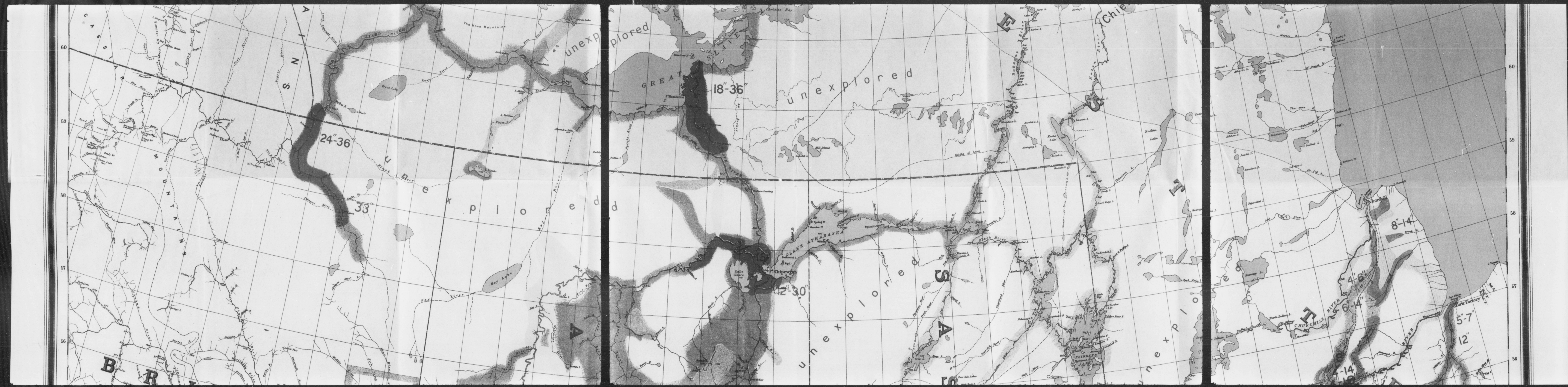
by

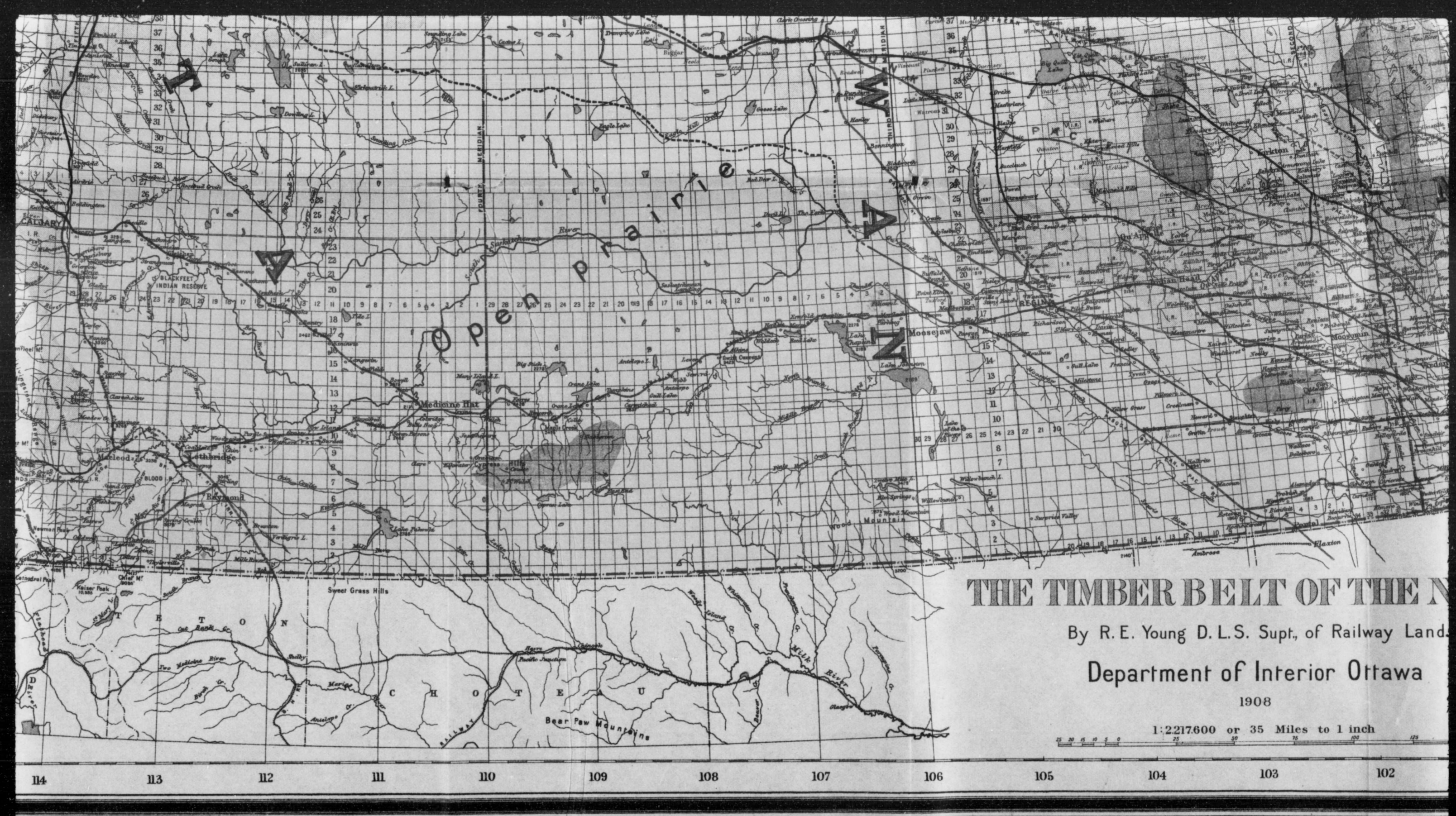
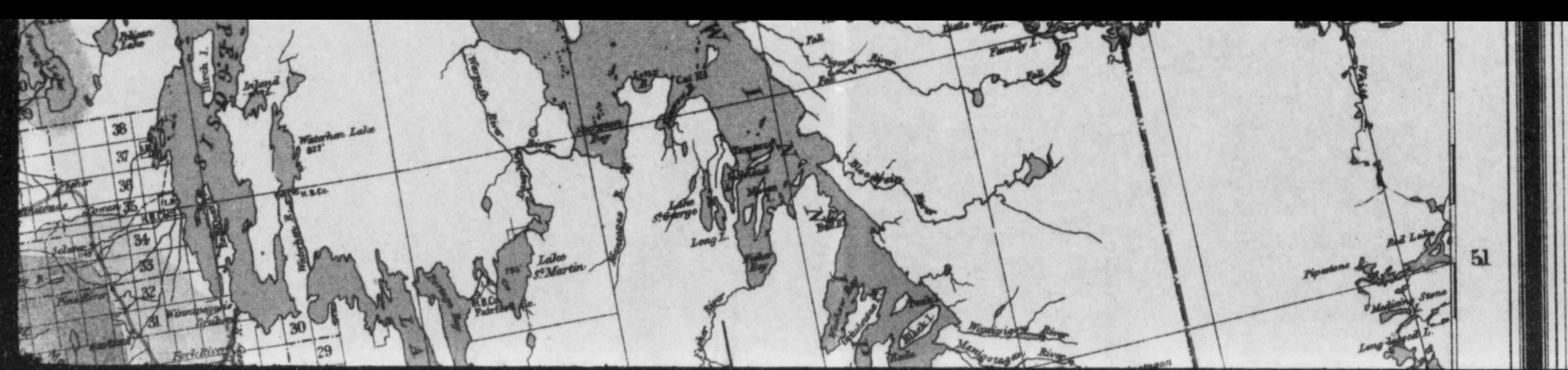
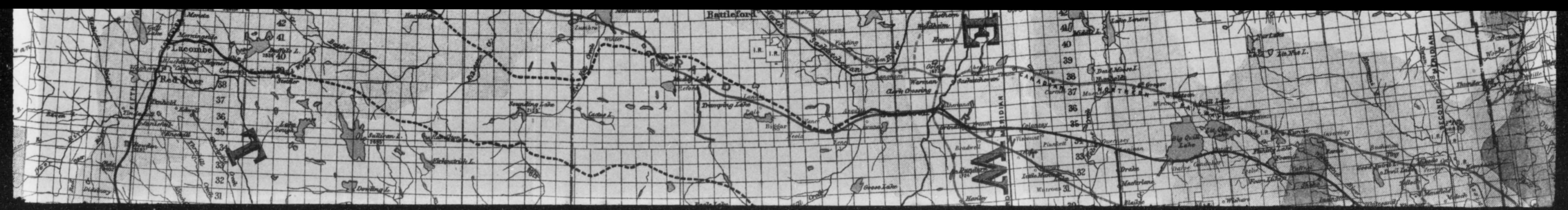
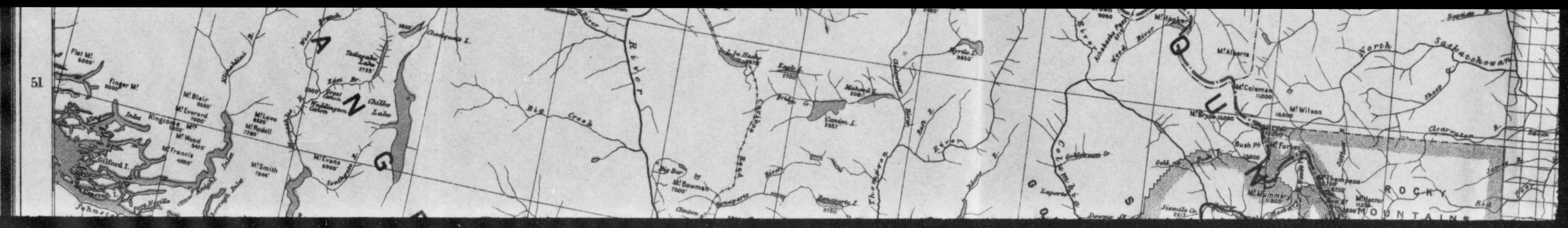
B. E. FERNOW, LL. D.

Dean, Faculty of Forestry
University of Toronto

Reprinted from *Forestry Quarterly*, Volume VI.
1908







THE TIMBER BELT OF THE NORTH

By R. E. Young D.L.S. Supt. of Railway Land

Department of Interior Ottawa

1908

1:2217600 or 35 Miles to 1 inch

LEGEND

LIGHT GREEN	Poor Scattered Timber.
MEDIUM GREEN	Fairly Wooded.
DARK GREEN	Thickly Wooded.
BROWN	Brule.
DARK YELLOW	Prairie.
LIGHT YELLOW	The Bare or Treeless Lands.

Red numbers indicate average diameter in inches of trees where noted.

125 124 123 122 121 120 119 118 117 116 115 114 113 112 111 110 109 108 107 106 105 104 103 102 101 100 99 98 97 96

AN ANALYSIS OF CANADA'S
TIMBER WEALTH



A Preliminary Study

by

B. E. FERNOW, LL. D.

Dean, Faculty of Forestry
University of Toronto

Reprinted from Forestry Quarterly, Volume VI.
1908

AN ANALYSIS OF CANADA'S

FOREST WEALTH

BY

A. S. FENNELL, D. D.

PROFESSOR OF FORESTRY

UNIVERSITY OF TORONTO

Published by the University of Toronto Press



AN ANALYSIS OF CANADA'S TIMBER WEALTH.

A Preliminary Study.

B. E. FERNOW.

The vast territory of the Dominion of Canada, with over 3.5 million square miles, covers an area larger than the United States and not less than the whole of Europe, extending over 20 degrees of latitude from the 49°, that of Rome, to the North Pole, and through 85 degrees of longitude, over 3,000 miles across the continent along the boundary line. With only about six million inhabitants, more than five-sixth living in the Eastern Provinces, it is natural that large areas remain still entirely unexplored, and other areas are still so little known that it would appear hazardous to venture very definite statements as to the timber resources of this large territory. If the writer nevertheless attempts this task after only a brief year of occupation with the subject and a few hasty reconnaissances, he does so with the full realization that the details of his conclusions may have to be modified on closer acquaintance. He has, of course, utilized what information is available, which is very scanty and often tinged by patriotic tendencies to magnify, but he relies largely on a study of the geological and climatic conditions which are either of record or can be readily conjectured and which predicate forest types and forest conditions.

Comparing Canada with the United States in their forest conditions two facts at once impress themselves, namely, the greater variety of forest types and the greater extent of continuous valuable timber areas in the latter. No such thing as the extensive southern pineries, in which almost every acre contains merchantable material, is to be found in Canada, and no such variety of species of value is to be found as the forests of the United States offer.

Everything is simpler in Canada, as its geology and topography and its entirely northern climate would lead one to expect, and her limited areas of merchantable saw material are distributed through a large area of inferior growth: the commercial timber

occurs mainly in "patches." And we may say at once, that while perhaps a larger area than of the States exhibits woodland conditions, the commercial timber area, actual and potential, is decidedly smaller.

Floristically, we may differentiate, as in the States, the Atlantic and Pacific Forest, but while in the States the prairie and plains country separates these two types effectually, in Canada the forestless country extends only 300 miles from the boundary north, with a base of 800 miles at the boundary, narrowed to 400 miles in its northern limit, and the Atlantic forest extends beyond about the 52° across the continent to the Rocky Mountains and to the mouth of the Mackenzie River and beyond, into Alaska. Indeed, along the Rocky Mountains on a limited area the boundaries of the Eastern *Pinus divaricata* and the Western *Pinus contorta murrayana* overlap and other species of the two floras associate here over considerable areas.

Towards the north, the number of species as well as individual development is more or less gradually reduced, and finally, another treeless or forestless area is reached, the "barrens" or "tundra"; the northern limit of trees being described by a sinuous line from Fort Churchill to the mouth of the Mackenzie River, and on the Ungava side of Hudson's Bay, by a line running close to the 58° from Nastapoka River to nearly the south shore of Ungava Bay and along the treeless coast of Labrador.

Forest Flora.—A census of the tree species of Canada develops in all precisely 150 species and varieties as now recognized, of arborescent form, of which 32 are conifers, namely, 10 pines, 5 spruces, 4 firs, 3 each hemlocks and larches, 2 each juniper and cedar, and each yellow cedar, red fir and yew. Twenty of these conifers belong to the Pacific flora, while of the broad-leaf type only 25 of the 118 are found there. All of the species, except a few minor ones, are also found in the United States.

Altogether, coniferous growth is prevalent, even in the Atlantic forest, most of the hardwood species finding their limits in the southern portions of the Eastern Provinces, and only a few species growing northward.

If an economic point of view be applied, taking into consideration either frequency of occurrence, high usefulness, or capacity of development to timber size, we may list the following 66

species for the two geographical regions; those once or twice underscored according to their importance, representing the 44 more prominent ones:

ATLANTIC FLORA.

- Abies balsamea.
Larix americana.
Picea canadensis, mariana.
Pinus strobus, resinosa, divaricata.
Thuja occidentalis.
Tsuga canadensis.
Acer saccharum, rubrum.
Betula lutea, papyrifera.
Castanea dentata.
Celtis occidentalis.
Fagus atropunicea.
Fraxinus americana, pennsylvanica, nigra.
Gleditsia triacanthos.
Gymnocladus canadensis.
Hicoria ovata, minima, alba, glabra.
Juglans cinerea, nigra.
Liriodendron tulipifera.
Magnolia acuminata.
Nyssa silvatica.
Platanus occidentalis.
Populus balsamifera, deltoides, grandidentata, tremuloides.
Prunus serotina.
Quercus alba, prinus, macrocarpa, acuminata, platanoides,
rubra, velutina, coccinea.
Sassafras sassafras.
Tilia americana.
Ulmus americana, fulva, thomasi.

PACIFIC FLORA.

- Abies grandis, amabilis, lasiocarpa.
Chamaecyparis nootkatensis.
Larix occidentalis.

Picea engelmanni, *sitchensis*.

Pinus ponderosa.

Pseudotsuga mucronata.

Thuja plicata.

Tsuga heterophylla.

Acer macrophyllum.

Alnus oregana.

Arbutus menziesii.

Fraxinus oregona.

Populus trichocarpa, *angustifolia*.

The importance of the species is, to be sure, an uncertain character. As timber producers, on the west coast Douglas Fir and Giant Cedar, with Hemlock, Yellow Cedar and Sitka Spruce and some Fir and Engelmann Spruce are at present only serviceable. In the Rocky Mountains, Bull Pine and Larch are most prominent. In the East, the finer hardwoods are mostly cut out, Elm, Basswood, Yellow Birch, more rarely Ash and Red Oak are still plentiful, and Paper Birch abounds. Of the conifers, White and Red Pine with Hemlock are the main producers. White Spruce and Balsam Fir in large amount form the main value of the Eastern forest. Such species as *Pinus murrayana* and *Pinus divaricata*, *Picea mariana*, *Populus balsamifera* and *tremuloides* are important because they cover vast areas and form a not insignificant source of local supply of wood. Balsam Poplar and the two Jack Pines mentioned seem to develop in the more northern field of distribution; indeed their center of distribution seems to be found in the upper Mackenzie valley.

The two eastern spruces are the most northern species up to timberline, and the White Spruce extends its field into the Rocky Mountain flora, while the Lodgepole Pine covering large areas of dry slopes, enters the field of the Eastern flora in its extension into Alaska. The Alpine Fir (*A. lasiocarpa*) and Patton's Hemlock, with *Larix Lyallii*, are the main alpine trees of the Rockies and the Coast range. Englemann Spruce and *Abies grandis* are found only scattered, but *Abies amabilis* is forest-forming in the higher altitudes of the Coast Range, while Sitka Spruce and Tideland Hemlock form almost by themselves the northern coast forest.

Forest Types.—Taking together into consideration geological

formation, soil, climate, and floral composition, we may conveniently divide the whole wooded area into 4 broad geographical types which again may be divided into 12 regional types, within which, of course, many local types may be recognized.

The Height of Land, a low ridge or succession of ridges rarely over 1,500 feet in height,—the watershed between Hudson's Bay and the St. Lawrence including the Great Lakes—forms for the most part the northern limit of the Eastern forest, and within this area is confined the commercial timber of the East. The Northern Forest forms the second type and extends north and west of this line to the Rocky Mountains, which form the third geographical type, from which the Coast forest is differentiated as the fourth type.

The Eastern forest may be subdivided into five regional types, which we may designate as the Acadian, the Upper, Middle, and Lower St. Lawrence, and the southern Laurentian.

The Acadian type comprises the Maritime Provinces, with the eastern townships of Quebec south of the river added. This area, being geologically a continuation of the Appalachians, the forest represents the same type as the Maine or northern New England type, a birch-maple-beech hardwood base with coniferous admixture, which on the higher slopes and plateaus may become pure. Originally White Pine, at present White and Red Spruce with Balsam Fir, form the valuable part of the composition.

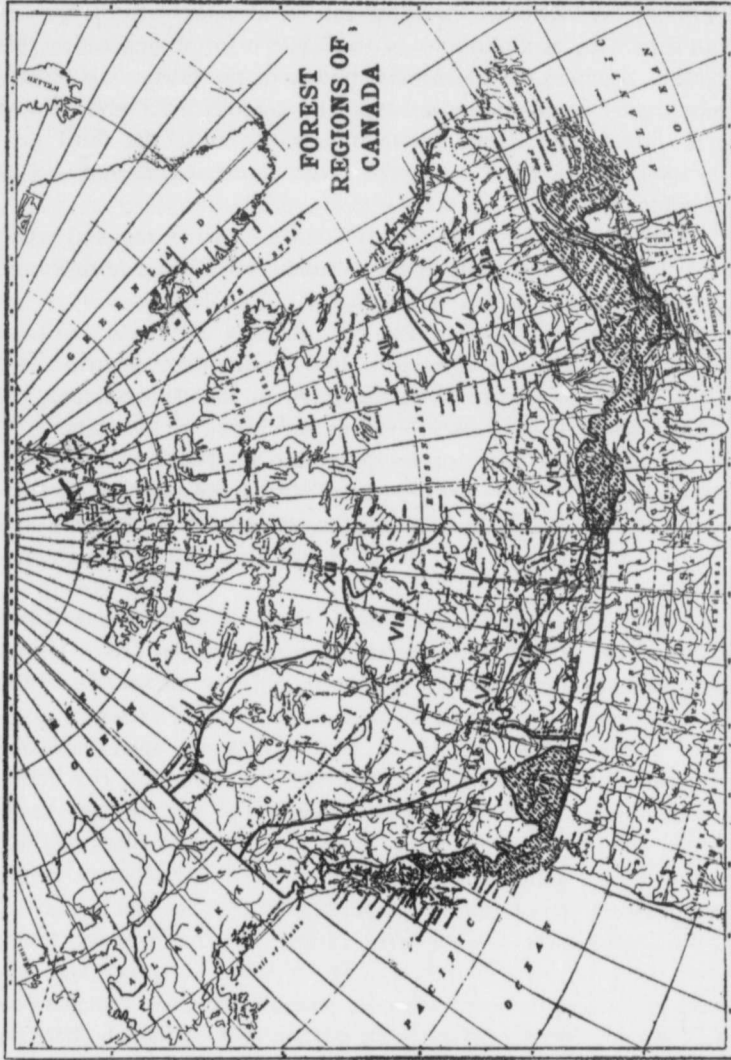
The St. Lawrence valley can be distinctly divided into three types. The peninsula of Ontario, located between Lakes Huron and Erie, to the west of Lake Ontario, enjoys, on account of the lake influence, a milder climate than other parts of eastern Canada and besides, being formed by glacial deposits upon limestone formations, excels in fertile soils, able to support a rich hardwood forest. Here we find an extension of the southern hardwood flora of oaks, hickories, Tulip-tree, Ash and Black Walnut besides Elm and Maple, all in magnificent development where any of them are left, and a number of other species like Sycamore, Sassafras, Kentucky Coffee-tree, Honey Locust, Chestnut, which find their northern limit here. The absence of spruce and balsam and the minor occurrence of pine and hemlock reminds one of the Ohio forests. Here is the garden spot of Canada, here on

Atlantic.

- I. Acadian.
- II. Upper St. Lawrence.
- III. Middle St. Lawrence.
- IV. Lower St. Lawrence.
- V. Southern Laurentian.
- VI. Subarctic
- (a) Northern
- (b) Southern

Pacific.

- VII. Southern Rocky Mountains.
- VIII. Northern Rocky Mountains.
- IX. Southern Coast.
- X. Northern Coast.
- XI. (a) Plains and prairies
- (b) Woodlands and prairies.
- XII. Tundra.



an area of 18,000 square miles lives half the population of Canada, and practically all the commercial timber is cut away to give room to farms, and many farms being even without woodlots, so that, a few years ago, in consequence of the anthracite coal strike, a fuel famine was experienced.

The Middle St. Lawrence Valley includes the shore of Lake Ontario, east of a line drawn from Toronto to Midland on the Georgian Bay, and towards the north limited by a line drawn from the Georgian Bay to the Thousand Islands, and the river valley, east of a line from Belleville to Arnprior, narrowing from a width of 75 miles to less than 30 miles at a point south of Quebec. This is also glacial and river deposit, perhaps not quite so rich as the peninsula and certainly different in climate, the influence of the large continental area to the northwest being felt in a wider range of temperatures and lower rainfall and humidity.

It is still a hardwood type, but reduced in variety, the species mentioned before as finding their northern limit on the peninsula, being ruled out by the climatic change. This region, too, is nearly cut out to make room for farms.

The Lower St. Lawrence Valley from Quebec north narrows down to still smaller width, the fertile land extending from 6 to 20 miles at most alongside the river. The climate, still more rigorous, rules out again a number of species, among which the White Oak, Burr Oak, Beech, Basswood and Butternut, and soon also the Hemlock and Red Pine disappear. The characteristics of the Acadian conifer type on one side and of the northern forest on the other are more and more approached.

North of the St. Lawrence Valley drift, there extends a vast area formed of the Archean rocks of the Laurentian period—the Laurentian plateau—the oldest land of this continent, a rocky country, topographically little diversified, the thin soil collected in pockets, only occasionally of sufficient depth and richness for farm use.

On the southern slope of this "Laurentian Shield" south of the Height of Land is located the true commercial forest area of Eastern Canada, a country fit mainly for forest use. If we take the White Pine as the most important timber, this area is still further confined in its eastern portion, for while in the west-

ern portion the northern limit of this pine very nearly coincides with the Height of Land, in the east, the limit of its occurrence is climatically still further limited, and lies far south of the Height, namely, on a line from the headwaters of the Gatineau to Seven Islands in the Gulf of St. Lawrence.

This is a country of lakes and swamps alternating with low hills and plateaus, most variably forested, although the flora is limited to few species. It would be difficult to pick the leading species in this territory of approximately 150,000 square miles extent. There is still a hardwood basis, in which Maple, Elm, Basswood and Paper Birch, with Beech, Red Oak, Yellow Birch, Ash, Balm of Gilead, besides the ever-present Aspen on burnt areas, play a part. Of the conifers, Balsam Fir is probably numerically the most frequent, with White Spruce a close second, and in the swamps the almost useless Black Spruce is prominent, with the more valuable White Cedar and Tamarack according to the character of the swamp. White Pine and Hemlock, the two most valuable species, and the Red Pine occur much more localized, mainly along the waters and on the better drained sandy hills. A century of logging has removed the accessible pine very nearly, and, while it is impossible to make even a guess of the amount still standing, the fact that hemlock is cut in ever increasing amounts sheds light on the situation. The Ontario portion of this area has always been reputed to be better stocked with this class of timber than the Quebec portion. Yet, the government officials, claiming on the unlicensed territory—which by the way in Ontario comprises still 140,000 square miles—10 to 12 billion feet of standing White Pine (or one-third of the annual consumption of coniferous material in the United States) seem to think this is a large amount.

Those who realize that the commercially available and accessible saw timber is near exhaustion point to the enormous amount of pulpwood material as the value for the future. There are undoubtedly large and for the present unmeasured amounts, but it should also be realized that a large portion of this, perhaps more than 50 per cent., is Balsam Fir, which, although according to the writer's contention superior to spruce for pulp, is not advantageously floated, and since the rivers are the only means for getting it out at present and probably for a long time to come,

it will remain unavailable until other values invite railroad development.

The cut-over lands are treated no better or worse than in the States. Fire sooner or later ravages them, and on the thin siliceous soil destroys not only the young growth but the mould; the waters soon wash the soil and the bare rock comes to view. Thousands of square miles have been and are being burned over repeatedly and, while the Aspen and the Banksian Pine struggle to keep a forest cover, the value is gone. The characteristic attitude of the authorities to this spoliation policy is exhibited in the declaration of a high official in charge of timberlands, that the extensive fires of the last season did not do much damage since they occurred mostly on cut-over lands.

Beyond the Height of Land, the Northern or Subarctic Forest begins. Although White and Red Pine are still found, overlapping along the upper river courses, and, although Aspen, Balsam Poplar and Paper Birch are frequent accompaniments and sometimes sole occupants of the soil, the general type may be described as spruce forest, the White and Black Spruce being by far the predominant species. While the eastern portion of this region lies on the old granite rocks, its western extension lies on limestone formation. With a climate still more rigorous than in the last described region, and with still less topographical differentiation, it stands to reason that on this northern slope of the Laurentian plateau, not only a reduction in the number of species to eight—besides those just mentioned only the Banksian Pine, Balsam Fir and the Tamarac take part in its composition—but reduction in development of individuals and of the whole forest is experienced.

This vast territory, comprising about 1.5 million square miles, has for the most part been only superficially explored, and the explorations have followed mostly the river courses. Recently, a compilation of the meager reports on timber conditions by the explorers, from Hearne (1770) to Tyrell (1898), has been made and the results as far as practicable have been mapped. The writer is indebted to Mr. R. E. Young, Superintendent of Railway Branch, Department of Interior, Ottawa, for a copy of this unpublished report and the accompanying map in anticipation of its issue, so that the readers of the *Quarterly* are the first to

secure an insight into the conditions of this vast domain. It would lead us too far to print in full the interesting report, and on the other hand, it is difficult to dispose of such a large region in a few words, for variations of the type with change of soil, topography and climate must after all produce considerable variety over the vast area. Only impressions left from reading the report may be given. In regard to the map it should be understood that the explorations followed mostly the river courses, and hence the indicated areas should be conceived only as locations not extent of forest areas.

It is a plateau region or rolling plain dotted with thousands of lakes, large and small, and swamps or mossy muskegs in the shallow valleys, with only here and there better drained sandy or rock areas. Temperature conditions are of greatest importance here and it is likely—this only a suggestion by the writer—that different exposures as well as soil depth account for the observed striking local differences of development. The different species occupy different localities, although the spruces are perhaps nearest to being ubiquitous. The Black Spruce occupies the boggy ground until, farther north it, too, prefers the drier situations, and joins the White Spruce to the very limit of tree growth. Balsam Fir is not common, and, with the Tamarac, at its northern limit, leaves the muskeg borders and swamps for drier ground. It is the first species to disappear from the composition in going northward. The Banksian Pine seems to be the tree to the manor born, for it is the tree of the rocky and sandy situations and yet becomes of better size in its northwestern extension than it is known to attain in its more southern range, trees over 100 feet high and 12 to 20 inches in diameter having been observed along the Beaver, English, Athabasca and Clearwater Rivers between latitude 53° and 58°. It, too, gives out in the northern extension of this belt. The Balsam Poplar and the Aspen which latter occupies, almost exclusively, a wide belt around the prairie region, are both an accompaniment of the more northern conifer forest. Both of them also improve in habit in their northern field. The Aspen in the Riding and Porcupine Mountains and westward to Prince Albert and Edmonton, becomes a fine tree, of 50 to 100 feet in height with diameters up to 18 inches and is considered an indicator of good soil. The Balsam Poplar, too, reaches its great-



Muskeag Vegetation.



Semi-barren Island in Great Slave Lake.



Island in Lower Slave River, Three Zones of Growth.

SUB ARCTIC FOREST TYPES.

From North American Fauna, No. 27.



Poplar and Birch Forest in Saskatchewan.

[Photo by L. Seton Thompson]

est perfection on the Athabasca, Slave, Peace, and especially the Lower Liard rivers. Perhaps because they are allowed here to occupy the better soils, their development is improved, or else, as analogous observations in the alpine region of Colorado lead the writer to think, at least Aspen and Banksian Pine find their center of distribution in this northern climate. Paper Birch is not plentiful, and irregularly distributed, but has a wide range. An interesting island of this species in nearly pure stand occurs near the headwaters of McLeod and Athabasca Rivers, after an almost total absence of the species in the more eastern districts.

Regarding the diameter developments noted on the map it should be kept in mind that the observers were not in most cases timberlookers and naturally noted the striking things, the giants relatively speaking, leaving us open to doubt as to what the generality of condition might be. There are, as a rule, no descriptions given which may allow surmises as to the commercial character of the timber, nor how far the conditions observed from the canoe may be surmised to exist beyond the vision of the observer. The probability is that the sheltered river valleys exhibit the best development, and the plateau-like watersheds, except in the southwestern sections with its milder climate like the Peace and Liard river basins are usually without forest growth of value.

At any rate, looking at the economic value of these northern woodlands, everybody must agree that their timber, although of inferior character is of utmost value for home use by the prospective settler and miner, and of no commercial value to our eastern civilization, especially as the direction of down grades is in another direction. That vast areas, probably 50 per cent., are destroyed by fire and are annually burned over must be considered an incalculable loss for the future.

If an attempt were made to further differentiate this Northern Forest, we might recognize a northern and southern section, the limit between the two being formed by the northern limit of the Balsam Fir, which coincides for most of its trend closely with the division line of the "Hudsonian" and "Canadian" life zone, lately established by the U. S. Bureau of Biological Survey.* South of this line we may assume, and we know in part, that a

*North American Fauna No. 27. A Biological Investigation of the Athabaska Mackenzie Region.

better development of forest growth is found more frequently than in the northern section in which the Balsam Fir is absent and Balsam Poplar and Banksian Pine are rare.

As the foothills of the Rocky Mountains are reached by this northern forest, beyond the 52° it still continues northwestward into Alaska and to within a short distance of the Behring Sea and Arctic Ocean. There is, however, a change in the composition, two western species relieving two eastern. The Balsam Fir is supplanted by *Abies lasiocarpa* and the Banksian Pine by *Pinus contorta murrayana*.

These latter also mingle in a narrow limited area southward, and the White Spruce and American Larch also invade the Rocky Mountain flora, while even the Douglas Fir from the West descends the eastern slopes for some 30 to 50 miles, joining the eastern flora.

The Pacific Forest may regionally, and in part florally, be divided into four types, and topographically at least six types can be differentiated, namely, the northern and southern Rocky Mountain type, the northern and southern Coast type, and within each of these the wet and dry slopes and the alpine type.

Temperature conditions divide the British Columbia forest into the two northern and southern, and the alpine types. Humidity is the determining factor for the dry and wet types in each of these, and humidity, of course, is predicted by topography.

The topography here being extremely diversified, changes in composition and development are as diversified. West slopes and valleys opening to the west under the influence of the winds from the Pacific Ocean are humid. East slopes and valleys withdrawn from the influence of these winds are dry to arid. An arid interior plateau similar to that east of the Sierras in the States, divides the Rocky Mountains proper from the Coast ranges.

The southern Rocky Mountain type is an extension of a southern flora, with the Bull Pine (*Pinus ponderosa*), the Silver Pine (*P. monticola*), Engelmann Spruce and Western Larch as representative timber trees, with Douglas Fir, Cedar, Hemlock, and Lodgepole Pine in minor occurrence, to which the eastern White Spruce may be added. This type varying somewhat in composition and development extends to nearly 53° latitude, then to



The Northernmost Spruces.

[Photo by L. Seton Thompson]



Foot Hills of Rocky Mountains.

change into a type of simpler composition in which the Lodgepole Pine plays a prominent part, covering the dry slopes and plateaus northward as far as they are wooded. *Larix Lyallii*, *Pinus albicaulis* and *Abies lasiocarpa* are the species of the alpine zone, above 4,000 to 5,000 feet up to timberline, which is found at 7,000 to 7,500.

West of the Coast range, the celebrated Coast forest, also an extension of a more southern flora, is found in a belt running for 200 miles north, and rarely broader than 50 miles at most from the shore, except at the southern boundary where it reaches 150 miles inland, crossing the Canadian Pacific a few miles east of Yale. The large island of Vancouver is for the most part wooded in a similar manner. Here the Douglas Fir in magnificent development with the Hemlock and Giant Cedar are the main timber trees, *Abies grandis*, *Picea sitchensis*, and *Chamaecyparis nootkatensis* adding locally to the values. The fine timber with diameters sometimes up to 12 feet and 300 feet in height, is, to be sure, not to be found in a continuous body, but according to topography varies with timber of poorer development. Generally speaking the bottoms, benches and gentler slopes exhibit the heavy timber up to altitudes varying between 1,500 and 2,500 feet. Above this elevation there is found in some parts for another 1,000 feet or so, another type, still of commercial value, mainly of *Abies amabilis*. Above the 3,500 foot level only the scrubby or stunted growth of the Alpine type is found.

Along the coast and on the islands north to Portland Canal, the northern Coast Forest changes in composition to the simpler Hemlock-Spruce type which continues all the way along the Alaskan shore to Cook's Inlet. It is mainly composed of Hemlock, Sitka Spruce and Yellow Cedar, occasionally where the soil depth is favorable developing to good size, although mostly branchy and really much of it of inferior quality.

The Coast range being a series of low broken hills rather than a continuous range, this type continues into the valleys of the rivers for a considerable distance from the Coast.

Timber Areas and Standing Timber.—Actual knowledge regarding commercial timber areas is scanty and the scattered knowledge has not been systematically collected. We have to rely on very much generalized estimates.

Of the vast territory of British Columbia, estimated at 370,000 square miles not more than 30,000,000 acres or 12 per cent. is by well informed land lookers considered merchantable, according to present standards, and it is doubtful whether under any change of standards the acreage of actual and potential commercial forest could be increased beyond 50,000,000 acres. At present, to be sure, the lowest standard at the Coast mills is as a rule 14 inch in 32 feet logs, and, as a rule, no trees under 26 inch d. b. h. are cut. Of such timber, now pretty nearly all located by timber licenses, not more than six million acres are supposed to exist, which may be swelled to 15 million of commercial character when standards are lowered, and both the northern extension and timber of higher altitudes are added, which at 15 M feet average may indicate a stand of over 225 billion feet.

In the mountain mills the average log sawed at the mill is 12 inches. Of this description some 15 million acres may be found in the southern Rocky Mountain type, which figured at 5 M feet, gives another 75 billion feet, or altogether for the western Canadian forest 300 billion feet. One might easily double these estimates without finding the supply inexhaustible. Every effort is being made to get rid of this valuable limited asset of the Province. The Government has disposed of at least two-thirds of the coast timber and of one-half of the mountain timber, and only six million acres, believed to be good timber, are not disposed of.

The mill capacity so far established is, to be sure, still small, hardly one million feet, the value of the log products of the Province being by the Census of 1905 placed at \$11,000,000.

Fires, as everywhere, have made great havoc, especially in the mountain timber. While, on the western humid slopes in the heavy timber fires do not do much damage, the drier mountain country has suffered severely, not only along the line of travel, but wherever prospecting could be facilitated by the destruction of the forest cover. The northeastern section, but little explored, is probably without timber of other than local interest.

Of the Northern Forest, so far as known, not much of commercial value, especially for saw mill use, except for local consumption, may be expected. Those who figure on pulpwood values will have to keep in mind that for such use too qualitative

development as well as quantity per acre in accessible situations are required, and that these conditions are mostly not met here. Not only the distance from centers of consumption is inimical, but the fact that river transportation is for the most part impracticable—the rivers running mostly in the wrong direction and their use being otherwise beset with difficulties.

The Southern Laurentian forest is destined to be the permanent forest reserve of the Eastern civilization, for most of it is not fit for other use. Agricultural lands do not abound, but pasturage could probably be established over wider areas and the writer expects eventually a large cattle industry to be developed on the better soils now occupied nearly exclusively by hardwoods.

As intimated before, soil conditions vary considerably and hence local forest types vary from the almost pure hardwood growth in which Birch, Maple, Elm, and Basswood are prominent with Black Ash, little Red Oak, and Beech of more local distribution, to pure coniferous forest of pines, or Black Spruce in the swamps. The good saw timber is so irregular in its distribution, that one can travel hundreds of miles without seeing any of it. Banksian Pine occupies long stretches. It is the "fire pine," being serotinous and opening its cones preferably under the influence of the heat of forest fires. While this pine is useful enough for mine props, railroad ties and fuel, it rarely reaches saw timber size. Outside of Spruce and Balsam Fir, the White Pine, Red Pine and Hemlock are the commercial trees, and the northern limit of the White Pine circumscribes this area of 150,000 square miles, or say 100 million acres. Little, if anything, is known of the total stand of timber remaining, but if, for the sake of getting at some reasonable figure, we assume an average stand of 2,000 feet per acre, we would probably estimate too high. In other words a stand of 200 billion feet of saw timber must be considered an ample allowance.

The St. Lawrence Valley sections are, as stated before, practically cut out and may only be considered as helping to eke out the over-estimate for the previous section.

Taking Ontario alone with a total land area of 126 million acres, of which 80 million are still unsurveyed, we find that the distribution of these lands among three types of forest country occupied by the Province, gives 30 million acres to the southern

hardwood type, 50 million acres to the central southern Laurentian type, and 46 million acres to the Northern Forest. Not quite 25 million acres are disposed of to private owners. From the assessment lists we learn, that of these, 14 million acres are cleared, of which 12.4 millions are in the peninsula, Lake Ontario and in St. Lawrence Valley, and 1.7 million in the Southern Laurentian plateau. The woodlots on these farms are assessed at 5.5 million acres, nearly 2 million acres are reported as slash, and 2.8 million as swamp and waste (2.4, 2, and 1 million of the latter respectively in the three sections).

Applying a general experience figure for waste land incapable of recuperation, we would come to the conclusion that 85 million acres or two-thirds of the Province will always remain in woods except so far as it may be turned into grazing lands.

Mr. Whitson of the Crown Lands Department, one of the best informed men on these matters, places the figure as at best 70 million acres productive forest area, and the stand of pine outside of licensed lands (12.5 million acres are licensed and were some time ago estimated to contain 24 billion feet, the annual cut being around 800 million feet) and of forest reserves (10 million acres) at 10 billion feet B. M., and the pulpwood at 288 million cords. He also states that of the Jack Pine not 10 per cent. is fit even for railroad ties.

For Quebec the distribution of land areas may be made as follows: Of the 218 million acres (342,000 square miles) around 144 million acres belong to the Northern Forest, 50 million, the same amount as for Ontario, to the southern Laurentian; the St. Lawrence valley with 5 million acres represents mostly farm area, and the balance of 19 million acres may be accredited to the Acadian region. There are about 9 million acres in farms, of which 7.5 million are in crops, and 1.5 million is waste land, hence the total forest and waste land area is over 210 million acres. An estimate by Langelier, Superintendent of Forest Rangers, places the standing lumber of the White and Red Pine at less than 40 billion feet, and spruce sawlogs at over 100 billion, all other saw material (including Jack Pine!) at about 18 billion feet, or altogether less than 160 billion feet.

The Maritime Provinces with somewhat over 57,000 square miles, together with the Eastern townships of Quebec, south of

the river (30,000 square miles) belong to the Appalachian or Acadian forest type. This area is practically cut out as far as pine is concerned, and relies now mainly on spruce for saw timber.

In New Brunswick 12 million acres are estimated to be under wood, the composition of which, by good authorities, is figured as 60 per cent. spruce, 10 per cent. pine, 5 per cent. hemlock, 5 per cent. cedar, 20 per cent. hardwoods. Here the larger portion is owned privately, some 10.5 million acres. Of the 7.25 acres of crown lands all but about one million acres is under license, the latter area being barrens or burnt.

The small remaining area of timberland on Prince Edward Island is in calculations like these entirely negligible. New Brunswick together with Nova Scotia which represents an area of some 14 million acres, may round off the total stand of saw timber in the Eastern Provinces to 300 billion feet and for the whole of Canada to 600 billion feet. We might readily double these estimates and still remain within reasonable limits of the truth, if a closer utilization, especially on the Pacific Coast, and more careful lumbering generally were practiced, and if the fires running with tolerable regularity through the slash did not destroy much of the growing timber besides the young growth.

Considering that the above estimated stand of saw timber, which others have considerably reduced, would not suffice to supply the present annual consumption of coniferous material in the United States for more than 15 to 20 years, and the import into Great Britain of this class of material for more than 60 to 80 years, the need of securing better knowledge of the conditions of this resource and of employing conservative methods in its use are apparent.