

through and overflows the ice-covered surface. The end of winter finds a great ice dam more than 30 feet thick built across the river just above Mt. Charles, a circumstance which makes the formation of an ice jam at this point an annual event. In 1919 as late as July 30 ice ramparts 20 to 30 feet thick were found bordering Great Bear River above Mt. Charles for more than a mile. These consisted not of the cemented blocks of jam ice but of ice which had formed in place — the ends of a great winter ice dam.

Source of Mackenzie Driftwood

The Gravel, the Peele, and other large western tributaries of the Mackenzie doubtless carry notable quantities of driftwood into the main stream, but the great bulk comes from the Liard River. The timber growing on the banks of the Liard and its southern branches is about as large as that found on the Peace and Slave Rivers, and its driftwood includes many trees from one to two feet in diameter. The unusually high stage which the Liard reached in 1919 set afloat a vast quantity of stranded logs, many of which had started their northern journey in previous years. At the time the mouth of the Liard was passed on July 1, it was discharging very little driftwood. The vanguard of the main volume of the Liard driftwood reached Old Fort Good Hope on the lower Mackenzie about July 13. At that time the writer was using a canoe a short distance above the old fort and had an opportunity to get a clear conception of the great volume of the floating mass of trees, logs, limbs, and bark. The immense volume of this floating mass of travel-scarred tree trunks and forest debris greatly exceeded anything previously seen or imagined. In general it formed a nearly continuous mass a quarter of a mile or more in width. When, as frequently happened, the mass of drift spread out under the influence of a breeze or current which carried it toward the middle of the river the width often exceeded a mile. Walking over this driftwood was often more feasible than canoeing through it. The closely packed phase of this particular exodus occupied about four days in passing a given point. Detached masses of small size and single, widely scattered logs followed it for several days. Spruce and poplar comprise the great bulk of the Mackenzie driftwood. Here indeed is a mammoth supply of pulpwood delivered at tide-water, cutting and transportation free, that merits the consideration of any enterprising paper company that can solve the commercial problem of transportation around the Alaskan coast!

This vast contribution of driftwood eventually comes to rest chiefly on the coast of Arctic America and the islands west of Greenland. Frank Russell, traveling down the Mackenzie delta and



VIEW OF ICE RAMPARTS ON THE GREAT BEAR RIVER ABOVE MT. CHARLES, LOOKING UP-STREAM. THE RAMPART ON THE FAR SHORE HAS AN AVERAGE THICKNESS OF ABOUT 20 FEET.

along the coast to Herschel Island, remarked the immense quantities of driftwood brought down by the Mackenzie "strewn for hundreds of miles along the coast. . . . The sand beaches of the coast are literally covered with the white trunks from which the bark and branches have been worn".

Other travelers have noted the large quantities of driftwood seen along the Arctic coast east of the Mackenzie, which is evidently its principal source. Dr. R. M. Anderson has informed the writer that he found it much more abundant on the western than on the eastern sides of projecting points along the shore east of the Mackenzie. On the coasts of Victoria Island and Banks Land seen by Dr. Anderson, driftwood was scarce as compared with the mainland. That it is distributed far and wide throughout the Arctic Archipelago, though less abundantly than on the mainland, there can be little doubt.

(Published by courtesy American Geographical Society.)

Lumber Resources of Canada

A census of the lumber industry, in Canada has been completed by the Dominion Bureau of Statistics, embracing 2,879 operating concerns, of which 52 were in Alberta, 251 in British Columbia, 29 in Manitoba, 255 in New Brunswick, 462 in Nova Scotia, 60 in Ontario, 60 in Prince Edward Island, 1,151 in Quebec in Quebec and 16 in Saskatchewan.

The total capital invested in the industry, including land, buildings and plant, machinery and tools, stocks in process and supplies and working capital is given as \$149,266,019.

The number of employees on salaries was given as 2,874 males and 285 females, who received a total of \$3,554,097. The average number of employees on wages was 25,516, engaged in logging operations and 28,820 in the mills, their combined wages amounting to \$34,412,411.

The aggregate value of production in 1917 amounted to 115,884,905. The census covered 29 kinds of lumber, 11 of shin-

gles, 10 of lath, 6 of pulpwood and 10 of miscellaneous products.

Ontario is estimated to have between 70 and 90 million acres covered with commercial saw lumber.

Quebec is estimated to have forest resources of 230 billion board feet, of different kinds of commercial saw timber and an additional 100 billion feet of pulpwood.

New Brunswick is estimated to have 17 million acres of commercial saw timber, estimated at 25 billion board feet.

Nova Scotia is estimated to have 15 million board feet.

In British Columbia, the area of merchantable timber land is estimated at 33 million acres. Saw timber is estimated at 350 billion feet and pulpwood at 366 billion feet.

The Prairie Provinces are estimated to have an area of 10,920,000 acres of forest and the merchantable saw timber is estimated at 41,850,000,000 board feet.

How Fast Do Trees Grow

One of the things most necessary to know in regard to Canadian forests is how rapidly they grow again, when cut down or burned over. Most of the European countries have this knowledge in fairly complete form and are managing their forests accordingly, but European figures cannot be applied to Canadian forests. Each country must make up its own growth-tables. Information on this subject is being gathered in different parts of Canada. One of these scientific studies of the rate of tree-growth is being made by the Forestry Branch of the Department of the Interior at Petawawa, Ontario, in the heart of the Ottawa valley. Plots of different kinds of trees are set apart, and the rate of growth in these measured and recorded. The effect of thinning, trimming, and draining upon the growth is also studied, so that in a comparatively few years data will be available which will be of the greatest value in the management of Canadian forests and woodlands.