

Forest Growth on Cut-over Lands

Protection of Forests from Fire and Disease Necessary to Provide for Second Cutting

The recent study made by the Commission of Conservation in Algoma district, Ont., makes clear the value of the forest in this district after the first logging operation has been completed. Lumbermen and pulp operators who have considered only the first crop in financial calculations, will be agreeably surprised to learn of the large number of growing young trees left as forest capital for future operations, and the rapid rate of their growth in the area mentioned. The general pessimistic attitude toward the future of cut-over lands is not justified in this district, where the forest is comparatively young and has not reached a condition of stagnated old age as has been found in portions of the red spruce belt.

The hopeful prospect shown in the study has been previously obscured by the losses due to wind, fire, disease and insects, which tend to offset the growth and prevent the accumulation of timber that will appeal to the practical man as valuable. This loss has been heaviest following the logging operations, because of the exposure of the remaining timber and of other detrimental conditions created by logging operations. The influence of the slash left by the loggers has been previously considered only in its relation to fire risk, and its detrimental effect as a breeding place for insects and fungous diseases has been overlooked. It was found that the volume of timber which has died or been windthrown is nearly equal in ten years to that removed by the first cut, and few such trees have been windthrown or ill weakened by disease or insect. The primary need is, therefore, a closer utilization of all trees which will not survive to the next cut.

Sanitation of the forest is an essential feature of future logging operations. The prevalence of diseased and insect-infested trees in the virgin forest is one of the chief causes of low yield of the average virgin acre. Young trees are forced to struggle up to the light in competition with older established ones, and during this weakened and unthrifty stage they become diseased or distorted. In the keen struggle for supremacy in the forest the weak member is the one that falls prey to insects, disease and wind.

Such a heavy mortality without growth would soon deplete the forest. Yet the study shows a good stand of growing young trees, which have added volume fast enough to offset the losses during the past ten years, and the whole character of the forest has improved from the condition left by the loggers. This forest promises during the next fifteen years to gain in volume sufficiently to pro-

Important Forest Trees of Canada

SPRUCE

It is not generally appreciated that the value of the annual production of spruce lumber and pulpwood in Canada exceeds that of nickel, silver, gold, copper and lead combined. In 1919, the value of the spruce lumber was approximately \$44,000,000 and of pulpwood \$28,000,000, or three times the value of either the Douglas fir or white pine production.

This is probably due, at least in part, to the fact that spruce is a dual-purpose wood, being valuable for both lumber and pulp. The light colour, long fibres and easy pulping qualities make it the most valuable wood for the manufacture of paper. Spruce was at one time considered the only wood suitable for the manufacture of newsprint. Though the increasing difficulty of securing sufficient spruce to meet the demand has led to the use of other woods, chiefly balsam and hemlock, in combination with spruce, spruce still comprises over 70 per cent of the wood used by the pulp and paper mills in Canada. As lumber, it is white, soft, light and easily workable, possessing a maximum of strength for its weight, so that it is in demand for light construction and interior finish. The absence of a very distinct grain precludes its general use in a natural finish, but it is largely used in place of pine where it is to be painted.

There are five species of spruce in Canada. Red spruce (*Picea rubra*) is confined to the Maritime Provinces and the eastern part of Quebec. White spruce (*P. canadensis*) and black spruce (*P. mariana*) extend from the Atlantic coast to Alaska and as far north as the mouth of the Mackenzie river. In the southeastern part of its range, the black spruce is usually confined to wet or swampy sites, where it grows slowly and to a small size. In the northwest, it is found on better sites and is a better tree. White spruce is, however, the most important eastern species of spruce.

Sitka spruce (*P. sitchensis*) is confined to the Pacific coastal region. It attains very large sizes, up to 8 to 12 feet in diameter and 160 to 180 feet in height. During the war, it was found that Sitka spruce wood was the best in the world for the manufacture of the framework of air-craft, and 26,000,000 board feet of the finest quality was supplied by British Columbia to the Imperial Government for this purpose.

Engelmann spruce (*P. engelmanni*) is plentiful in the inland, mountainous region in the southern half of British Columbia. It is also a splendid tree, but does not attain the gigantic sizes of the coastal species.

All of the spruces reproduce well under proper conditions. They are all tolerant of shade, which enables them to reproduce and remain alive even under comparatively dense stands. They do not thrive under such conditions, however, and, unless relieved of the oppression in time, their recuperative powers will be weakened. If given a chance, all of the species, except possibly black spruce, will make a rapid growth, and will afford perhaps a better return in a forest managed for sustained yield than most other kinds of trees. This is especially true where small sizes can be utilized, as in the pulp industry.

Although reliable information is not available as to the amount of spruce in Canada, it is estimated that about one-third of the standing timber is spruce. There is, perhaps, between 100 and 150 billion board feet suitable for the manufacture of lumber, and, in addition, between 350 and 400 million cords of spruce pulpwood. A very considerable amount of this, possibly one-half, is not commercially accessible under the present conditions of market and transportation.

The annual cut of spruce is a little over two billion board feet. To this must be added the annual destruction by fire and by insects, which, during the last two decades, has far exceeded the amount used. The depletion of the pulpwood resources of the eastern United States has already created, and will continue to cause, an ever-increasing demand on the spruce forests of Eastern Canada.

Unless measures are taken to reduce the waste in logging, to check forest fires, and to provide for the development of new crops, the available spruce forests of Eastern Canada, at least, will be within sight of exhaustion inside of fifty years.

duce a second cut and still leave a good capital growing-stock for future returns.

The second lesson taught by this study of cut-over lands was an appreciation of the value of young softwood trees, already on the ground at the time of logging, but too small to be of use, since these are a surer reliance for future cuts of timber than the chance of seedling following the removal of the older tree. Trees less than one-

half inch in diameter at four and one-half feet from the ground were counted, and an average of 856 spruce and balsam per acre were found on the cut-over land. This represents an average of about 13,000 acres of such land. Two hundred and six larger spruce and balsam were found per acre on the cut-over land, in addition to the seedlings already mentioned. This good representation must impress every one as constituting a valu-

Severn River

Unused Power Sites on This New Ontario River

Among the larger rivers of the District of Patricia, New Ontario, the Severn is one of the most important. Its total length is some 420 miles, with a drainage area of 48,600 square miles. This is twice the area of the St. Maurice basin in Quebec which has acquired such importance from its water-power resources.

Information regarding the water-powers of the Severn basin is far from complete, but, judging from available data, the river affords valuable power sites.

Numerous large lakes, providing good storage opportunities. Among them may be mentioned Deer lake, 45 miles long and from 1 to 4 miles wide; Favourable lake, 25 miles long and from 2 to 5 miles wide; Muskrat Dam lake, 20 miles long and 4 miles wide; Sandy lake, 35 miles long and 8 miles wide.

The following are the estimated power possibilities of some of the known sites on the main branch of the Severn, given in the order in which they are met in ascending the river from its mouth:

Site	Head Feet	Min. h.p.
White Seal fall, 28 mi. from mouth	30	23,000
15 mi. above Favourable lake	25	4,000
20 mi. above Severn lake	6	1,000
32 mi. above Severn lake (in 2 rapids)	11	1,600
45 mi. above Severn lake	10	1,400
10 mi. below Sandy lake (in 2 rapids)	11	1,400
5 mi. below Sandy lake	18	2,500
10 mi. below Favourable lake	15	900
3 mi. below Favourable lake	25	1,500
2 mi. below Favourable lake	8	500
2 mi. above Favourable lake	12	400
5 mi. above Favourable lake	20	800
15 mi. above Favourable lake (5 chutes in 5 mi.)	50	2,900

—L. G. Denis.

Marble and granite to the value of \$922,725 were quarried in the province of Quebec in 1920.

able forest, deserving of care and protection from its natural enemies; nor should it be overlooked that this is the gift of nature, which, if destroyed, will be replaced only by nature's slow process.

Before planting or other expensive effort is made, the protection and improvement of such a forested area is the first and most logical step toward conservation of our forest resources. Failure to use the timber crop will not help, since natural mortality will take it away as it has done in the past, slowly replacing each year's loss with a new growth. By diligent and careful use this forest may not only be kept in a growing condition but the quantity and quality of the timber can be improved.

Finally, it must be understood that the study covered only a specific area of Ontario just east of Lake Superior and its results are not applicable to other parts of Canada, without consideration of other factors.—E. F. McCarthy.