BRITISH COLUMBIA

FOREST SERVICE

THE ALEZA LAKE FOREST EXPERIMENT STATION

A Brief Statement of Its Purpose and Development.

1931.

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Research Division
British Columbia Forest Service
Victoria
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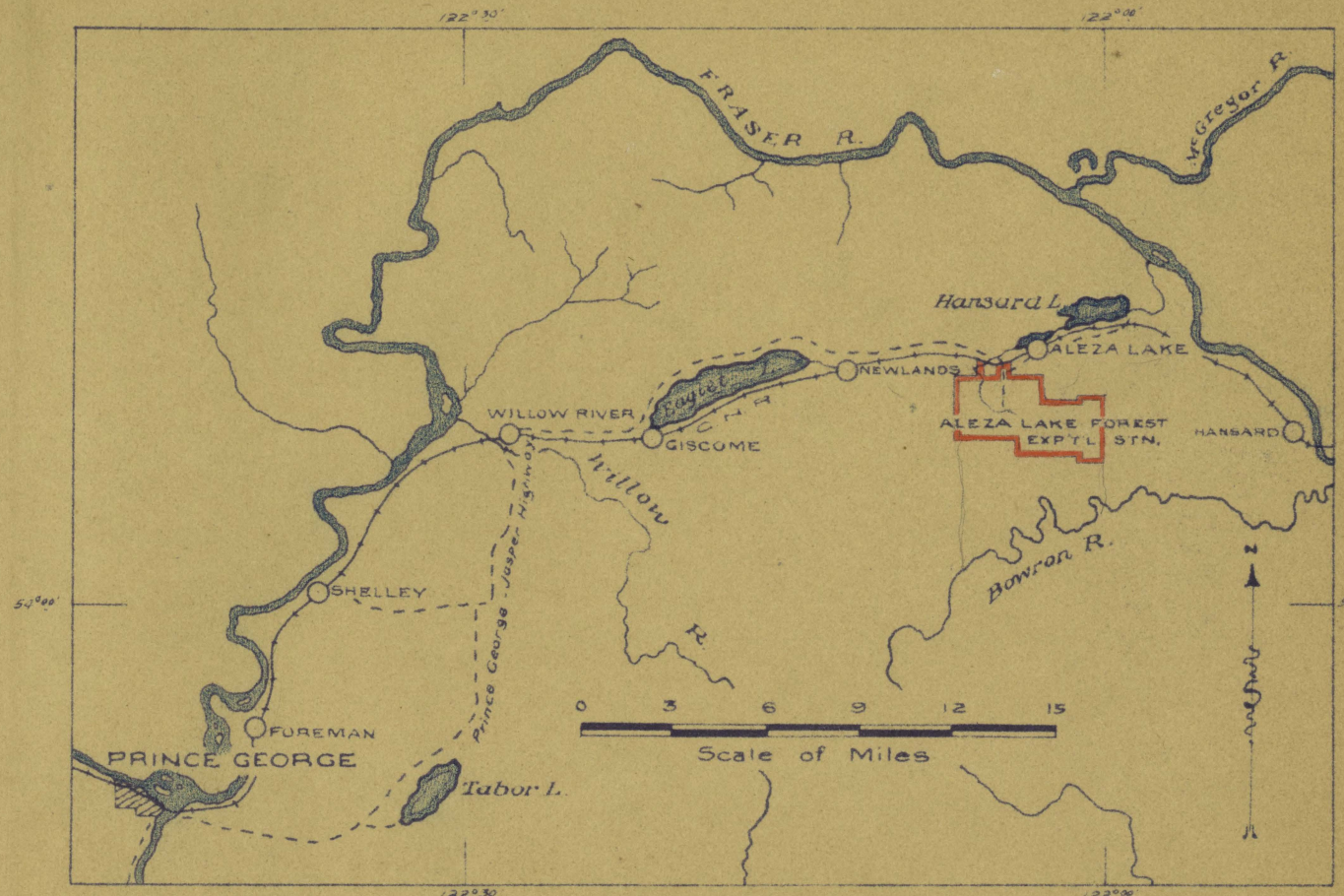
122°30'
122°00'
FRASER R.
McGregor R.
Hansard L.
ALEZA LAKE
NEWLANDS
Fraser
C N R
WILLOW RIVER
GISCOME
ALEZA LAKE FOREST EXP'TL STN.
HANSARD
Willow R.
Bowron R.
54°00'
SHELLEY
Prince George - Jasper Highway
FOREMAN
PRINCE GEORGE
Tabor L.
0 3 6 9 12 15
Scale of Miles
N

Typical Spruce Forest at Aleza Lake.

455

INTRODUCTION

The experiment station of the British Columbia Forest Service at Aleza Lake was established in 1924 as a center for research work in the spruce forests of the central interior of the Province. In a large part of the region the utilization of stands of this type forms the principal industry, upon which most of the population is directly dependent.

In view of these conditions the general purpose of the local forest administration is to maintain this industry on a permanent basis, with a continuous and perpetual supply of timber. The main features of such a policy are protection against fire, the prevention of overcutting, and the restocking of cutover lands with thrifty second-growth of desirable species.

This last requirement, adequate regeneration of cutover forests, is a problem which can be solved only by careful scientific study over a long period of years. The purpose of the Aleza Lake experiment station is to provide facilities for such work, and to demonstrate by means of experimental cuttings the application of intensive forestry methods to actual conditions in the woods.

Seed-bed (framed) in lower right.

Aleza Lake Forest Experiment Station.
Foreman's Residence and Superintendent's Cottage.

(Log cabin was built in 1926 with office in front.
Dr. Barr brought his bride here in the fall and used it as a residence after finishing the roofing.

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Aleza Lake Forest Experiment Station.
Barn, Dining Hall, and Residence.

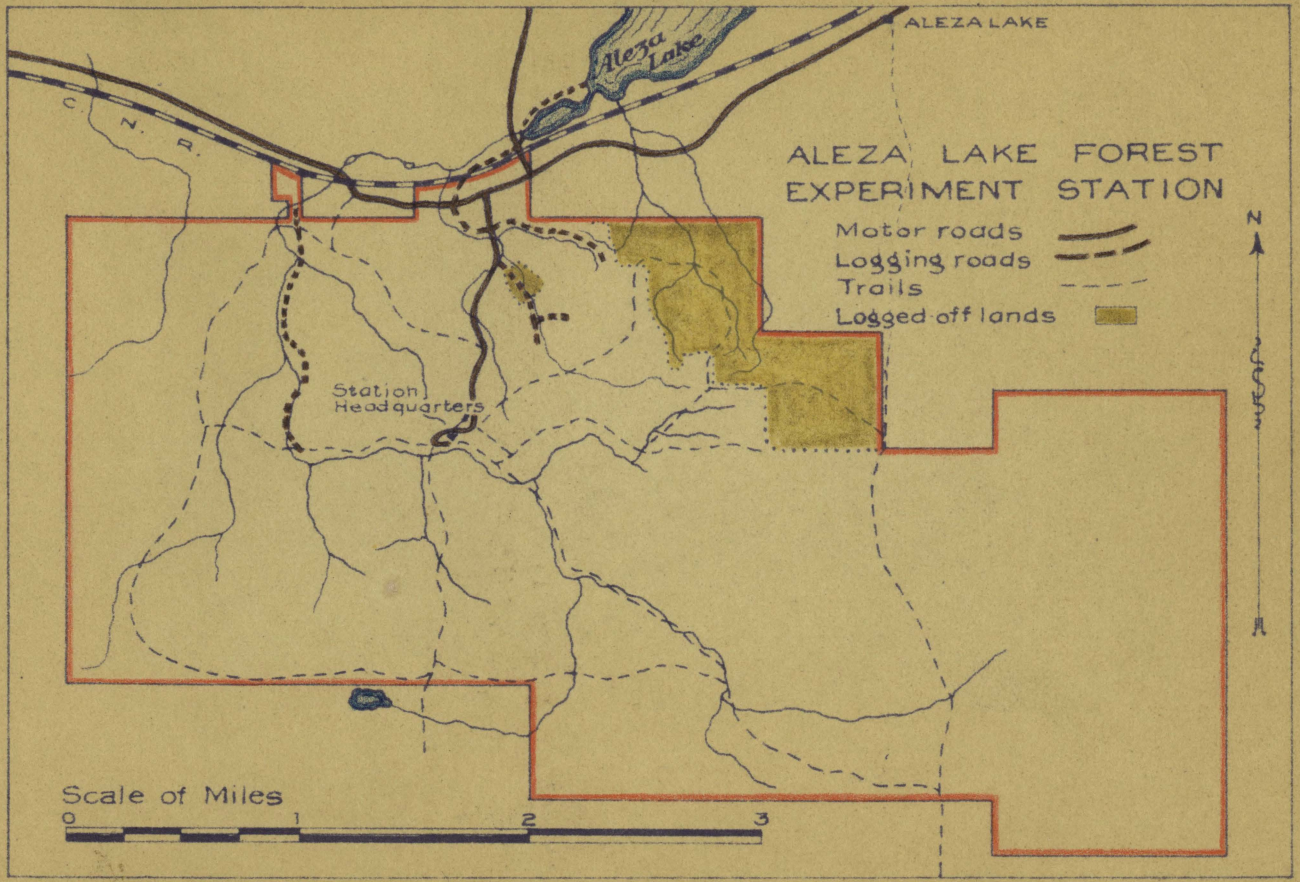
built 1926 1927 or 1926 1926-7

DESCRIPTION OF THE EXPERIMENT STATION.

The experiment station is located on the Canadian National Railway 34 miles east of Prince George and consists of a forest of 6600 acres, permanently reserved for investigative purposes, and equipped with the buildings and other improvements necessary for research work.

The forest comprises the upper portion of the watershed of a small stream which, after leaving the boundaries of the experiment station, flows through Aleza Lake and Hansard Lake into the Fraser River.

The headquarters of the station has been established on this stream at a central point in the forest. A gravel road connects the Prince George - Aleza Lake road with this site, where three residences, a dining hall, and workshop-barn have been erected. Two miles of woods roads have been cut out in preparation for logging operations and 17 miles of trails have been built in order to make all parts of the experimental forest reasonably accessible from the central buildings. Approximately 1-1/2 acres of ground have been cleared for nursery purposes. The station is connected with the local C.N.R. telephone system and a 70-foot lookout tower has been built near the headquarters to assist in the detection of fires.


ALEZA LAKE
Aleza Lake
C. N. R.
ALEZA LAKE FOREST EXPERIMENT STATION
Motor roads
Logging roads
Trails
Logged-off lands
N
MILES
Station Headquarters
Scale of Miles
0
1
2
3

Experiment Station Road and
Typical Spruce-Balsam Forest.

Trail Construction and Forest Conditions in Swampy Soil on the Experimental Forest.

FOREST CONDITIONS.

The forest consists for the most part of a uniform mixture of spruce (P. engelmannii and P. canadensis) and balsam (A. lasiocarpa) with scattered individuals of Douglas fir, aspen, and lodgepole pine.

The principal type is a mature unevenaged mixture up to 300 years of age in which spruce forms 88% and balsam 12% of the net merchantable volume. The balsam forms a larger proportion of the gross volume but is badly decayed and the volume suitable for use is less than half of the total stand of this species. The spruce is generally sound and of good quality. There is an abundant underwood of natural regeneration in which 82% of the stems are balsam and 18% spruce.

Details of area and volume are as follows:

AREA, Acres		VOLUME, F.B.M.		
		Species	Total Volume	Volume per acre
Spruce-Balsam type	5880	Spruce	94000M.	16000
Cutover land	400	Balsam	13600M.	2300
Swamps and meadows	320	D. Fir	1030M.	170
Total	6600		108930M.	18470

Underwood of Balsam Reproduction
Beneath Typical Spruce Forest.

230/2

SOIL CONDITIONS.

During 1927 a survey was made of the soil conditions on two selected 320-acre blocks of the experimental forest by means of strips eight chains apart on which examinations were made at intervals of two chains.

The original deposit of soil appears to have been a deep clay deposited in still water. Where it has not been eroded or covered by later deposits, this soil has a well developed profile and is comparatively old. In parts of the area there is a considerable depth of a lighter, more sandy soil which has been covered by clay to a depth of from 30 to 40 inches. River flows and the washings of local small streams have in places obscured the original deposits.

A soil map has been prepared for the parts of the experiment station covered by the survey, and a manuscript report by R. A. Fisher describes the subject in detail.

The humus conditions of the soil are discussed, with analyses and illustrations, in "The Effect of Soil Moisture on the Establishment of Spruce Reproduction in British Columbia", P. M. Barr, Bulletin 26, Yale School of Forestry, 1930.

Spruce and Balsam Seedlings Growing in Litter Which Has Developed on Soil Exposed During Logging Operations.

191/2
191/4 Similar

INVESTIGATIVE PROGRAMME, 1925 - 1931.

Factors Affecting Natural Regeneration of Spruce:-

This has been the main subject of study at Aleza Lake, the investigations being grouped under two headings:-

1. Existing Conditions of Natural Regeneration.

Since 1926 a series of sixteen plots has been established for the purpose of studying the occurrence of regeneration beneath the overwood, from natural sources of seed supply. In each plot four quadrats or sub-plots have been prepared with different conditions of soil surface, including natural humus, exposed mineral soil, and the same two types of surface with root competition eliminated by trenching. The establishment and survival of spruce and balsam seedlings under such conditions has been studied in detail, and a description of methods and results is given in "The Natural Regeneration of Spruce in Central British Columbia", by B. G. Griffith, Forestry Chronicle, Vol. 7, December, 1931.

2. The Effect of Soil Moisture on the Establishment of Spruce Reproduction.

The purpose of this study was to observe the trend of soil moisture in the spruce-balsam forest during the growing season, and to correlate this factor with the establishment and survival of young seedlings. Artificial seeding was provided, with variations of shade, water supply and seedbed surface; certain phases of the study were repeated under greenhouse conditions. The project is described fully in "The Effect of Soil Moisture on the Establishment of Spruce Reproduction in British Columbia", by P. M. Barr. Bulletin 26, Yale School of Forestry.

167/5.

Portion of an Experimental Plot in the Study of Regeneration of Spruce from Natural Seeding.

INVESTIGATIVE PROGRAMME, 1925 - 1931.

Reproduction and Growth in Spruce-Balsam Forests After Logging.

This study was undertaken in 1926 for the purpose of determining the density and development of the advance growth of young trees which is left after logging operations under existing methods together with natural regeneration which may become established later. Four plots were examined from which the following information was obtained:-

Conditions 7 Years After Logging in a Typical Spruce-Balsam Forest.

Number of trees per acre	Spruce	Balsam	Birch
Established prior to logging	130	620	20
" since logging	120	780	770
Total	250	1400	790

These four plots are to be re-examined at intervals of 5 years.

Additional plots have been established for a similar purpose in the areas on which experimental cuttings were made in 1927 and 1928. Examinations of these plots are being made annually in order to obtain detailed information on the progress of regeneration from the time of logging.

Herbaceous and Shrubby Growth on Cutover Land
Seven Years after Logging.

192/1

INVESTIGATIVE PROGRAMME, 1925 - 1931.

Study of Natural Reproduction After Forest Fires.

In 1926 a general survey was made of the burned-over timber lands in the Upper Fraser Valley to ascertain the type, extent, and density of regeneration following forest fires. Seventeen plots and 12-1/2 miles of transect were examined, and the following conclusions were drawn:-

1. Natural regeneration is unsatisfactory on burned lands, probably as a result of poor seedbed conditions resulting from fires. About 75% of the areas are understocked with second growth.

2. The density and composition of the reproduction are dependent for the most part upon soil moisture and seed supply.

3. No correlation appears to exist between the density of stocking and the age of the burn.

INVESTIGATIVE PROGRAMME, 1925 - 1931.

Miscellaneous Studies.

Minor investigative projects at Aleza Lake have included the following:-

1. The development of a herbarium of local species for use in checking specimens from experimental plots and other sources. The relation between ground cover and the forest types of the station was studied during 1931, by Dr. V. Kujala and Mr. A. Cajander of the Finnish Forest Research Institute.

2. Weather records have been kept each season since 1926.

3. A study has been made of the effect of aspect on atmospheric conditions beneath the forest canopy, as described in "The Effect of Local Changes in Topography on the Temperature and Relative Humidity of the Atmosphere", B. G. Griffith, Forestry Chronicle, Vol. IV., No. 3, 1928.

BRUSH DISPOSAL.

Proper disposal of slash following logging operations in spruce-balsam forests is essential in providing adequate protection against fire. A study of this subject was undertaken in 1926 by means of six sample plots in a typical logging operation, a different method of disposal being undertaken on each plot. The following information was obtained:-

Type of disposal	Merchantable Volume per Acre, F.B.M.	Cost of Disposal per M.
Lopping only	21000	$.13
Lopping and scattering	14000	.34
Piling	21000	.76
Piling and burning	24000	.64
Live burning at time of skidding	26000	.45
Live burning at time of felling	18000	.66

Each plot was one acre in area and it should be possible to reduce the above figures on a larger operation. Disposal by live burning has been practised on two small experimental cuttings made at the station since the time of the above study.

PATHOLOGY AND ENTOMOLOGY

An outstanding feature of forest conditions in central British Columbia is the extent of decay in balsam. This subject was studied at Aleza Lake in 1927 when all the balsams on a series of six plots, comprising 502 trees, were felled and analyzed. It was found that 58% of these trees were unsound, the decay representing 17.4% of the total volume. In almost all cases the causal agency was Echinodontium tinctorium, the Indian Paint Fungus, the infection being found to take place through wounds or branch stubs at an average age of 120 years. It would appear that with intensive forestry methods it may be possible to control the disease by cutting second-growth balsam before the age of infection is reached.

No entomological work has been undertaken in the Aleza Lake forest, but the region provides an unexplored field in this subject and with the facilities existing at the experiment station, valuable investigations could be made very readily.

MANAGEMENT PLAN OF THE EXPERIMENTAL FOREST.

The total stand of timber in the forest is approximately 100 million board feet. In view of the overmature condition of the larger diameter classes it is probable that the annual growth of the entire stand is balanced by losses from disease, insects, windthrow, and other factors. Yield studies indicate that the productive capacity of the site would enable the increment by growth, with a proper series of age-classes, of about one million board feet annually.

The present surplus of mature timber will permit the removal of an additional 500,000 feet each year until the second-growth becomes merchantable. Therefore, until more accurate measurements of yield have been made, it is proposed to cut 1,500,000 feet per annum for a preliminary period.

Experience at the experiment station to date indicates that the most satisfactory method of logging will be to contract the separate operations of cutting, road-making, and hauling; the marking, scaling, and

brush disposal should be done by Experiment Station personnel, although in time it may be possible to contract the work of disposal.

The operation of the forest will be dependent upon log-sales in the local market and the making of such sales in a satisfactory manner will depend largely upon general trade conditions. There are several nearby mills which are desirous of obtaining Experiment Station timber in normal times and no difficulty is anticipated in this connection. With the continued operation of the forest, however, consideration should be given to the possibility of operating a small mill at the Station; this would be determined by the cost of transporting logs to the nearest privately-owned mill offering satisfactory prices.

The location of the Experiment Station will permit shipment of either logs or lumber by rail and there are suitable road and water connections to one or more local mills on Aleza and Hansard Lakes.

The maintenance of a continuous supply of timber from the Station will support a portion of the local community on a permanent basis, furnishing a demonstration of the economic effects of forestry definitely practised on a policy of sustained yield.

From the silvicultural point of view, the object of management will be to develop a method of cutting which will preserve the existing advance growth and at the same time favor the establishment of a larger proportion of spruce as the healthier and more valuable species. Regular annual cuttings will provide opportunities each year for the practical application on an experimental basis of the results from research studies. This will include not only cutting systems but also brush disposal and logging technique.

Methods developed in this way and found to meet the requirements of both silviculture and economics will provide a means of applying correct forestry practice throughout the surrounding spruce region.

PUBLICATIONS DEALING WITH ALEZA LAKE EXPERIMENT STATION.

Barr, P. M. Spruce Investigations in Central British Columbia. Forestry Chronicle, Vol. 3. No. 3, September, 1927.

_____ The Aleza Lake Forest Experiment Station: Its Development and Purpose. Forestry Chronicle, Vol. 4. No. 3, September, 1928.

_____ The Effect of Soil Moisture on the Establishment of Spruce Reproduction in Central British Columbia. Bulletin 26. Yale School of Forestry, 1930.

British Columbia Forest Branch. Annual Reports, 1924, p. 10; 1925, 18; 1926, 11; 1927, 12, 16; 1928, 14; 1929, 13; 1930, 20.

Garman, E. H. Natural Reproduction Following Fires in Central British Columbia. Forestry Chronicle, Vol. 5. No. 3, 28 - 44. September, 1929.

Griffith, B. G. The Effect of Local Changes in Topography on the Temperature and Relative Humidity of the Atmosphere. Forestry Chronicle, Vol. 4. No. 3, September, 1928.

_____ The Natural Regeneration of Spruce in Central British Columbia. Forestry Chronicle, Vol. 7, No. 4, December 1931.