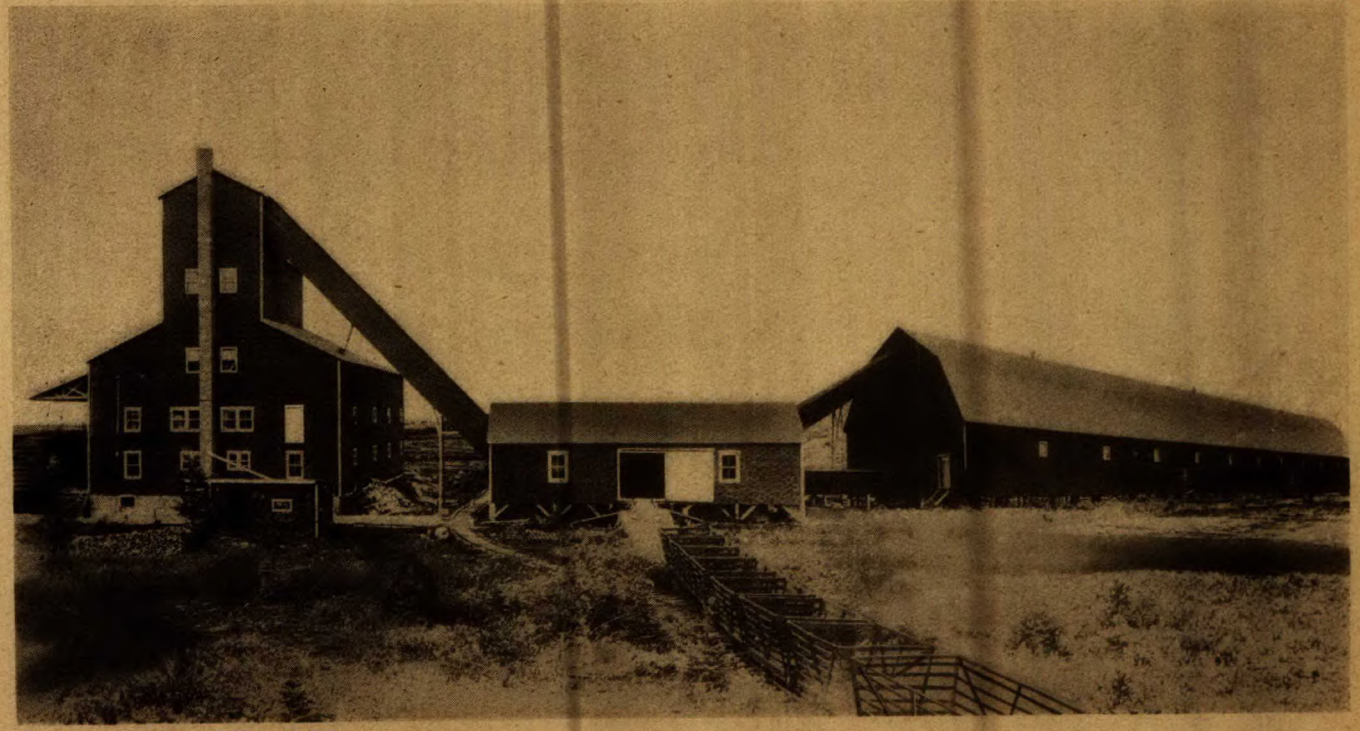

Courtesy of Premier Peat Moss, Ltd.

Peat litter factory of Premier Peat Moss, Ltd.: mill at left; storage shed at right.

CANADA
DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH
BUREAU OF MINES

PEAT MOSS DEPOSITS IN CANADA

BY
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Price, 25 cents

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KING'S PRINTER AND CONTROLLER OF STATIONERY
1946

No. 817

CONTENTS

CHAPTER X

CHAPTER XI

CHAPTER XII

ILLUSTRATIONS

Photographs

Figures

PREFACE

This report is based mainly on the field investigations of the author during the years 1939 to 1943, inclusive. For the most part the information it contains on various operations is closed out as of the end of 1944.

The value of peat moss has long been recognized in Europe where it is widely used, but in spite of the existence in Canada of deposits comparable with the largest in Europe, it has as yet been used only to a limited extent in this country. In the United States, however, its value is being increasingly appreciated, and the quantity imported from Europe increased from 5,000 tons in 1924 to 78,000 tons in 1939. When supplies from Europe were cut off during the late war, active attention was given to the development of the deposits in Canada, with the result that in 1944 over 60,000 tons were produced, most of which was exported to the United States.

Canada has become a dependable source of supply of good quality moss for the United States market, and, moreover, most of its active and potentially important deposits are within easy access to the principal United States outlets. There is, also, a large potential market for peat moss in Canada which if fully developed would enable the Canadian industry to become firmly established as a continuing enterprise, even though the demand in the United States were to decline considerably as a result of competition from the European producers. If the demand for peat moss in Canada were proportionate to that in Sweden, on the basis of population, seventy plants with a yearly capacity of 100,000 bales each would be required to supply the needs. This would provide direct employment for about 15,000 people and indirect employment for many others.

Producers of peat moss can do much in the way of educational publicity to further the use of their products in Canada, and they would probably find that in due course comparatively little publicity would be needed, as the value of the products for their various uses would become widely recognized.

W. B. TIMM,
Director, Mines and Geology Branch.

Ottawa, January 15, 1946.

Peat Moss Deposits in Canada

INTRODUCTION

Canada has very extensive resources of peat moss and there are large deposits in every province, many of which are within easy reach of transportation facilities. Prior to World War II, however, production was insignificant. The Canadian demand alone was much too small to warrant a large-scale development of the deposits and for years the United States had been obtaining practically all of its requirements of peat moss, surplus to its own production, from Europe. In the main, Canadian and American users received good service from these European producers from the viewpoint of quality and cost of product, adherence to specifications, and regularity and promptness of shipments. Thus, it would have been difficult under the circumstances to have undertaken the development of the Canadian deposits on a large scale, especially as comparatively few Canadians were acquainted with the many uses of peat moss. Shortly after the commencement of the war, however, all imports of peat moss from Europe ceased, and this gave rise to the active development of Canadian deposits. Since then, Canada has been supplying its own needs and the greater part of the requirements of the United States that were formerly imported from Europe.

Mainly for the purpose of acquainting Canadians with the peat moss resources of the country, with the possibilities of the industry, and with the many uses of peat moss, the Mines and Geology Branch during the course of the investigations that form the basis of this report issued several publications, mention of which is made below. The present report amplifies the information contained in these reports, and it is hoped that the information will aid in building up an extensive market for peat moss within the country. This would largely offset a possible decline in the exportation of peat moss to the United States and would enable the industry to become firmly established as a continuing enterprise.

Previous investigations of peat deposits in Canada were chiefly concerned with peat fuel and were designed to foster the production of a domestic fuel. Late in the autumn of 1939 a survey of Canada's peat moss deposits was undertaken, beginning with deposits of peat moss in Eastern Canada and eventually extending across the country. For the most part, the peat bogs investigated were those that were reported to contain unhumified or slightly humified peat suitable for the production of commercial peat moss. As the area was very large and the time and staff available for the investigation were limited, the survey was of a cursory nature, and detailed work had to be largely omitted. An exception was made in regard to certain bogs in the Maritime Provinces that were not mentioned in previous reports, and the early development of which seemed likely.

Visits were made to several bogs in Eastern Canada that were previously investigated by A. Anrep, as requests had been received for further information regarding them. His examinations were made at a time when little or no market existed for peat moss, and its presence in some parts of peat fuel bogs was deemed unimportant. Many requests were received for analyses representative of separate parts of the larger bogs; and in the case of smaller bogs for analyses of the part most suitable for peat moss development, which is generally the area along the summit of the deposit. The results of analyses of the present samples are appreciably higher than those of samples collected by Anrep in

1923 and 1928, since only the better parts of the bogs were sampled in the recent investigation.

This report describes the various bogs surveyed, particularly in regard to the quality of the peats, whether they yield peat moss or fuel peat, their approximate area, thickness of moss strata, probable industrial and other uses, drainage possibilities, and situation in regard to shipping facilities; and it deals generally with the technology of peat moss, the peat moss trade, and specifications.

Owing to prolonged rains several bogs had become flooded and could not be sampled. With some exceptions, bogs that are difficult of access and those that have no commercial importance were not sampled. The peat moss was sampled at vertical intervals of 5 feet by means of a peat drill. In most cases, deposits of great thickness are reported as 15 feet thick and over. When sampling those considered as likely to be important to an eventual peat moss industry, notes were taken of the quality of each $3\frac{1}{2}$-foot stratum. Unless more detailed information was needed, the samples were collected along a line run lengthwise of the bog and the samples were taken at intervals of 500 to 1,000 feet, depending upon the size of the deposit.

Seven interim mimeographed reports and two printed reports were issued during the investigation, the interim reports covering the work of the years 1939, 1940, 1941, 1942, and 1943. To meet the many requests for early information on the results of the field work in Western Canada in 1942 a condensed mimeographed preliminary report (Memorandum Series No. 82) was published in October of that year. Report No. 809, "Peat Moss or Sphagnum Moss, Its Uses in Agriculture, in Industry, and in the Home", and the French edition, No. 810, were issued in 1943. Memorandum series No. 84, "Peat Moss Deposits in the Province of Quebec" in French, was issued in 1944.

Acknowledgment is made to the Provincial Mining Departments and to the Universities of New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia for their courteous assistance in facilitating the investigation and in supplying information, maps, and aerial photographs. Valuable assistance was rendered by C. S. Clements, mining inspector, Department of Lands and Mines, Fredericton; W. B. Paton, mining inspector, Mines Branch, Department of Natural Resources, Winnipeg; W. Hastings, geologist, Department of Natural Resources, Regina; and J, M. Cummings, mining engineer, Department of Mines, Victoria.

DEVELOPMENT OF THE PEAT MOSS INDUSTRY IN CANADA

Since the beginning of this investigation the development of Canada's peat moss deposits has made rapid headway. Before then, only a few small plants in Eastern Canada, a plant in Alberta, and two bogs in British Columbia were in production and the output was insignificant. Packaging was done mostly by hand. The plant in Alberta produced insulating material in the form of boards and loose moss for the building trade. Output from the two bogs in British Columbia was mainly exported for use as horticultural moss and poultry litter, and a smaller quantity, chiefly poultry litter, was sold locally. In contrast, thirty-two bogs were producing moss in Canada in 1944. Output from some of these bogs is sufficient only to supply local markets, but large plants have been built in Eastern and Western Canada. The plant that operated on the Burns bog in British Columbia was one of the world's largest producers of peat moss; another in Wentworth county, Ontario, manufacturing limy humified peat, has a large output and the product appears to be excellent as a growth stimulant and soil sweetener.

Several large bogs that have been acquired for exploitation, principally in the Maritime Provinces, await development.

PRODUCTION

Commercial shipments of peat moss in 1944 reached a total of 63,000 tons valued (less cost of container) at $1,554,000. This compares with 64,360 short tons in 1943, and with 4,000 tons in 1938. Production of moss in 1944 was reported from bogs in New Brunswick, Quebec, Ontario, Manitoba, and British Columbia. Of the total tonnage shipped, 57·0 per cent originated in British Columbia, 22 per cent in Quebec, and 15·5 per cent in Ontario. Shipments in 1943, according to use, were as follows: poultry and stable litter, 26,324 tons; horticulture, 24,790 tons; metallurgical, 12,974 tons; insulation, 140 tons; and unspecified, 132 tons. Products were marketed in the form of pressed bales, bags for loose moss, and crates for peat moss pads and insulating boards. The cost of packing material and containers totalled $224,022. Canadian moss sold for metallurgical use was for consumption in the United States in the production of magnesium metal. Most of the other shipments were also to the United States.

CHAPTER I

TECHNOLOGY OF PEAT MOSS

CLASSIFICATION OF PEATS

Peat occurs in nature in two distinct forms, unhumified and humified, which differ markedly in physical properties and in chemical composition. Unhumified peat is the dead moss of sphagnum mosses, only slightly humified. It is fibrous, elastic, of light greyish green, or yellowish to light brown colour, becoming somewhat darker on drying. It has an absorptive value of up to twenty-five times its own weight, is light in weight, and porous. Humified peat in its natural state is dark brown to black, colloidal, plastic, homogeneous, and somewhat elastic. It dries into a hard solid mass of a specific gravity higher than water. It has almost no absorptive value. A piece of dried humified peat may be under water for weeks without absorbing any water. Unhumified peat left in its natural state will humify in course of time and all fibrous matter eventually disappears. From the description of the peat moss bogs in this report it is noted that the lower peat strata are darker and consist of intermixtures of humified and fibrous peat with a bottom stratum of well-humified peat.

Humified peat in the trade is usually named "fuel peat", and unhumified or slightly humified peat, "peat moss". The term peat moss may be considered correct in regard to unhumified Canadian peat products, because most of them are derived from sphagnum mosses; but there are many large deposits in Canada and in the United States that originated from carex and other sedges, reed, hypnum, and a mixture of aquatic plants, and these should not be sold under the name of peat moss. They are of much lower quality than the sphagnum mosses. The name peat moss, however, has become the established trade name for unhumified or slightly humified peats, and is likely to remain so unless the trade accepts a standard classification for all peat products. Zailer[1] classifies fibrous peats suitable for the manufacture of peat litter and other peat products in three groups, according to their botanical origin, ranking in quality as follows:

1. Sphagnum mosses, and sphagnum mosses with intermixture of eriophorum residues (cotton grass).
2. Sedge, carex, scheuchzeria reed, and hypnum mosses.
3. Wood peat, bog earth, and heath humus.

Sphagnum moss, sometimes termed "white moss" or "genuine peat moss" is by far the best raw material and yields the best grade of commercial peat moss. Although the Sphagnacæ consist of one genus, the number of species is very large and it requires the trained eye of a specialist to recognize them.[2] They form the typical dome-shaped high moors, have a water absorptive value of up to twenty-five times their own weight, and also absorb gases such as carbonic acid, ammonia, hydrogen sulphide, and other gases having offensive odours. Such mosses dry somewhat more slowly than do other kinds of fibrous peats, but with less shrinkage, and retain from one-half to four-fifths of their original volume, depending upon drying conditions. Litter and peat mull made from sphagnum peat moss are almost free from dust and owing to their elasticity can be easily pressed into bales.

Sphagnum peat moss, however, seldom occurs in deposits in a pure state, but is generally intermixed with the residues of *Eriophorum* (cotton grass), sedges, hypnum mosses, *Andromeda glaucophylla* (bog rosemary), *Ledum decumbens*

[1]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, mit besondere Berucksichtung von Neuanlagen; Hanover Verlag M & H Scharper; p. 17.

[2]Grout, A. J.: Mosses with Hand-lens and Microscope, pp. 51–52.

(labrador tea), *Vaccinium oxycoccus* (cranberry), *Empetrum nigrum* (crowberry), *Scheuchzeria palustris*, *Rubus chamæmorus* (cloudberry), *Sarracenia purpurea* (pitcher plant), etc.

As sphagnum moss brings the best price and costs no more to produce than the inferior grades of unhumified peat, it should be possible to maintain the high quality of Canadian peat moss in the export market.

Eriophorum, of which there are several species commonly named cotton grass, is a sedge occurring in most Canadian sphagnum moss bogs. Residues of this sedge consist of strong reddish bundles of fibres from the stems and leaves and of the highly decomposed roots of the plant. It is seldom found in quantity in the pure state. Thus, the trade name "Fibre-Peat" which at times appears on the market, designating cotton grass litter, is a misnomer. It should be termed cotton grass peat moss. The cotton grass residue forms a very useful constituent in a peat moss litter and is, therefore, much in demand. Owing to its high fibre content it serves as a bond in forming a solid non-crumbling bale, increases the porosity and elasticity of the litter bedding, and when handled as a manure is more convenient in the stable and on the field. Its absorptive value, however, is not so high as that of the sphagnum mosses. Cotton grass residue that has been screened and cleaned consists of tough fibres only and is used extensively by surgeons and veterinarians for bandaging.

Carex Peat is a characteristic low-bog peat distinguished by its dirty brown to brownish black colour. In the dry state its elasticity is rather low and it can be easily disintegrated between the fingers. It consists mainly of the residues of straws, leaves, and roots of the tall-stemmed sedges of the Carex group, of which none of the many species can be identified in the peat by the naked eye. The newly dug peat when exposed to the oxidizing action of the atmosphere quickly turns black. It does not yield a good litter, as it possesses neither the elasticity nor the absorptive value of the peats previously described and disintegrates readily under the hoofs of animals, causing large amounts of dust. The plant nutritive value is comparatively high. Its absorptive value varies from eight to thirteen times its own weight.

Reed and Sedge Peat consists of residues of these plants. In quality it compares in almost all respects with the carex peat. It has absorptive values from three and one-half to eight times its weight. The ash content is higher than that of carex peat.

Hypnum Peat is composed of the residue of the moss hypnum, of which there are many species. The hypnum mosses differ widely from the sphagnums in anatomical structure and in chemical composition. Hypnum moss belongs to the low-bog mosses and is generally intermixed with carex, reed, and sedge peat, but often occurs alone in massive strata covering wide areas. The colour of this peat is yellowish brown to reddish brown, and in its highest degree of humification, dark brown. Hypnum peat is brittle and easily disintegrated, possessing not even a trace of fibre. It produces mull only, or, by less intensive shredding, pieces of hazelnut size that possess neither elasticity nor porosity. In mixture with carex or reed peat, which usually occurs in the same deposit, a somewhat better quality is attainable, but it is still an inferior product. The star mosses originating from the mosses Meesia, Paduella, Verbera, Polytrichum, etc., also occur in large strata or intermixed with other types. They produce inferior peat litters, which in value are comparable with hypnum peat moss.

Wood Peat occurs in certain high bogs and in most low bogs, in the latter usually in strata of fair depth. It consists of decomposed or humified wood from birch in the high bogs and from alder in the low bogs. This peat is crumbly, contains pieces of undecomposed wood and bark residue, and if made into a litter contains much dust. It has no commercial value, but may find some local uses in composts, for sanitary purposes, cess-pools, etc.

Bog Earth and Heath Peat are formed in the surface strata of peat bogs that have been drained for a long time and consist chiefly of the decomposed residues of the surface vegetation, principally of the Vaccinium class, which produce humus-like, earthy peat. This class of peat has no commercial value except for uses similar to those of wood peat.

CHEMICAL COMPOSITION OF UNHUMIFIED PEATS

Characteristic analyses of the various kinds of unhumified or slightly humified peats are as follows:

Kind of Peat	Organic matter %	Ash %	Nitrogen %	Potash %	Phosphoric acid %	Lime %
Sphagnum moss, slightly humified	98·0	2·0	0·8	0·06	0·11	0·12
Cotton grass, slightly humified	99·4	0·6	0·9	0·06	0·06	0·12
Carex grass, slightly humified	96·0	4·0	2·2	0·06	0·14	1·8
Reed, slightly humified	85·5	14·5	1·7	0·24	0·39	0·9
Hypnum, slightly humified	92·0	8·0	2·6	0·13	0·18	3·0
Birch wood peat	97·5	2·5	1·6	0·05	0·11	0·5
Heath humus	90·0	10·0	2·3	0·13	0·46	0·3

These analyses show in particular that the ash content varies appreciably with the botanical classification. It may reach as high as 25 per cent or more in some inferior peats and is derived largely from inorganic matter deposited from running water or springs, or from dust carried by the wind. In general, the limit set for the ash content of fibrous peat should not exceed 5 per cent for sphagnum-eriophorum moss; 10 per cent for carex and hypnum; and 15 per cent for reed peat; all on the basis of dry substance. High content of ash makes the products heavy, lowers their absorptive value, and contributes to the formation of dust and adulterates the commodity with an inert material.

The organic substances in an unhumified peat consist of many compounds, albumen, starches, sugars, tannin substances, fats, acids, dyestuffs, etc., which, during the long process of humification by extensive chemical reactions, are converted into a wide range of chemical compounds, the final substances being those of the humus acid series. The content of plant food such as potash, phosphoric acid, nitrogen, and lime also varies in accordance with whether it is high or low bog peat. As a rule sphagnum-cotton grass peats are impoverished in respect to these inorganic substances, which is expected from their low ash contents. They should contain from 0·5 to 1·0 per cent of nitrogen, whereas carex and reed peats contain from 1 to 3 per cent. Reed peat is noticeably high in all plant food, but this advantage far from compensates for its physical inferiority.

PHYSICAL PROPERTIES OF PEATS

Of even greater importance than the chemical, are the physical properties of unhumified peat, as these constitute the qualities most required of a good commercial product, which should have a good absorptive value for liquids and gases, be only moderately hygroscopic, suffer little loss from shrinkage in drying, and possess high porosity, good elasticity, and antiseptic qualities. A good quality of unhumified peat is that it is safe from the danger of spontaneous combustion.

Absorptive Value. The peat mosses possess higher absorptive value than any other material used as litter. This is due to their high porosity and the capillarity of the plants from which they were formed, enhanced by the peculiar anatomical structure of the sphagnum mosses, which by nature are built for the

storage of water. The absorptive value of a peat is primarily dependent, therefore, upon its botanical structure and only to a minor extent on its degree of humification and ash content.

The botanical composition plays an important part in the absorptive value, because the anatomic-morphological structure of the individual peat-forming plants is quite different and shows capillary tissues, pores, and water-retaining cells, which are of importance in enhancing the capacity for absorption of water. The sphagnum mosses are, in this respect, the most highly specialized, as the stems, leaves, and branches hold the water by capillarity, and they possess special water-absorbing organs. The stem is composed of thin, delicately walled, elongated cells, which later become woody, surrounded by cells of the hyaline "bark" arranged in layers.[1]

These hyaline cells have neither plasma nor chlorophyll and are particularly associated with the storage of the water, as are also the hyaline cells of the leaves. The structure of the leaves is quite different from that of other mosses. There are two kinds of cells of the branch leaves, namely, very large hyaline rhomboidal or elliptical cells having the walls spirally thickened and often perforated by round pores, and the true chlorophyllous cells, which are narrow and elongated and are placed side by side.[2] The leaves of some species are pink or deep red and furnish microscopic mounts of great beauty. Beside the chlorophyll-free cells there also occur, with the exception of the Cymbifolium group, retort-shaped cells on the branches with openings towards the outside, which serve solely for water absorption. The sphagnum mosses also have the anatomical peculiarities of forming dense cushions and of having the branches, stems, and concave leaves pressed to each other whereby the capillarity is further increased to a considerable degree.

According to H. Paul[3] the absorptive value of high bog sphagnums is appreciably greater than those of the low bogs. V. Feilitzen[4], in his investigation on Swedish sphagnum mosses, has shown that the absorptive value of a moss depends solely on the species of sphagnum that built up the bog. As the Canadian sphagnums in the main are identical with those in Europe[5] and the species included in his tabulation are common in the Canadian bogs, Feilitzen's figures are applicable to the Canadian sphagnum mosses.

The absorptive values of the various sphagnums are as follows:—

Sphagnum molluscum	26·8 times its own weight
Sphagnum papillosum	25·3 times its own weight
Sphagnum medium	23·2 times its own weight
Sphagnum cymbifolium	23·1 times its own weight
Sphagnum cuspidatum	20·3 times its own weight
Sphagnum acutifolium	18·6 times its own weight

In the dried or partly dried and slightly humified condition, the sphagnum mosses absorb much less water, however, and thus the absorptive value of commercial mosses is always less than the maximum figure shown in the table, ranging from twelve to twenty times their own weight. The hypnum mosses are less suitable for water storage, as they do not possess the cells typical of the sphagnum mosses and can absorb the water only by capillarity between small leaves close to the stem, and little of the water penetrates the cells. The relative absorptive value of the peat moss is, therefore, small, usually below fifteen times its own weight. Still more unfavourable in this respect are the star mosses, which occur in some bogs and have absorptive values of about three times their own weight.

Other peat-forming plants such as sedges, scheuchzeria, reed, and eriophorum

[1]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, p. 21.

[2]Grout, A. J.: Mosses with Hand-lens and Microscope, p. 51.

[3]Paul, Dr. H.: Die Aufnahmefähigkeit des Torfmoose fur Wasser, Mitteil. der Kgl. bayr. Moorkulteranstalt, Pamph. 2, p. 111.

[4]Svenska Mosskultur Foreningens Tidskrift, 1888, Jonköping, Sweden, p. 310.

[5]Grout, A. J.: Mosses with Hand-lens and Microscope, p. 51.

differ in this respect only slightly as they all consist of stems, leaves, and roots of grasses and sedges without special capacity for storing water. The absorptive value increases somewhat in species possessing finer stems and compact roots, which form more capillary tubes than do the coarser-stemmed and smaller-rooted plants.

By increased humification the absorptive value gradually decreases until the porosity of the sphagnum mosses is negligible, and they become homogeneous and converted into a brown or black fuel peat possessing little absorptive value. Peats composed of a mixture of humified and fibrous peat are still further reduced in value owing to their poor elasticity and tendency to form dust when used in stables and poultry pens.

The absorptive value of a commercial peat is increased proportionately to its disintegration. Feilitzen[1] in his investigation of Swedish peat litters and peat mulls found that this increased up to 330 additional parts per 100 parts. Screenings finer than $\frac{1}{2}$ millimetre, however, had a lower absorptive value, the explanation being that the finest grain classes consist not only of fibrous peat, but principally of earthy humus, highly humified peat, and dust of inorganic composition deposited in the bogs by streams, springs, and wind. This is especially the case with reed, carex peat, and heath humus, which are heavy, dust freely, and have absorptive values from three to ten times their own weight.

By hard freezing of the wet sods and subsequent thawing and drying the absorptive value is appreciably increased. J. Nesler[2] investigating a number of varieties of peat found a marked increase in the absorptive value of peat that had been frozen. In some cases it was twice as high as for peat that had not been subjected to low temperatures. The peat became more porous and dried with less shrinkage. The subject is discussed under the heading "Shrinkage in Drying," page 9.

Thus, manufacturers in most parts of Canada benefit by having the quality of their peat moss products improved without extra cost in the manufacture.

Hygroscopic Quality. The hygroscopic quality of peat, or its capacity for absorbing moisture from the air, is closely related to its absorptive capacity for water. It is well known that humus matter exceeds all mineral bodies in this respect and this is especially true with very porous substances like the peat mosses, which absorb water vapour more readily than do bodies of high density. The content of moisture increases with the humidity of the atmosphere, for water vapour penetrates into the finest pores and capillaries, where it condenses.

Zailer[3] investigated samples representing characteristic peats placed in water-saturated atmosphere at a temperature of 15° C., examining them at intervals of one-half, one, and three weeks, when the hygroscopic quality was determined. It was found that the hygroscopic quality and the rate of absorption from the air diminished with the degree of humification of the peat, the porous material being more hygroscopic than that of greater density. In accordance with their hygroscopic qualities the various kinds of fibrous peat are placed in the following order: sphagnum, hypnum, scheuchzeria, eriophorum, carex, and reed peat.

Hygroscopic quality is an important consideration in handling peat products in the trade. The manufactured bales and dried sods should be protected from moist atmosphere and kept in dry storage rooms, and the dry sods in the field piles should be protected from the weather and damp winds.

Absorption of Gases. Ammonia, carbonic acid, hydrogen sulphide, and other gases of offensive odour are absorbed by the various kinds of peat mosses in the same way as water vapour. The absorption of ammonia is of special importance, not only because a valuable constituent of the manure of animals is reclaimed,

[1]Svenska Mosskultur Foreningens Tidskrift, 1888, p. 311.
[2]Wochenblatt des landw. Vereins in Baden, No. 3, 1886.
[3]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, 1915, pp. 27–28.

but its removal from the atmosphere of stables and poultry pens materially contributes to the health of the employees and animals. Constant breathing of ammoniacal air affects the respiratory organs and the eyes. In peat that is not humified or is only slightly so, and contains no appreciable amounts of the humus acids, the absorption of ammonia is mainly by a process of condensation in the pores and in the minute spaces between the particles, just as water is absorbed by the sphagnum peat mosses. In more humified peats, however, the ammonia base reacts with the humus acids to form neutral compounds. Peat litter readily absorbs appreciable quantities of carbonic acid, the adsorption being attributed to a condensation process in the hyaline plant cells and in the finely porous interstices of the plant fibres. Born[1] has shown that of the air in the stables of the Berlin tramways, 1,000 parts contained 1·0 part of carbonic acid when peat litter was used, compared with 1·4 to 2·9 parts for straw litter. The same applies to hydrogen sulphide and other gases of offensive odour invariably present in stable atmospheres that are unpleasant and detrimental to health.

Shrinkage in Drying. A soft, elastic peat litter can be obtained only from a peat that dries with little shrinkage in volume. Sphagnum mosses are readily adaptable to this, as sphagnum peat dry substance weighs only from 148 to 190 pounds a cubic yard. Hypnum peat ranges in weight from 160 to 315 pounds, carex from 219 to 438 pounds, and reed peat from 266 to 466 pounds.[2]

When possible, in order to decrease shrinkage in drying, the wet sods should be allowed to freeze, which increases the absorptive value of the peat. At the Bremer Moorversuch Station (Bremen Peat Bog Investigating Station) it was shown that frozen and unfrozen samples of the same kind of peat of equal volume, when dried to the same moisture content, measured 273 cubic centimetres and 134 cubic centimetres respectively, or, converted into weight per cubic metre, 360 and 747 kilograms. According to Litzen[3] the higher porosity and decreased shrinkage effected by hard freezing of the wet peat sods is not due to any chemical change in its constitution. A water-saturated substance like raw peat sods increases in volume when the water freezes, causing disintegration of the solids. In early spring a slow thawing takes place, but as peat moss is a poor conductor of heat the sods dry on the surface before they are thawed out and the solidly frozen core prevents shrinkage during drying. It has been estimated that frozen peat moss sods when dried to the desired water content of 25 to 30 per cent will decrease in volume, on the average, only 20 per cent instead of 50 per cent as in the case of unfrozen sods. Moreover, the fibres are divided by fissures and a light and porous material results, which is easily and more effectively disintegrated by the shredder in the finishing mill.

Heat Conductivity. Owing to its porosity and readiness to form air spaces peat moss is one of the best natural insulators. It is also a good sound-proofing material and is used extensively in the building trade and in refrigeration plants.

Elasticity. The elasticity of a commercial peat moss is traceable to its fine fibres and the comparatively small shrinkage in the drying of the raw peat. Sphagnum-eriophorum peat moss possesses the highest elasticity of all peats, because the eriophorum sedge fibre especially is fine and tough in texture. It has an absolute tensile strength of 1·87 kilograms per square millimetre.[4] The numerous branching stems of the sphagnum moss give high elasticity to a litter, but render the moss somewhat more difficult to disintegrate in the shredder. Carex and hypnum peats may be classed as rather brittle; whereas wood peat and heath humus readily disintegrate when exposed to the air, and yield litters

[1]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, p. 31.

[2]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, p. 32.

[3]Uber die Veranderung Feuchten Torfes durch Frost. Mitteil, d. Vereins zu Förderung d. Mosskultur in Deutches Reich, 1941, p. 278.

[4]Die Eigenschaften der Torfstreu, ref. by Dr. V. Zailer, Torfstreu und Torfstreuwerke, p. 31.

of slight elasticity that dust freely. Reed peat possesses in its more unhumified state a felty, cigarette tobacco-like consistency of high elasticity and softness, but it crumbles readily under the feet of animals and owing to its low absorptive value forms a slurry-like mass with the liquid manure.

Owing to their brittleness most low bog peats yield 40 to 50 per cent of mull and only 40 to 60 per cent of litter after passing through the shredder, whereas high bog peats yield only 15 to 20 per cent of mull[1]. The injurious effect of dust formed from peat litter is not due to small particles separated from the fibres during the disintegration of the sods in the finishing mill, but to the finest particles of dust, barely discernible to the naked eye, consisting mostly of inorganic matter. These settle on and lacerate the mucous membrane of the respiratory and sight organs. This defect in a peat of inferior quality is easily detected by raking around the litter with the hand, when the dust adheres so firmly that it cannot be blown off.

Disinfective Qualities. There is much divergence of opinion as to the disinfective quality of peat mosses. Grout[2] refers to the subject; as does, also, Nina L. Marshall,[3] who bases her opinion on the fact that the body of a woman dressed in haircloth was found in perfect preservation in a peat bog at a depth of 10 feet, having been there for several hundred years, and that logs of trees found in bogs for comparable periods of time show no sign of decay. This may be due, however, to the lack of oxygen, a condition necessary for the process of humification to take place. Zailer, quoting several authorities, expressed the view that although peat itself cannot be properly classed as a disinfectant, it possesses certain disinfective qualities, due to the strongly acid reaction of its humus substances, which are not, however, altogether germ-free. This disinfective quality may be partly traceable also to the great absorptive value and resistance against decomposition of the peat moss itself, its deodorant quality, which partly prevents the increase of lower organisms, and to its low conductivity of heat.

Inflammability and Spontaneous Combustion. Peat moss is not easily ignited. Straw, excelsior, etc., burn with a bright flame, whereas peat moss smoulders and the fire is quickly detected by the peculiar odour of the smoke. The Bremer Moorversuch Station has determined the ignition temperature of sphagnum moss at 205° C. or 401° F. Peat moss is much less subject to spontaneous combustion than is semi-dried hay or baled cotton and such combustion is more likely to happen in large storage piles of air-dried peat sods, which may contain sods of higher content of moisture. Storage piles, therefore, need to be ventilated by air passages. The cause of spontaneous combustion of peat moss has been carefully investigated, but, as far as can be learned, without definite results. E. Haglund[4] studied the matter in detail in his investigation of many Swedish peat mosses and proved that the increase in temperature of baled peat moss is due neither to the action of bacteria nor to the free access to the combustibles of the oxygen in the air, but originates internally and the fire may take weeks to reach the surface of the bale.

Spontaneous combustion has a very harmful effect on the quality of the peat moss, as the moss assumes a dark shiny colour, becomes brittle, and in composition resembles peat fuel. The weight increases in range from 187 to 339 kilograms per cubic metre and the carbon content from 50·8 to 52·3 per cent.

STANDARDS AND SPECIFICATIONS FOR COMMERCIAL PEAT MOSS

It should be noted that the standardization of peat moss implies the selection of a few types most suitable for the purposes desired, whereas specifications deal with a description characteristic of the kind of peat to be procured.

[1]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, p. 32.
[2]Grout, A. J.: Mosses with Hand-lens and Microscope, p. 51.
[3]Marshall, Nina L.: Mosses and Lichens, p. 110.
[4]Svenska Mosskultur Föreningens Tidskrift, pamph. 1, 1909.

Some confusion exists in the peat moss trade, in regard to the quality of the products. So far, no standard has been generally adopted in regard to the name of the products, the physical and chemical standards of the peat, and the size and weight of packages. Thus, in Europe the products are usually named according to the size of the shredded material, as peat litter, poultry litter, and mull; whereas in Canada and the United States the term peat moss is generally used whether the product is derived from sphagnum moss, sedge, reed, or other aquatic plants. In Europe, bales and packages range in size from 130 to 220 pounds, and in Canada from 75 to 130 pounds. Many other sizes of smaller packages are in use according to the requirements of the trade.

The United States Treasury Department, through its Procurement Division, Washington, D.C., has adopted standards for the distinct grades of peat recognized commercially, and has issued specifications to cover their purchase by the Federal Government.[1] The peat industry can aid in the work of standardization by co-operating with the standardizing agencies concerned. Even producers and dealers not interested in obtaining government contracts should familiarize themselves with the specifications for the grade of peat produced. They are:

"Peat shall be furnished in the following types and classes, as specified in the invitation bids:—

Type I. Moss peat.
- Class A. Horticultural grade (fine shreds).
- Class B. Poultry litter (medium shreds).
- Class C. Stable bedding (coarse shreds).

Type II. Reed muck or sedge muck.

Type III. Reed peat or sedge peat.
- Class A. Acid grade.
- Class B. Nearly neutral grade.

Detail Requirements

Type I:

Moss peat shall be the poorly decomposed (fibrous or cellular) stems and leaves of any of several species of sphagnum mosses. Its texture may vary from porous fibrous to spongy fibrous and it shall be either crumbly or compact but fairly elastic and substantially homogeneous. It shall be free from decomposed colloidal residue, wood, sulphur and iron, and shall be brown in colour, tinted grey, yellow or red.

Acidity. The pH value shall be not less than 3·5 and not greater than 5·5.

Moisture Content. Peat shall be furnished in air-dry condition and shall contain not more than 35 per cent moisture by weight.

Water-holding Capacity. Shall be not less than 1100 per cent, by weight, on an oven-dry basis.

Coarseness Classification of Shreds. Peat shall be furnished in three classes of coarseness, as specified in the invitation for bids:

1. Class A (Horticultural grade)—Shall be finely shredded material suitable for horticultural purposes. Particles shall vary in size from dust up to the size of wheat bran.
2. Class B (Poultry litter)—Shall be medium shredded, suitable for use as poultry litter. It shall be coarser than Class A and lumpy. Individual pieces may be as large as walnuts.
3. Class C (Stable bedding)—Shall be coarsely shredded, suitable for use as stable bedding. It shall be coarser than Classes A and B and may contain larger lumps.

NOTE: Where the highest grade of moss peat (Type I) is not required, the purchaser may find satisfactory a grade containing up to 2 per cent, of foreign matter, such as twigs and cotton grass. In this event, it should be so specified in the invitation for bids.

Type II:

Reed muck or sedge muck, shall be finely divided plant debris, in a fairly advanced state of decomposition (peat humus). It shall be furnished in granular form, of uniform composition and size, free from hard lumps. It shall be low in wood, sulfur and iron content and shall be dark brown to black in colour.

Acidity. The pH value shall be not less than 5·0 and not more than 7·5.

Moisture Content. Shall be not more than 55 per cent by weight.

Water-holding Capacity. Shall be not less than 100 per cent, by weight, on an oven-dry basis.

Ash. Shall be not more than 15 per cent.

[1] "Specifications for Peat (Moss, Reed, and Sedge)"; No. 563, May 19, 1942, and "Peat Resources of Alaska," by A. P. Dachnowski-Stokes; U.S. Dept. of Agriculture, Tech. Bull. No. 769, p. 71.

Type III:

Reed peat or sedge peat shall be the moderately decomposed stems and roots of rushes, coarse grasses, sedges, reeds, canes, and similar plants. It shall be coarse or finely fibrous, and brown in colour. It shall be low in wood, decomposed colloidal residue, sulfur, and iron content. It shall have either a definitely acid reaction (Class A) or be slightly acid to slightly alkaline (Class B) as specified in the invitation for bids.

Acidity. Class A shall have a pH value not lower than 4·5 and not greater than 5·5. Class B shall have a pH value not lower than 5·5 and not greater than 7·5.

Moisture Content. Shall be not more than 50 per cent by weight.

Water-holding Capacity. Shall be not less than 350 per cent, by weight, on an oven-dry basis.

Ash. Shall not be more than 10 per cent.

Packaging, Packing, and Marking for Shipment

Packaging. Unless otherwise specified, commercial packages are acceptable under this specification.

Packing. Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

Marking:

Issue Packages. Unless otherwise specified, each package shall be marked with the name of the manufacturer.

Shipping Containers. Unless otherwise specified, shipping containers shall be marked with the name of the material and the quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

Notes:

Purchasers should exercise any desired options offered herein and should specify the types and classes required. Type I, moss peat, is generally designated by the trade as "peat moss."

The various types of peat specified herein commonly have a water absorption capacity greatly in excess of the minimum specified. The following limits are characteristic of the respective types:

Moss peat	1100 to 2000 per cent.
Reed muck or sedge muck	100 to 350 per cent.
Reed peat or sedge peat	350 to 800 per cent.

Peat having a higher moisture content than is permitted by this specification but otherwise meeting specification requirements, may be considered acceptable by the inspector, at an appropriate reduction from contract price."

No mention is made in the above specification of the upper limit of ash content in the peat moss class. In most cases 5·0 per cent of ash computed on the dry basis is considered normal. Ash content in peat moss used in metallurgical processes, however, should not exceed 2·0 per cent and absorption value should be not less than twelve times its own weight in water, computed on the dry basis.

Peat moss used as a base for the preparation of various commercial stock foods must be prepared from the purest obtainable sphagnum moss, free from dust, and ground to a certain size grain.

CHEMICAL AND PHYSICAL EXAMINATION OF RAW AND COMMERCIAL PEATS

Sampling. In determining the commercial value of a peat deposit it is necessary to collect samples from the bog carefully and systematically, and from them to determine the water and ash content, absorptive value for liquids and gases, especially ammonia, the pH value, and the content of nitrogen, potash, lime, and phosphoric acid. It is of importance, also, to have a microscopic examination made of the sample to determine the botanical species present, from which the classification of the peat can be established with fair accuracy. Notes should be taken of the characteristics of the bog surface, whether high or low moor, and of the vegetation from which the peat was derived. It should never be expected, for example, to obtain a first-quality sphagnum moss on a low grassy bog, but

after taking the vegetation into consideration it is reasonable to expect good material for peat moss products from the stratum immediately below the layer of vegetation in a high bog. Many deposits, however, especially in Ontario and Quebec, yield strata of well-humified peat underlying a heavy growth of sphagnum moss. To obtain a true conception of the structure of a bog, and the quality of its different strata and their thicknesses, samples should be taken at regular intervals in depth, using specially devised boring equipment, and physical and chemical analyses should be made of these samples. At the time of sampling an examination should be made in regard to the colour of the peat in the natural state, and after the water is squeezed out. The colour of the water in the peat when squeezed in the hand gives a fair indication of the quality of the peat. If clear and white, little or no humification has occurred, but if coloured and muddy, humified peat is present. Raw peat that squeezes out between the fingers when pressed in the hand is usually in a fairly advanced stage of humification.

The thickness of the strata should be determined as well as the character of the bottom of the bog, whether clay, sand, gravel, rock, etc. The drill-holes must be distributed over the surface of the bog in accordance with the topographical characteristics and should be located especially in depressions and elevations. The sampler used is termed a chamber drill.[1] The samples should be placed in air-tight containers of glass or non-corrosive metal and sent to the laboratory for further physical and chemical examination.

At least every eighth or tenth bale should be sampled in order to obtain a true general sample of a shipment of processed moss. To avoid opening the bale a special sampler has been devised by Br. Tacke-Bremen by means of which a core may be obtained right through the bale. The samples must be placed immediately in air-tight containers and on no account in paper wrappers or in sacks.

Methods of Chemical Analysis and Physical Tests

Moisture Content. Place 5 to 10 grams in a tared and covered weighing bottle and weigh to the nearest milligram. Record the weight. Remove the cover and place vessel and contents in a drying-oven at 105° C. to 110° C. until constant weight is obtained. Before each weighing, cool the vessel and content in desiccator. Compute the percentage of moisture, based on oven-dry weight.

Acidity. Determine the hydrogen-ion concentration, pH value, by any convenient approved method. In preparing the solution for this test use distilled water of known pH value and sample in a ratio 4 to 1, respectively, by weight, permitting the material to soak for 30 minutes at a temperature of 20° to 30° C. Determine the pH value at approximately 25° C.

Absorptive Value. For this determination, peat in the raw state must not be subjected to partial preliminary drying, because dried or partly dried peat or muck may not re-absorb water to its original absorbing capacity. In the analysis a sample of 30 grams of the peat as described above is weighed out and 1 litre of boiling water is poured over it, then stirred up several times until the peat sinks to the bottom of the beaker. After soaking for at least 6 hours the water is decanted off and the mass is turned into a mortar, then mashed with a pestle, and the water that has been already decanted off is poured on the peat moss.

When stirred by hand, no lumps should be felt, only loose fibres. The alluvial peat moss is poured into a graduated cube-shaped copper wire basket having a mesh of from 2 to 1 millimetre, and a content of 1 litre. Peat substance that screens through the basket with the water is poured into the basket with the other peat and screened again. No notice should be taken if the filtrate is muddied and still contains some small particles of peat. The basket is then inclined at an angle of 45 degrees with one corner turned downward and kept in this position

[1]Zailer, Dr. V.: Torfstreu und Torfstreuwerke, p. 88, fig. 20.

until less than one drop of water a minute passes from the basket. The basket with content is then weighed, standing in an evaporating basin. The basket, peat, and basin are dried at 105° C. until constant weight is obtained. Knowing the weight of the empty basket and basin, the absorptive value is computed for absolutely dry peat and for peat of 25 per cent moisture content.

Absorption of Ammonia. One gram of the sample evenly disintegrated is weighed out on a watch glass and placed for 24 hours in an atmosphere saturated with ammonia gas, and afterwards aired for another 24 hours. The nitrogen content absorbed by the peat is determined by the Kjeldahl method. In calculating the ammonia, the nitrogen present in the original peat must also be determined. It is not permissible to calculate the absorptive value of ammonia on the basis of dry substance, as the ammonia absorption is appreciably increased by the water content in the peat. Analysis should, therefore, report ammonia absorption on the sample as received, stating the moisture content of the peat.

Hygroscopic Quality. This determination is made by placing 5 grams of peat for one-half to one week's time into a glass bell with a water-saturated atmosphere, following which the sample is weighed and from the increase in weight the moisture taken up is calculated in parts per cent.

Earthy Material and Humus Matter. These are determined by stirring up a weighed quantity of peat in a tall beaker filled almost to the brim with water and allowing it to stand for a short time. The fibrous peat floats to the surface, while earthy material and well-humified peat sink to the bottom. The fibrous peat is skimmed and decanted off and the sediment is filtered on a tared filter, dried, and weighed. The results obtained by this method are only approximate, and care must be taken not to allow too long a time for settling of the earthy and humus matter, as, otherwise, part of the fibre may become water-logged, sink to the bottom, and yield high results.

Nitrogen, phosphoric acid, potash, and lime are determined in accordance with methods of analysis used in soil analysis.

Method of Estimating Quantities of Available Peat Moss

In estimating the quantities of peat moss available in the deposits described in Chapters IV to XII, it is assumed that:

1. The stratum 0 to 5 feet in depth is of doubtful value and is, therefore, disregarded, though part of it may yield good moss.

2. The bog has been, or will be, properly drained.

3. When drained the bog will settle 2 feet, which amount is deducted from the average depth represented over the area with contour.

4. One cubic yard of drained moss yields 250 pounds of standard commercial peat moss containing 30 per cent moisture.[1]

[1]The weight of commercial moss obtained per cubic yard from raw peat should be determined for each bog, preferably based on a long run of production. This was not possible and thus the only available figures from the larger plants in Quebec and Ontario were accepted.

Note: The contours shown on the maps appearing in the report are approximate, as time did not permit running more lines and making more drill-holes. This pertains especially to the outer contours. All analyses, unless otherwise stated, were made by the Division of Fuels, Bureau of Mines.

CHAPTER II

OPERATION OF PEAT MOSS BOGS AND PLANTS

During the period of the investigations the newly constructed and the old and modernized peat moss plants were operating at capacity under various conditions. For the most part the weather was favourable for drying the excavated peat sods, though the summer of 1941 in Eastern Canada was wet and cold and a large part of the sods excavated did not dry enough for processing and had to be left on the drying-field for the winter. Fuel peat would have been ruined under such conditions, but peat moss improves in quality with freezing, becoming light in weight, and its absorptive capacity is increased. Thus, manufacturers of peat moss would be well advised to keep one year's supply of drying or dried moss sods ahead of the needs of the baling mill. The sods excavated during the latter part of the season and those that, because of rain, high atmospheric humidity, and cold, do not become sufficiently dry for baling during the summer nearly always form a large part of the year's cut and have to remain on the field throughout the winter. They benefit also from the favourable drying weather of spring when high winds of low humidity prevail.

Such conditions, however, do not occur at the bogs in the Fraser Valley southwest of New Westminster, where the most important deposits are situated. In other parts of Canada, when frosts occur in the autumn, the frozen surface of the peat moss sods protects them against absorbing moisture from occasional rains, snow, and humid atmosphere. In the Fraser Valley, however, heavy frosts and prolonged periods of low temperatures are rare and after the middle of September heavy rains cause high humidity in the air, which condition continues to a varying degree throughout the winter. Partly dried sods having no protecting frozen surface absorb water and by spring are as wet as when they were excavated. Peat moss producers in the Fraser Valley, therefore, have to work against time and their summer's cut must be under cover before the middle of September, as, otherwise, they risk serious loss, not only because of delay in drying, which will be accentuated by the wet, soft sods settling into a solid mass, but because of unavoidable disintegration that occurs when the soft sods are beaten down by heavy downpours of rain.

SELECTION OF THE BOG

It is imperative that the greatest care be taken in selecting a suitable deposit of peat moss, with particular attention to the following:

(1) A bog should be selected that can be fairly easily and inexpensively drained, so that its surface becomes sufficiently firm to support the weight of men, horses, field railway, and other bog equipment.

(2) The deposit should contain a sufficient amount of sphagnum peat moss of good quality and should be not less than 4 feet deep.

(3) Suitable climatic conditions are essential to ensure drying of the cut sods to the required content of moisture.

(4) The site should be adjacent to a railway, canal, harbour, navigable river, or at least to a good road, and not too distant from the market.

(5) Sufficiently large plant, and working capital is necessary.

(6) A superintendent or foreman with thorough knowledge of and experience in the production of peat moss should be employed.

(7) The bog should be systematically sampled and the depths of the various strata and their quality as to absorptive value and general suitability for the manufacture of peat moss should be determined.

DRAINAGE OF THE BOG

The laying out of the drainage system of a deposit of peat moss depends upon local conditions, principally the topography of the bog and of the immediately surrounding country. The main drain should, as a rule, pass through the deepest part of the bog and, wherever possible, through its centre. Its fall need not be more than 3 to 5 feet per thousand. The secondary drains may be shallower and empty into the main drain on both sides at right angles. The distance between the secondary drains is usually 250 to 300 feet, but varies according to the condition of the bog, being from 70 to 150 feet in the case of very wet bogs.

In opening up a virgin bog it is unnecessary to excavate the main drain to the mineral bottom. A depth of 4 feet will suffice for the first year and will prevent the drain from closing up. It is neither necessary nor economical to drain the entire surface of the bog at once; if a bog is overdrained, the fibre of the moss becomes brittle, breaks down and crumbles, is difficult to excavate, and assumes a dark colour, resulting in an inferior product. It is, therefore, sufficient at the start to excavate the main drain and the necessary secondary drains, and in later years to develop the drainage system as it will be required for cutting sod. The drainage work should be kept at least two years ahead of the cutting. Many bogs, especially those containing light-weight, porous moss of high quality, require drainage for from one to two years to make the bog settle to a more compact body of moss and to reduce the water content of the raw peat from 95 per cent to about 90 per cent. Failure to do this results in low production capacity with consequent poor financial returns.

Bog Operation. Peat moss is best excavated by hand. Several mechanical excavators have been tried, some of which have worked satisfactorily from a mechanical point of view, but none has so far proved to be an economic success. The diggers work singly or in pairs and are paid at an agreed rate a linear foot excavated from the cutting lane, or per 1,000 sods cut. The size of the sod varies, but 4 by 4 by 18 inches up to 6 by 6 by 18 inches seems preferable both as regards weight for handling and convenience in cutting. The sods are spread on the field to dry and after they have obtained a dry surface, can be turned and raised from the ground to allow free access of the air around them.

In some districts where the drying season is short the sods are dried on racks. When placed on the rack they need no further handling until they become uniformly dry. A large capital expenditure is required to supply the racks, however, and depreciation of the racks is fairly rapid. There is also the danger of the racks toppling over in the event of violent storms. Under normal drying conditions in the summer the sods are ready for cubing after 8 to 14 days. They may then be stacked in hollow piles, thus providing "chimneys" for the air to circulate freely through them. When sufficiently dry they are piled in the field in stacks 9 to 12 feet in height so as to clear the drying-field for the next sod-cutting and spreading.

After it has received a good air-drying, peat moss should not contain more than 20 per cent of moisture, but in practice this is difficult to attain, at least for the whole season's output, unless the drying conditions are unusually favourable. It may be accepted that for a No. 1 grade peat moss the content of moisture must not exceed 30 per cent; for No. 2 grade, 40 per cent; and for No. 3 grade, 50 per cent.

HARVESTING

Harvesting of the dried peat sods is carried out by different methods in different parts of the country. In Eastern Canada the large peat moss producers usually harvest the sods by means of a field railway system, with a permanent track through the centre of the bog connecting with the baling mill and portable tracks for the drying-fields between the drains. Light side-dumping and, in some cases, front-dumping cars and gasoline tractors provide the means of

transportation. A fairly large shed adjacent to the baling plant is used for storage of the dried sods, but most of the season's cut is usually kept in the field in large stacks with or without a light roof, and with the sides open. In western Ontario and in Manitoba, where good drainage is possible and the bog surface becomes firm, tractors and trailers are used to bring the sods from the drying-field to large stacks or storage sheds under cover, where they are loaded by conveyers. On the Pacific Coast, movable field conveyer belts, 1,200 feet in length, clear the drying-field of sods at a speed of 250 feet a day, feeding a stationary conveyer that brings the sods to the storage sheds adjacent to the baling mill. This method is efficient. A sufficient number of movable conveyer belts operate to clear the drying-field in two weeks. Speedy harvesting is essential on the Pacific Coast for reasons previously mentioned, but should be equally advantageous in other parts of Canada, as this system saves labour and time. One eastern peat moss company was gradually changing over its car and rail harvesting system to conveyer only.

PEAT MOSS BALING MILL

The average-sized baling mill for peat moss can be housed in a building 50 by 50 feet, and consists of a conveyer, shredder, bucket elevator or pneumatic conveyer, rotary hexagon or shaker screen, dust-collecting system, and two baling presses. Such a plant should have a capacity of about 100 bales an hour. Machinery for a complete peat moss plant, bog equipment, and baling machinery can be obtained in Canada.

In addition to the plant there should be an engine room, unless electric power is available; a storage room of 50 by 80 feet floor space, for at least 2,000 manufactured bales; a covered loading platform for shipping; a covered unloading platform for the cars bringing peat sods to the baling mill; and usually an attached storage shed for the dried sods, the capacity of which depends on the amount of sods it is required to have on hand and on the distance from the bog; an office building, store and machine shop, camp, and a garage for tractors. All buildings should be constructed for winter use, as peat moss plants operate during the winter.

In the operation of the mill, the dried sods are brought from the field by cars or field conveyers and are either piled in the storage shed or go directly to the mill from which the shredder is fed by means of a conveyer. The shredder can be adjusted to disintegrate the sods into any size desired. A bucket elevator or pneumatic conveyer brings the shredded sods to a rotary or shaker screen, where three sizes are separated, the coarse for use as stable litter, the medium for poultry and small animal litter, and the fine, usually termed peat mull, for soil conditioning, packing, and insulating material.

After the shredding, the sizes used for litter are vacuum-cleaned in order to obtain a non-dusting stable and pen litter, necessary for the comfort of the animals and stable employees, and the fine dust is usually added to the mull. Each size of screened material is sent to its respective bin placed above a press and is pressed into bales of suitable size. The bales are covered with burlap or heavy paper and are held together with laths and wire. Owing to the scarcity of burlap, due to the war, veneer held together with laths and wire and cartons are used for packing.

Peat moss intended for use for insulation in loose form should be finely shredded, clean sphagnum moss, free from humified peat, as in case of leakage into the dwelling it causes a brown stain, discolouring ceilings and walls.

In the manufacture of insulating boards the wet moss is mixed with excelsior (in some plants the waste from the manufacture of coco-mats is used), which serves as a bond, and the mixture is treated in a closed vessel with steam. The moss is then fed into a press consisting of two steel frames with plungers, one frame being filled while the other is pressed. Some of the water is removed in

the pressing, after which the wet slabs are transferred to trays and left on racks to dry, and are then trimmed to the required size and crated.

Some peat moss producers also manufacture peat pads used for the shipment of asparagus cuttings. The method used in the manufacture of moss pads is as follows: at the top of the elevator bringing the air-dried peat moss sods to the baling factory the cleanest sods, free from fissures and strata of dark and humified peat, are selected and transferred to a belt bringing them to the shaping machine. There they are sawn into the desired sizes, reduced in volume by hydraulic pressure, and crated for shipment, 500 to a crate. The cuttings from making the pads are run into the baling mill, where they are shredded, screened, and baled.

EMPLOYMENT OF LABOUR

The peat moss industry is an important employer of labour, and the work is less seasonal than most outdoor occupations. Digging of the sods can be carried on from the time the frost leaves the ground until the freeze-up. The baling plant is kept in operation most of the year, depending upon the amount of dry sods on hand, and employs men in the factory and for transportation of the sods of dried peat moss from the stacks in the field to the plant.

CHAPTER III

USES FOR PEAT MOSS

Peat moss has been used widely and with satisfactory results in Europe for many years, but as yet it has been used only to a limited extent in Canada. For this reason the claims made in reference to the uses given below are based mainly on the experience of recognized specialists on the subject in Europe. Certain of the claims made in regard to the use of peat moss in Canada can be readily substantiated, whereas others can be neither proved nor disproved until such time as sufficient experience in the uses concerned is acquired. Nevertheless, it seems reasonable to assume that, in the main, the results in Canada will be as satisfactory as those for similar uses in Europe.

Peat moss owes its usefulness to its high absorptive capacity for liquids and gases, its resistance to decomposition, its low conductivity of heat, its elasticity, and its deodorizing quality. There is some evidence, also, of its satisfactory use as an acid disinfectant.

USES IN AGRICULTURE

Poultry and Stable Litter. Approximately 41 per cent of the total Canadian shipments of peat moss in 1943 was for use as poultry and stable litter, compared with 39 per cent for horticulture and market garden use, and with 20 per cent for metallurgical use. In this connection it should be noted that the order of importance in reference to the uses of peat moss changes mainly in accordance with the changing economic importance of the fields of use. Until comparatively recently, for instance, horticulture and market gardens were at the top of the list.

At the end of 1944 more peat moss was being used for poultry litter than for any other single purpose. It has been acclaimed as being of prime importance to the health and comfort of the flock. When used as bedding in the pens the intervals between the cleanings may be appreciably increased as compared with the use of other material, and it absorbs the droppings of the birds to form a valuable manure rich in nitrogen. Peat moss litter makes a warm flooring and nesting and when scattered in the chicken runs it provides an ideal scratching material. Its use is reported to give the birds comfort, health, and freedom from vermin.

Peat moss has the requirements of a good stable litter and surpasses in quality all other materials used for that purpose, as it provides for the animals a warm, clean, dry, and elastic bedding, absorbs and retains excrement, and increases the fertilization value of the manure by retaining the more valuable parts thereof. The moss is an efficient soil conditioner. It holds the moisture longer than does manure if applied to a sandy light soil, and it makes heavy clayey soil lighter by allowing circulation of air and more rapid movement of water to the plant roots. It improves sanitation of stables by its absorption of gases and by its general qualities as a deodorant. Foot and mouth disease among cattle appears to be less frequent and less virulent when peat litter is used for stable bedding.

For stables and pens, the bedding can be easily kept dry and clean by removing the damp parts and replacing with fresh moss litter. Such bedding may last upwards of a month before an entire change becomes necessary. It is reported that 1 ton of peat moss will serve as long as $2\frac{1}{2}$ tons of straw, thus lightening the work in the stables, for not only is less handling required, but a peat litter bedding keeps the animals cleaner.

When peat moss is used in sties as bedding for pigs their skin is less apt to become inflamed, and the offensive odour of the sties is greatly decreased. This

pertains to all animals except sheep, in which case the fine peat is likely to penetrate into the wool and is difficult to remove.

Horticulture and Market Gardens. Sphagnum peat moss is not a fertilizer, but is of importance as a soil conditioner; as a filler in commercial fertilizers that if used alone would "burn" the plant growth; and as a base for composting manure. Other fibrous peats such as carex, sedge, hypnum, and especially reed peat, are noticeably high in plant food, but this advantage far from compensates for their physical inferiority. In gardens peat moss is used extensively as a soil conditioner, and, being free from weed seeds, serves as an excellent soil dressing. It is widely used in nurseries and horticultural farms. As a mulch, it virtually prevents growth of weeds and effects greater retention of moisture in the soil. A mulch of peat moss will protect the more tender plants and shrubs from being winter-killed. The use of peat moss tends to produce healthier and more advanced plants.

Horticulturists find it very useful for packing bulbs, tubers, and roots for winter storage. They are protected against the cold weather and remain firm throughout the winter. Similarly, live or slightly humified sphagnum moss ("floral moss") is used for shipping flowers, shrubs, etc., in cold weather. Successful overseas shipments of plants and saplings are made by covering the roots with moist peat moss and wrapping them in live sphagnum moss.

Peat moss is used extensively in making, renovating, and remaking lawns. It improves the texture of the soil and retains sufficient moisture for the grass roots. Golf clubs, which use it for improvement of the greens and gardens, are among the best customers in Canada.

USES IN INDUSTRY

Peat moss has a variety of uses in industry, the more important of which are dealt with below.

Artificial Fertilizers. Mixed with waste from fisheries and packing houses, it makes an efficient fertilizer, rich in nitrogen and phosphate, which, owing to the deodorizing quality of the moss, is free from offensive odour. Peat moss filler in commercial fertilizers facilitates the use of many materials otherwise difficult to handle. Many kinds of waste matter from packing houses absorb moisture from the air and either cake or give off offensive odours. Peat moss largely prevents this decomposition and absorbs the gases released.

Stock Food. It is used in Europe and in the United States for the preparation of various stock foods, particularly those compounded with the uncrystallized residues from beet and cane sugar refineries. Molasses, although a valuable foodstuff, requires an effective diluent owing to its viscous condition and its extreme laxative action when concentrated. Peat moss converts the crude molasses into a convenient and stable product and largely prevents digestive disturbances. It also adds a small amount of protein and improves the palatability of the food. It is claimed that as much as 50 per cent of molasses may be used in stock foods when mixed with peat moss. Its corrective qualities make it a desirable material also for admixture with cotton seed meal. When used for stock food it must be prepared from the purest obtainable sphagnum moss, free from dust, and ground to a certain size of grain.

Building Trade. Peat moss is used to some extent in the building trade as an insulating material, by packing in wall spaces and between the rafters in roofs. It does not readily ignite and keeps the house warm in winter and cool in summer. It is used in floors, partitions, and ceilings as a soundproofer. It preserves the wood, and vermin do not thrive in it. In Germany, peat boards are impregnated with chemicals to render them fireproof. In Alberta, there was an appreciable production of peat boards, and several thousand houses in and about Edmonton are insulated with this material.

Packing Material. Peat mull, the finest screening of peat moss, and to a certain extent the coarser sizes, have been used extensively in Europe as packing material for perishable products, especially for shipments overseas of products sensitive to dampness, and for fragile wares such as glass or crockery. The moss adds little to the weight of the package. It provides protection against frost in winter; and in summer chilled fruit and vegetables packed in peat moss will keep cool for a long time.

Peat Pads. In Western Canada a number of producers manufacture peat moss pads on a fairly large scale. They are used for the shipment of asparagus cuttings and keep the vegetable moist and crisp for several days.

Metallurgy. A use during the war was in the production of metallic magnesium and a large part of the Canadian peat moss was thus used.

USES IN THE HOME

Peat moss is an excellent agent for preserving food. Hard fruit and vegetables will keep in good condition throughout the winter if packed in it. Onions, potatoes, etc., will not sprout prematurely, nor will fruit and vegetables emit offensive odours. The storage place retains a fresh atmosphere. Soft fruit and vegetables will keep appreciably longer if packed in peat moss. Eggs have been kept for six months or longer, and meat and fish for two weeks or more. During 1942, oranges, bananas, and eggs packed in fine peat mull were sent overseas by parcel post to patients in military hospitals in England. The recipients stated that the fruits arrived in perfect condition, that the eggs were fresh and on boiling did not have the usual musty taste.

In packing food of all kinds there should be at least two inches of peat moss between the packed material and the walls and bottom of the container. Peat moss used for storage will last almost indefinitely, since it does not readily decompose and if it becomes damp from usage it can be easily dried by spreading it out in the sun. In ice houses, it makes the ice last longer and prevents the formation of fungi and mildew if packed in the spaces between the wall boards, under the floor, and between the rafters of the roof.

On farms and in small communities, in Europe, without sewage systems peat moss has been used for a long time as a deodorant and disinfectant in earth closets and cess pools.

OTHER USES

Surgical Dressing. Peat moss, and particularly fibrous peat from eriophorum (cotton grass) specially treated, makes very good surgical dressing, and was so used during the war of 1914-1918 by the armies of the Allied and Central Powers. The United States Army used 600,000 pads made of moss obtained from bogs in that country. It was found to be a good substitute for absorbent cotton. A similar material made in France, known as peat batting or peat wool, was used widely during the war for bandaging.

Various. It was also employed as filler for mattresses, pillows, and for upholstery in the military hospitals.

Peat moss has many possible war uses as a substitute for materials difficult to obtain. These include its uses as a substitute for cork in the insulation of aeroplanes; as linoleum filler; in the form of peat yarn for the manufacture of coarse blankets for horses and cattle; as peat fibre mixed with wool for making underwear, which is said to be warmer than that made of all-wool owing to the insulating property of peat; in making paper and cardboard; sweeping compounds; and as the raw material for manufacturing various chemicals, waxes, alcohol, and dyestuffs.

When used in making building brick it yields a product of high porosity, light in weight, and a good heat and sound insulator.

The value of peat moss for the foregoing uses has long been recognized in Europe and very large quantities are so consumed. Sweden, for example, prior to the war (1939), had a yearly production of between 4 and 5 million bales, in addition to which a large quantity of loose litter was produced by individual farmers from their small bogs. All of this, except an export of 600,000 bales, was consumed within the country. If the demand for peat moss in Canada were proportionate to that of Sweden, on the basis of population, there would be a marked expansion of the Canadian industry. An industry of comparative size in Canada would support from 14,000 to 15,000 employees in seventy plants of 100,000 bales yearly capacity each, distributed across the Dominion. The equipment and maintenance of these plants would give much indirect employment.

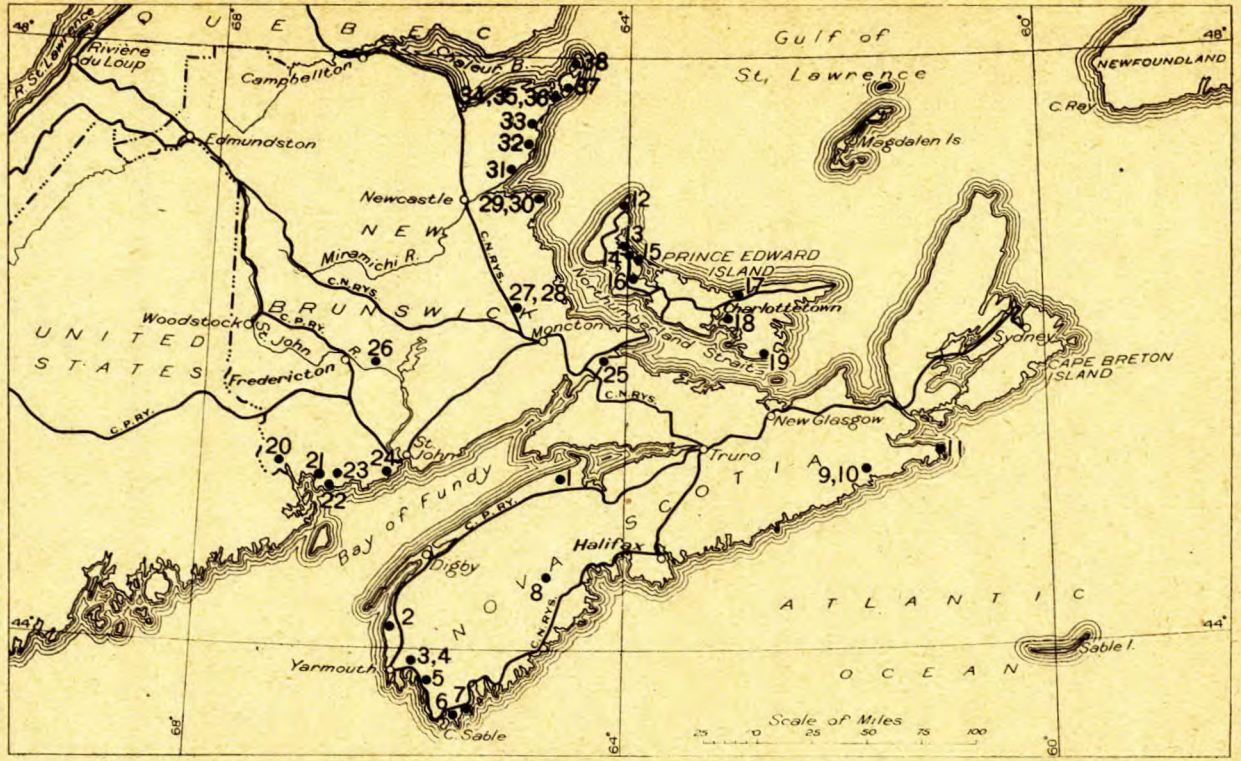


Figure 1. Index map of New Brunswick, Nova Scotia, and Prince Edward Island showing locations of peat bogs. Nova Scotia: **1,** Caribou; **2,** Black Point; **3,** Tusket; **4,** Makoke; **5,** Heath; **6,** Latour; **7,** Port Clyde; **8,** Cherryfield; **9,** Isaac Harbour; **10,** Seal Harbour; **11,** Canso. Prince Edward Island: **12,** Black Marsh; **13,** Black Banks; **14,** Portage; **15,** East Bideford; **16,** Miscouche; **17,** Mt. Stewart; **18,** Mermaid; **19,** High Banks. New Brunswick: **20,** St. Stephen; **21,** Pennfield; **22,** Seely Cove; **23,** Pocologan; **24,** Musquash; **25,** Chignecto Isthmus and Jolicure Lakes; **26,** Maugerville; **27,** Canaan; **28,** Hicks; **29,** Eel River; **30,** Escuminac; **31,** Burnt Church; **32,** Tabusintac; **33,** Tracadie; **34,** Green Point; **35,** Pokemouche; **36,** Shippigan; **37,** Lamek; **38,** Miscou.

CHAPTER IV

PEAT BOGS IN PRINCE EDWARD ISLAND

Prince Edward Island has at least two important deposits of peat moss, namely, the East Bideford and the Black Banks bogs. These contain a sufficient tonnage of high-grade material to maintain a large production of processed moss for many years. The Portage bog is probably of importance also, but all of the other bogs examined are of low value and would not warrant development on a manufacturing basis. Small deposits might be worked, however, and it should not be difficult to dispose of the moss in this agricultural province.

PRINCE COUNTY

Black Marsh Bog

This bog is 8 miles northeast of Tignish at North Point. It can be reached by good roads skirting the deposit on the east and west. The greater part of the large area covered by the bog is shallow and wooded, and perhaps less than 150 acres is open bog having a depth of over 6 feet. The bog was dry when visited. It is of the domed type and the growth is preponderantly sphagnum moss with some carex sedges in the low areas. The peat is chiefly sphagnum and well-humified fuel peat. Some partly humified peat moss occurs in the centre, but the moss cover is light and the peat moss is dark in colour and passes into humified peat. The bog is of little or no value in regard to peat moss; nor does it appear to be a good prospect for the manufacture of peat fuel, except on a small scale for local use.

Black Banks Bog

This deposit consists of two bogs, one on each side of Stephen Cove about 5 miles due south of Alberton in Halifax township. Both extend to the shore, where the sea erosion has exposed about 10 feet of solid peat moss on a clay bed. Both bogs are similar in appearance, dry, and somewhat dome-shaped with large open areas. The west bog is wooded toward the north and south edges. It has an area of 500 acres of workable peat land, the east bog being about 200 acres. Lines were run through the summits of each bog. Two holes drilled in the east deposit, 800 feet apart, showed depths of over 15 feet, and three holes drilled in the west bog, 1,000 feet apart, also showed depths of over 15 feet. The peat moss obtained was only slightly humified, light in colour, and nearly the entire depth is comprised of a uniformly good grade of marketable peat moss. The bogs can be drained to the cove.

Samples analysed as follows:

	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
East bog	19·7	14·5	4·5
West bog	24·1	17·9	3·6

There are no wharfs for loading near the deposits and the water on the banks of Stephen Cove is shallow. There is a haul of 7 miles by road following Foxley River, which crosses the west end of the larger deposit, to the nearest railway station at Conway.

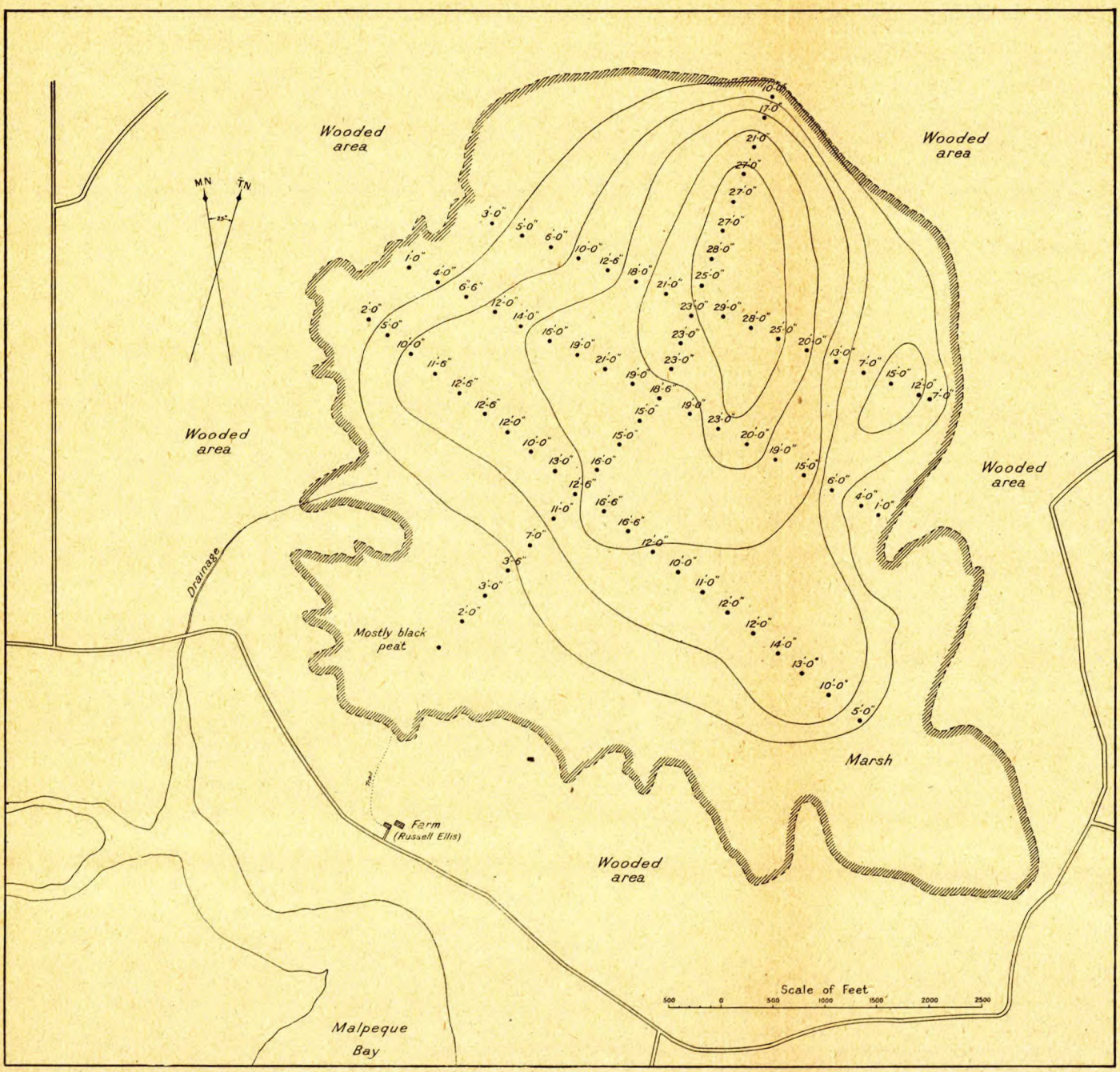


Figure 2. East Bideford peat moss deposit, Halifax parish, Prince county, P.E.I.

East Bideford Bog

This bog (Figure 2) is at the hamlet of East Bideford, half a mile from a good country road running close to the north shore of the northwest arm of Malpeque Bay, in Prince county. The bog can be entered by a short trail from the farm of Russell Ellis. It is of the high-moor type and has an area of about 1,000 acres. Of this area:

36 acres have a depth of 25–29 feet
56 acres have a depth of 20–25 feet
115 acres have a depth of 15–20 feet
160 acres have a depth of 10–15 feet
160 acres have a depth of 5–10 feet

or a total workable area of about 500 acres, the available peat moss being estimated as follows:

Area and depth	Average depth when drained, feet	Content, cu. yds.
	Feet	
36 acres: 25–29	27	1,450,000
56 acres: 20–25	20	1,500,000
115 acres: 15–20	15	2,800,000
160 acres: 10–15	9	2,300,000
160 acres: 5–10	5	1,300,000

or 9,350,000 cubic yards (1,160,000 tons) of standard commercial peat moss.

One large dome covers almost the entire surface, which rises slowly toward the centre. The summit runs in a northeasterly direction with a slight bend northward about the centre of the bog. There is a smaller dome in the northeast part of the bog. At the south end, the bog begins 3,000 feet from the shoreline with a depth of 2 feet of black, well-humified peat and only a light cover of moss. This cover gradually increases to 2 feet in the next 1,200 feet, after which there is a sudden increase to 11 feet, and then a gradual increase following the summit to 29 feet of good moss. The greatest depth is in the north end and this depth continues virtually to the edge of the bog, which ends abruptly in a sand bank. The southeast part of the bog runs into an impassable marsh, possibly the remnant of a lake. In the centre of the bog, over a large area, the peat moss ranges in depth from 13 feet to 28 feet and is remarkably uniform in quality. In general, humified peat occurs at the edges of the bog and is usually 1 or 2 feet in depth with an overlying stratum of a mixture of humified and unhumified peat and a light cover of unhumified moss. In the western part of the bog the moss stratum thins gradually to a light cover resting on a foot or two of humified peat. The part of the bog workable for peat moss is almost circular.

The whole area is open land with no spruce islands, lakes, pools, or other interference. The bog has a floor of sand in the centre and this continues to the northeast end where the bog ends abruptly in a sand bank. It has a clay floor toward the southwest and east and this continues to the edges of the bog. The growth is mainly sphagnum moss with occasional bunches of eriophorum (cotton grass), bog rosemary, and labrador tea on the more shallow parts of the bog, occasional clumps of dwarf spruce, and the usual bog plants, cranberry and crowberry vines, and aquatic plants.

Though the weather was wet during the summer of 1941 the bog was dry in most parts, with only occasional small pools of surface water. The fall of land from the highest point to the level of Malpeque Bay at high tide is 42 feet, and consequently the bottom lies well above the drainage level. Thus, the bog can be well drained in several directions, especially toward the southwest and east. In developing it from the south and working northward following the

summit, the best drainage would be from the southwest, where a natural drain was being cleaned out and extended into the bog during the summer of 1941.

Analyses of representative samples from two areas separated by the base-line over the summit, and of a sample representing a 15-foot stratum in the centre of the bog are as follows:

Average sample from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
NW. part of bog:				
Feet				
0– 5	21·1	15·6	3·6	0·7
10–15 and over	17·1	12·5	3·9	0·7
SW. part of bog:				
Feet				
0– 5	21·5	15·9	3·6	0·
10–15 and over	17·5	12·6	3·4	0·
Centre of bog: 15-foot stratum	23·4	17·3	3·2	...

The quality of the moss is uniformly high throughout the strata of the deposit. The samples of the stratum at 5 to 10 feet, which were lost in transit, would probably have yielded almost the same results as those from 0 to 5 feet. Some intermixture with black peat was noted in the stratum from 10 to 15 feet and over, but this does not seem to have appreciably affected the quality. In the main, the moss is light in colour and in weight.

The bog is a considerable distance from the United States market, and freight rates are high. Under peacetime conditions, however, the baled moss can be shipped by water, and ships can load in the arm of Malpeque Bay, which has a depth of 17 feet at low tide.

Portage Bog

This bog is 1 mile east of Portage station in Prince county. The Western Road and the Canadian National Railway cross the middle of the bog in an east-west direction. The deposit runs north and south and is fairly large, but there are only 150 acres of peat moss, this being at the centre, north of the road. The southern part and much of the outlying northern part is fairly well covered with spruce. The peat in these two areas is chiefly well-humified fuel peat. A line was run due north over the part of the bog containing peat moss, and drill-holes close to the highway and 1,000 feet apart showed thicknesses of moss of 7 feet, 10 feet, and 14 feet, resting on well-humified peat. Analysis of this peat is as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
16·7	12·3	5·7

The peat moss is slightly humified and is somewhat dark in colour, but it appears to be of a good grade. The bog was dry and can be drained easily by a creek running through the middle of the bog in a northerly direction to Trout River.

Muddy Creek Bog

This bog is near Sunbury Cove at the junction of Union Corner Road and the road to St. Nicholas railway station, and has an area of about 50 acres. Since the first investigation in 1913 it has become completely overgrown with a heavy growth of spruce, poplar, alder, etc., and contains no open spaces.

Clearing it of trees and stumps would be costly. The deposit is of no value for the manufacture of peat products.

Miscouche Bog

This bog is 1 mile east of St. Nicholas station in Prince county. The Western Road crosses it and the railway runs half a mile farther south and parallel to the road. The deposit is large, but most of it is shallow and is overgrown with trees, and only about 300 acres in the centre, close to the Western Road, contain moss. Parts of this 300 acres are heavily wooded. The peat moss is mainly sphagnum, dark in colour, and is intermixed with humus. Only the upper beds to a depth of less than 4 feet can be considered to be a fair grade of peat moss. The deposit is worked intermittently for the production of peat fuel for local use, but it does not warrant development for the manufacture of peat moss, except on a small scale for local use.

The bog was dry and can be well drained in a northerly direction. The peat moss analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
13·8	10·3	5·0

KINGS COUNTY

High Bank Bog

This bog is on lot 64, 2 miles southeast of Murray River, Kings county. It can be reached by a good road that crosses the west end of the bog. It has an open area of about 50 acres with a flat surface, and is wet and shallow. The greatest thickness is near the lake at the centre of the bog where there is 4 feet of almost liquid moss, with well-humified peat underneath. The growth on the bog is mainly sphagnum moss, eriophorum, and carex, and there are other marsh sedges toward the edges. The bog was partly drained in 1943. The moss is too shallow and the area is too small to warrant development. The peat moss analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
19·9	14·7	3·7

QUEENS COUNTY

Iris Station Bogs

In the district near Iris station are two small bogs, one of which, at the D. M. Rea farm, is flooded and cannot be drained. Some sphagnum moss overlying humified peat was noted, but it is too shallow to be worked commercially. The other bog is on Angus Matheson's farm and has an area of 20 acres. It contains well-humified peat only and is worked intermittently for peat fuel for local use.

Two Bogs on Crown Lands between Howe Bay and Broughton Bay

The Little Pond bog covers about 10 acres and contains only a light cover of moss on humified peat. No. 2 bog lies near the Bracket property and is of the same acreage. The deposit consists mainly of humified peat with no noticeable cover of moss.

Mount Stewart Bog

This deposit is on lot 35 about 1 mile south of Mount Stewart. It is small and is covered with heavy growth of alder and spruce with small open patches. There is a $2\frac{1}{2}$-foot cover of partly humified peat of rather dark colour and inferior grade overlying well-humified peat.

Mermaid Bog

This bog is near Mermaid farm, 2 miles north of Mount Herbert station. It has an area of about 150 acres and is mostly shallow, and wooded. The peat is well-humified sphagnum. The peat moss analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
6·2	4·4	7·2

CHAPTER V

PEAT BOGS IN NOVA SCOTIA

Most of the deposits in Nova Scotia are peat fuel bogs, but some bogs carrying peat moss could be easily drained and developed to produce a high-grade product. In order of their importance, taking into account the quality of the moss, proximity to transportation facilities, and possibility of drainage, these deposits may be rated thus: Black Point bog, Digby county; the Caribou bog, Kings county; the Big Plain bog on the isthmus in Cumberland county; and the Canso and Isaac Harbour bogs in Guysborough county. The last two contain a very good grade of peat moss, but are unfavourably situated in regard to transportation.

Bogs on the Chignecto Isthmus portion of Nova Scotia are described in Chapter VI.

KINGS COUNTY

Caribou Bog

This bog is in Kings county, between the villages of Berwick and Aylesford. The main highway from Halifax to Yarmouth crosses the bog at its southwest corner parallel to the Dominion Atlantic Railway, which skirts the entire southern edge of the bog. The distance to the nearest deep-sea harbour at Port Williams is 15 miles. The bog has an area of 1,000 acres, and consists largely of fuel peat of good quality. At the centre of the deposit on its summit, however, there is a fair depth of peat moss over an area roughly estimated at 300 acres.

Five test-holes were bored on a line run east and west across the centre of the bog on the north side of Caribou Lake and almost parallel to the Dominion Atlantic Railway. One of these, 100 feet from the edge of the bog, disclosed a depth of $3\frac{1}{2}$ feet of peat moss, and each of the other four taken at a higher level, 800 feet apart, disclosed a depth of over 15 feet of moss.

The peat moss analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
16·2	11·9	11·2

The moss is a good quality sphagnum and is light brown. The upper stratum of 5 to 10 feet is fairly free from humified peat, and even below that level the humification of the moss is slight, so that most of the 300 acres should yield a good grade of peat moss. The bog slopes east and west and can be drained into Annapolis and Cornwallis Rivers. Further investigatory work on this bog is desirable.

DIGBY COUNTY

Black Point Bog

This bog (Figure 3) is on the shore of the Bay of Fundy, in Digby county, near the Yarmouth county line, about a half mile north of Beaver River village. It is the southernmost of a chain of bogs, some of which contain peat moss, that extends northward following Salmon River as far as Meteghan. Near the Bay of Fundy the bog contains peat moss of good quality, but the moss at the

northern end of the bog is more humified and across the highway it is black, well-humified fuel peat. The deposit proper consists of a high bog with one dome. It is open land with no lakes or pools. The growth is chiefly sphagnum

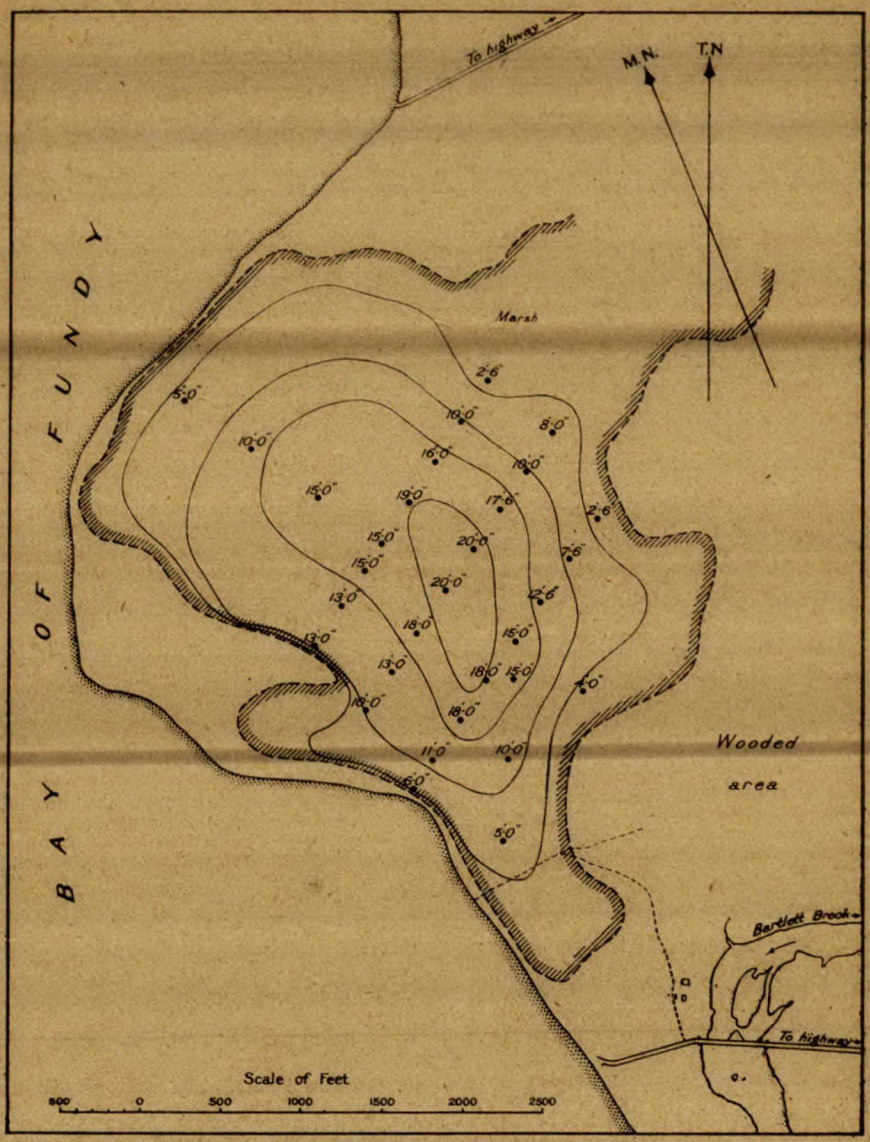


Figure 3. Peat bog at Black Point, Digby county, N.S.

moss with some eriophorum, cranberry, and crowberry vines, and some of the usual bog plants. The area of the bog is 250 acres, of which:

8 acres have a depth of 20 feet
43 acres have a depth of 15–20 feet
45 acres have a depth of 10–15 feet
47 acres have a depth of 5–10 feet

or a total workable area of about 140 acres.

Based on the assumptions given under the heading "Method of Estimating Quantities of Available Peat Moss" page 14, calculations yield the following values:

Area and depth		Average depth when drained, feet	Content, cu. yds.
	Feet		
8 acres:	20	18	240,000
43 acres:	15–20.....	15	1,050,000
45 acres:	10–15.....	10	720,000
47 acres:	5–10.....	7	550,000

or a total of about 2,500,000 cubic yards (310,000 tons) of standard commercial peat moss.

The best moss occupies the centre of the bog.

Analyses of three strata of peat moss for the entire area of the bog are as follows:

Average sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Depth: Feet				
0– 5	16·7	12·3	5·1	0·8
5–10	15·7	11·5	5·0	0·9
10–15 and over.....	12·3	9·0	5·4	0·7

Analysis of a general sample of the stratum of 15-foot depth from the area containing the best moss:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
17·9	13·2	5·6

For years the bog had been a nesting place for large numbers of aquatic birds and an appreciable increase in the nitrogen content of the peat might have been expected from their guano. The analyses, however, do not bear this out.

The bog is favourably situated for shipment of baled peat moss to the United States and to the fruit-growing district of Annapolis Valley, where a local market might be established. The Digby-Yarmouth Highway runs near and parallel to the deposit and from it two country roads run to the north and south ends of the bog. Port Maitland, about 2 miles away, is the nearest shipping port for small sea-going craft, and at Yarmouth, 13 miles distant, is a deep-sea harbour from which there are daily sailings to Boston and New York in the summer, and bi-weekly sailings in the winter. There is also a frequent freight service to several United States and Canadian ports.

The Black Point deposit should prove to be a good prospect for a medium-sized plant of an initial annual output of 50,000 bales. It is compact, with no obstructions, and can be easily worked, and drained. The peat moss is of fair depth and the quantity available is sufficient to keep such a plant in operation far beyond the duration of its depreciation. Labour is normally plentiful, transportation facilities are good by rail and water, and the rates by water are low.

Notwithstanding very heavy precipitation during the summer of 1941, and during the inspection, the bog could be entered from several directions without difficulty and was traversable in all parts. At the east and northeast ends it

becomes shallow and marshy. It lies high and can be drained to the Bay of Fundy and to Bartlett Brook.

The continuation of the Black Point bog northward along Salmon River contains mainly black peat or fuel peat. This could be used to supply the fuel requirements of the baling mill. The other deposits comprising the chain of bogs along Salmon River were not investigated, but a cursory examination revealed that a bog immediately south of Meteghan Station, having an estimated area of 200 acres, contains a high-grade moss, light in colour, and this bog might prove to be an important reserve.

YARMOUTH COUNTY

Tusket Peat Bog

This bog is a short distance south of Tusket Station in Yarmouth county and is close to Highway No. 3. It was worked for peat fuel several years ago, and contains little peat moss.

Makoke Peat Bog

This bog, which lies half a mile southeast of Tusket Post Office, contains little peat moss. It is accessible by a road traversing the middle of the bog and by other roads. It is of medium size, and the peat is composed of sphagnum intermixed with other mosses, carex, grass, and eriophorum, and is well humified.

Heath Bog

This deposit consists of a chain of bogs running south from Sand Point, in Yarmouth county, for 7 miles. The main part, known as Great Heath, lies east of the Canadian National Railway at Argyle and contains peat moss in the centre over an area estimated at 125 acres, but the deposit is shallow. This area can be reached by forest trail east of the bog, the distance being 4 miles from Sand Point. The bog is flat, the growth being sphagnum moss, eriophorum, and hypnum moss, intermixed with peat bog plants, carex, and other marsh sedges. The moss is of good quality, although decidedly brown even in the upper strata and it becomes darker and more humified below.

The bog was very wet, but traversable. In the event of development it could be drained possibly towards a creek following the eastern edge of Great Heath, with an outlet to Goose Lake. A road would be needed from the railway or highway in the vicinity of Central Argyle in an easterly direction. Analysis of the moss is as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
15·8	11·7	4·2

SHELBURNE COUNTY

Latour Bog

This bog is in Shelburne county, 1½ miles southwest of Port Latour. A good road skirts and in part traverses the south and east ends, which are the parts of the bog where less-humified moss is mainly found. The deposit has a workable area of about 150 acres, the growth being sphagnum moss, carex, eriophorum, and other sedges. Four test-holes along a line parallel to, and 800 feet from the road showed depths of 5 to 7 feet of moss. Analysis of the moss is as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
14·3	10·5	7·3

The moss is intermixed with humus, and, although it would yield a second grade of litter peat, it would make suitable horticultural moss. The bog was wet, but traversable, and can be drained to a creek at the north end of the bog.

Port Clyde Peat Bog

This bog is 3 miles southwest of Port Clyde station in Shelburne county. The Canadian National Railway crosses its northern end and good roads run close to its eastern and western edges. The bog is large, but only a third of it, about 600 acres, has a depth of over 5 feet. The growth is mainly sphagnum moss intermixed with eriophorum, sedges, and other marsh plants. Nearly all the peat is well-humified. Unhumified moss in the eastern part of the deposit contains no appreciable quantity of peat moss. When visited the bog was wet and impassable in many places.

In case of utilization for production of peat fuel, drainage is possible in a southerly direction, but would be expensive.

Clyde Peat Bog

This deposit lies due north of Clyde River village, Shelburne county, and can be approached by the post road from Clyde River village crossing the southeast part of the bog, and by the road following Clyde River and the edge of the central part of the bog. The bog has an estimated area of more than 2,000 acres, about half of which is workable for the production of peat fuel of good quality. The deposit contains little peat moss. It can be drained into Clyde River and to its tributaries, which run through most parts of the deposit.

LUNENBURG COUNTY

Cherryfield Bog

This deposit is near Cherryfield station in Lunenburg county. Highway No. 10 runs close to the northeast part, and the Canadian National Railway crosses the bog throughout almost its entire length. The bog, which could be drained into a creek running through it in a southeasterly direction, consists principally of well-humified peat that should yield a very good peat fuel.

Burnt Marsh Peat Bog

This deposit is 3 miles north of Mahone Bay station in Lunenburg county. The bog was wet and impassable when visited, and could be entered only for a short distance from the edge. It appears to consist mainly of well-humified peat.

GUYSBOROUGH COUNTY

Isaac Harbour Bog

This deposit consists of a chain of three bogs called North Glade, Centre Glade, and South Glade, and is on the peninsula at the height of land between Isaac Harbour and County Harbour, Guysborough county. The three bogs are separated by dry, narrow ridges, in some places less than 50 feet in width. They can be approached by a road from Isaac Harbour, less than three-quarters of a mile long, leading up to the South Glade bog.

The North Glade bog has an area of 150 acres, Centre Glade 75 acres, and South Glade 100 acres of workable bog. The surfaces are clear of trees and in most parts are dry enough for crossing dry shod. The growth is mainly sphagnum with some eriophorum. A test-hole bored in the centre of each bog showed 10 feet of moss, with only slight humification, light in colour, and uniform in quality for a depth of at least 7 feet. A composite sample from the three Glade bogs analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
19·6	14·4	4·4

It should yield a very high-grade peat moss. The bogs lie on a high level and offer no difficulty in drainage to either Isaac Harbour or County Harbour. If developed, transportation to Isaac Harbour would be downhill almost all the way. Shipment of finished peat moss to the market must be by sea, as there are no railway facilities. This applies to all the deposits in Guysborough county. Detailed investigatory work on these deposits appears warranted.

Seal Harbour Bog

At Seal Harbour, in Guysborough county, there are two bogs. One of these is at Seal Harbour mine and has an area of about 30 acres of sphagnum peat, consisting of 3 feet of unhumified moss resting on well-humified peat. A canal supplying water to the mill at the mine drains the bog to a depth of 4 feet, below which no further drainage is possible, since the water level of the canal is the same as that of the lake with which it connects. The moss is rather dark in colour and is somewhat intermixed with humified peat. The bog is thus of little value as a source of peat moss.

The other deposit is on the road leading from the mine to the village of Goldboro. It has an area of about 50 acres, with some growth of spruce and tamarack. The peat moss has a depth of 8 feet in the centre of the bog, is somewhat dark in colour, and in the lower beds becomes intermixed with humified peat. Drainage of the bog will present some difficulty, but may be possible in a southeasterly direction.

In view of the more favourable location of the Isaac Harbour bogs and their superior grade of peat moss, these two deposits are not likely to be developed. Analysis of a sample from the peat moss bog at Seal Harbour:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
18·8	13·8	6·1

Lily Pond Bog

This 30-acre bog is a short distance north of the Canso Highway, and about 7 miles west of Canso. It has little commercial value.

Reynolds Bog

This bog is southwest of the Lily Pond bog close to the Canso Highway on the south side. It is small, rather shallow, and about 100 acres are workable and fairly free from trees. It is moderately dry and can be drained to a brook in a northwesterly direction.

Canso Bog

This bog is a short distance south of Canso, Guysborough county. Its eastern edge can be reached by a road from the main highway at Canso, a distance of half a mile. Especially where it nears the bog this road becomes rough and would have to be improved. The bog comprises 300 acres of open land free from interfering vegetation, spruce islands, dwarf spruce, etc. The growth is mainly sphagnum moss, darkish in colour, with some eriophorum and a smaller quantity of the usual bog growth, small vines, etc.

Four holes drilled 1,000 feet apart on a line run over the summit of the bog, in a southwesterly direction, showed depths of: 10 feet of moss 200 feet from the edge of the bog, and then 12 feet, 12 feet, and 10 feet respectively. The peat moss is of a uniformly good quality to a depth of 7 feet, below which the strata of moss become more humified. The bog can be drained in a southwesterly and in a northerly direction. Transportation is by road to a deep-sea harbour. There are no railway facilities. This deposit deserves additional investigatory work. A sample of the peat moss analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
16·1	11·8	4·4

Glasgow Head Bog

This bog is 2 miles east of Canso, near the main highway, and has an area of about 50 acres. It is entirely free from wooded vegetation and is near a deep-sea harbour. It could be worked for peat moss on a small scale in conjunction with other deposits in the same locality. The bog is dry and can be drained to the sea, and to a creek at its west end. Three holes drilled 500 feet apart on a line running southwest over the centre of the bog showed, respectively, a depth of 15 feet of moss at the southeastern end 300 feet from the edge of the bog, 10 feet in the centre, and 10 feet at the northwest corner. The moss is mainly sphagnum with some eriophorum and is only slightly humified throughout most of its depth. It is light in colour and of good quality. In view of the high-quality moss of this bog, further investigatory work is warranted, since it forms valuable reserve to the two preceding. A sample analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
21·0	15·5	4·2

Yellow Marsh Bog

This bog is 2 miles west of Canso and is traversed by the Canso Highway. It has an area of about 40 acres, part of which is wooded. Two test-holes were drilled on each side of the road in the centre of the bog: one, 250 feet south of the road, and the other, 100 feet north of it. Good peat moss was obtained at a depth of 10 feet. A sample analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
19·0	14·0	3·3

The moss is fairly light in colour, and similar in quality to that of the Glasgow Head bog, described above. The bog was traversable and can be drained to lakes north and south.

CHAPTER VI

PEAT BOGS ON CHIGNECTO ISTHMUS[1]

On the isthmus between Cumberland Basin and Baie Verte there is an abundance of low land, big grass marshes, large floating bogs, and several sphagnum moss bogs, the last being mostly on the Nova Scotia side of the boundary line. Little attention has been paid to these deposits, probably because access from the highway is difficult. Some of them can be reached by way of the abandoned Marine Railway, but much road building would be needed to connect most of them with railway or highway. They are closer to the United States market, however, than are most other important deposits in the Maritime Provinces.

The fall of land in these areas is small and natural drainage is sluggish. As a consequence, large areas abutting some of the bogs were flooded to a depth of 1 to 2 feet, and in some cases this extended to the low level of the bogs.

The writer is especially indebted to Mr. E. F. Goodwin, D.L.S., of Baie Verte, who gave valuable assistance in connection with the investigation of deposits on the isthmus.

CUMBERLAND COUNTY, N.S.

Bogs at Head of La Planche River

Two bogs (Figure 4) in Cumberland county, at the head of La Planche River,

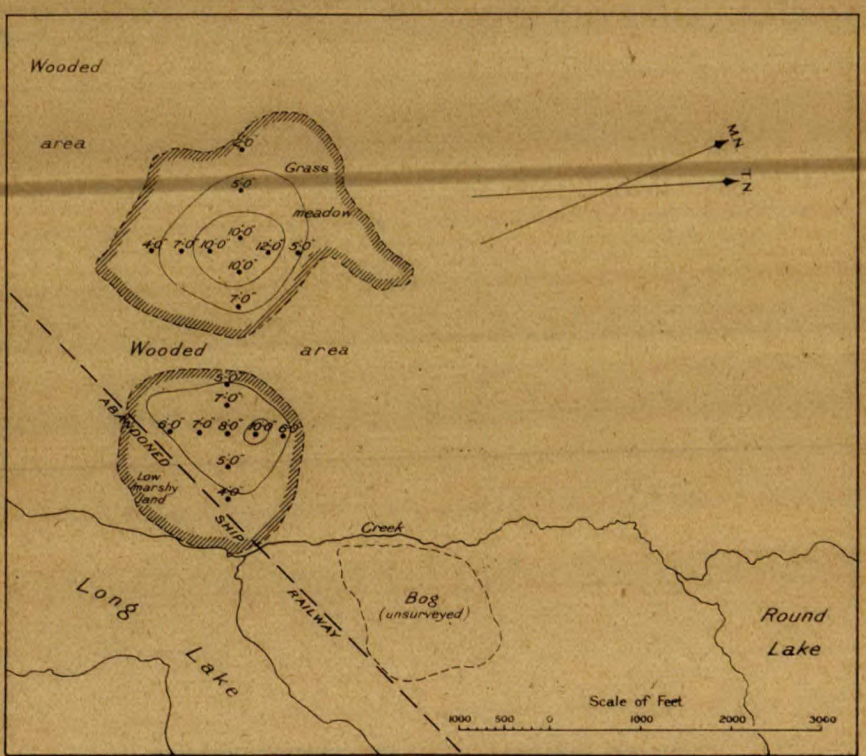


Figure 4. La Planche bogs, Cumberland county, N.S.

[1]The first four deposits are in Nova Scotia, and the last two, Shemogue and Jolicure bogs, are in New Brunswick; but these bogs are described in a separate chapter rather than under the chapter headings of the provinces in which they occur, since they are better known as the bogs on the Chignecto Isthmus.

are separated by a 300-foot, dense growth of wood and bush on soft, wet ground that is almost impassable. One bog abuts Long Lake and is crossed by the Marine Railway, and the other lies due west. Both are almost circular in outline. The east end of the west bog passes into a marshy meadow covered with sedges. That part of the east bog south of the Marine Railway is low marshy land and is impassable. The surfaces of the two bogs are open, with a growth chiefly of sphagnum moss, some dwarf spruce, and scattered common bog plants. Underlying the sphagnum moss is a stratum of well-humified, black fuel peat that rests on a floor of hard blue clay.

The area of the west bog is 110 acres and that of the east bog, 83 acres, of which only 44 acres and 30 acres, respectively, have depths of over 5 feet. Of the 193 acres, 12 acres are 10 to 12 feet in depth and 32 acres, 5 to 10 feet. The moss is of inferior grade, especially for the 10-foot stratum.

Analyses of the strata of the two bogs:

Average depth	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
Feet			
5–10	14·6	10·7	4·4
10–12	8·9	6·4	4·8

Calculations of peat moss that will be available when the bogs are drained:

Area and depth	Average depth when drained, feet	Content, cu. yds.
West bog:		
Feet		
12 acres: 10–12	9	187,000
32 acres: 5–10	4	200,000
		387,000 (49,000 tons)
East bog:		
Feet		
30 acres: 5–10	5	245,000 (30,000 tons)

The bogs cannot be regarded as attractive prospects, considering the small estimated tonnage available, the grade of the moss, and the amount of road-building that would be required in their development.

Big Plain Bog

This bog (Figure 5) is in Cumberland county, on the height of land between Tidnish River and Missaguash River, about one-third mile from the Marine Railway, and has an area of about 300 acres. From the Tyndale Road it can be reached by a forest trail that crosses the Marine Railway and leads to the eastern end of the bog.

It is a high bog of wide open surface. A large spruce island runs east and west through two-thirds of the workable part of the deposit. Much of the west end was flooded, and that part south of where the spruce island thins to a narrow strip becomes soft and shallow, and passes into a bog of the floating type. The summit of the deposit runs east and west, rising towards the centre to form a small dome towards the north end. The surface of the summit was fairly dry, with only occasional small surface-water pools. The growth is almost entirely sphagnum moss, with a few small patches of dwarf spruce.

Analysis of a composite sample representing the best part of the bog taken from the summit and the average of a 15-foot stratum:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
18·7	13·2	3·2

The moss is light in weight, light yellowish brown, and only slightly humified. It should yield a uniformly good grade of marketable peat moss.

Analyses of the strata for the entire workable area of 132 acres:

Average depth, feet	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
0– 5.....	20·5	15·1	2·9
5–10.....	16·1	11·8	2·6
10–15.....	15·5	11·4	3·8

Of the workable area of 132 acres:

3 acres have a depth of 20–22 feet
25 acres have a depth of 15–20 feet
27 acres have a depth of 10–15 feet
77 acres have a depth of 5–10 feet.

Calculations of peat moss that will be available if the bog is drained:

Area and depth	Average depth when drained, feet	Content, cu. yds.
	Feet	
3 acres: 20–22.....	20	90,000
25 acres: 15–20.....	13	510,000
27 acres: 10–15.....	10	440,000
77 acres: 5–10.....	5	620,000
132 acres:		1,660,000 (200,000 tons)

The deposit can be drained from the west into Goose Lake with outlet to the Missaguash River; from the southeast to Little West Brook, tributary to Tidnish River; and from the northeast to the west branch of the Tidnish River. Goose Lake at the head of the bog is 15 feet above the level of low tide, which ensures good drainage.

To develop the bog 1½ miles of road would have to be built to the Tyndale Road, or about a third of a mile to the Marine Railway, the old road-bed of which would have to be reconditioned for 3 miles northeastward until it strikes the Tyndale Road; or a road could be built to Uniacke Hill, 2½ miles to the north, that would connect with the Tidnish Road.

Between the Big Plain bog and Goose Lake is a chain of bogs that could serve as reserve deposits in the development of the Big Plain bog, but draining of the latter would be required to attain ready access to the chain of bogs.

Twin Plain Bog

This bog (Figure 5), also named the Spectacle bog, as its outline suggests a pair of spectacles, is in Cumberland county, south of the abandoned Marine

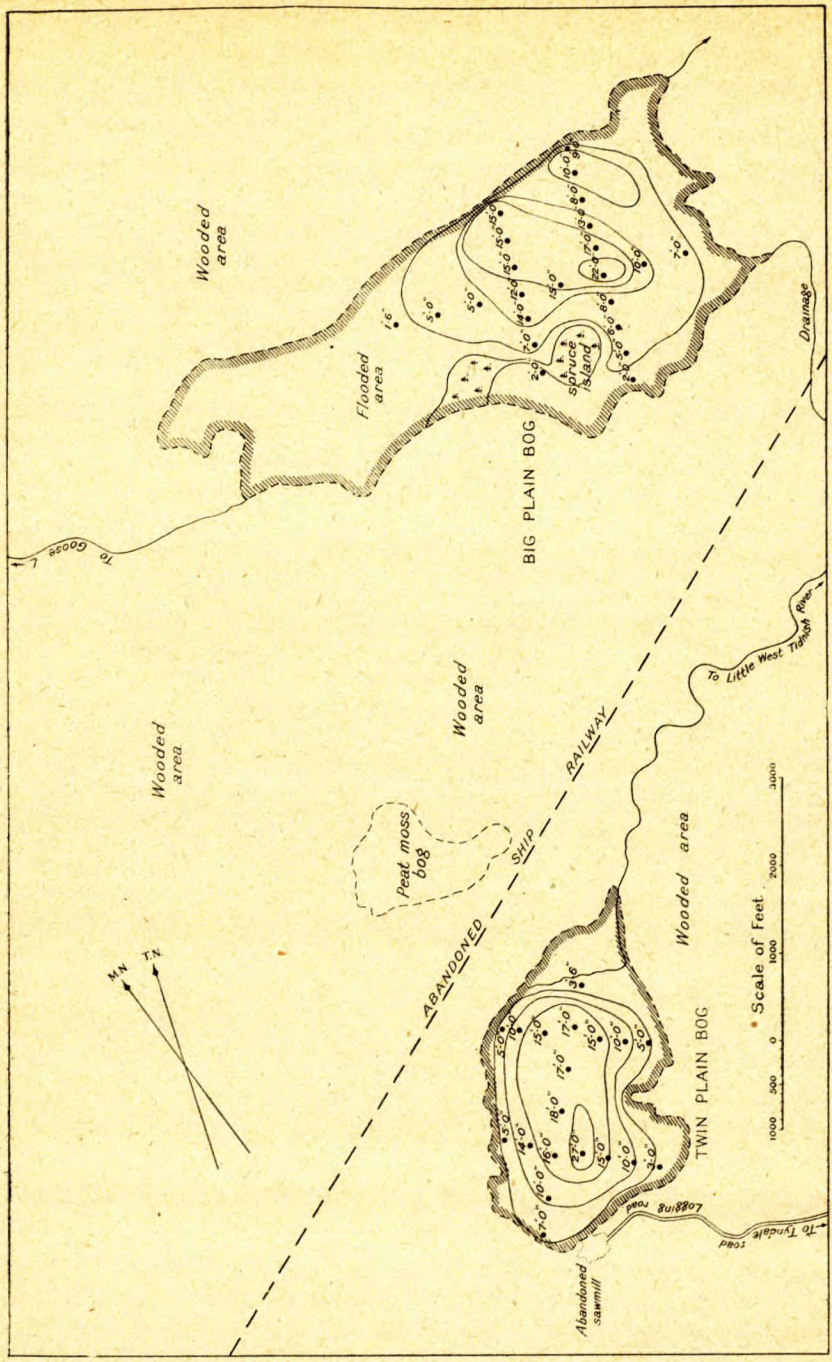


Figure 5. Big Plain and Twin Plain peat moss bogs, Cumberland county, N.S.

Railway and 2 miles from the southeast end of the Big Plain bog. It can be reached by a logging road, 1 mile long, that connects with the Tyndale Road and ends at an abandoned sawmill at the west end of the bog. The road can be reconditioned at small expense for the transportation of baled moss.

Lengthwise, the deposit runs almost north and south and consists of two

lobes that are joined by a low ridge 200 feet in width. The northern lobe, which constitutes the main part of the deposit, is of the high-moor type. It is dome-shaped, with the summit near its centre, and ends abruptly northeastward at a small creek. The lobe is of appreciable depth and slopes toward the edges to a shallow bog. It has a workable area of about 90 acres, the northern end of which borders a creek. Of this 90 acres:

5 acres have a depth of 20–27 feet
34 acres have a depth of 15–20 feet
24 acres have a depth of 10–15 feet
29 acres have a depth of 5–10 feet.

The growth on the northern lobe is chiefly sphagnum moss, with some of the usual bog plants and occasional clumps of small spruce trees. The moss from the workable part of the lobe analysed:

Average depth	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
Feet			
0– 5.....	17·7	13·0	3·5
5–10.....	15·0	11·0	3·7
10–15.....	13·3	9·7	4·3

Based on the above analysis the quantity of standard commercial peat moss that will be available on the 90-acre workable area, if the bog is drained, is estimated as follows:

Area and depth	Average depth when drained, feet	Content, cu. yds.
Feet		
5 acres: 20–27.....	25	185,000
34 acres: 15–20.....	14	720,000
24 acres: 10–15.....	9	340,000
29 acres: 5–10.....	4	175,000

or a total of 1,420,000 cubic yards (184,000 tons).

The moss is light yellowish, light in weight, and is only slightly humified.

The southern lobe is flat with only a slight elevation towards the centre. The growth is chiefly sphagnum and the moss is of good quality to a depth of 4 to 5 feet, below which it becomes slightly humified. Samples were collected at points 500, 800, 1,200, 1,600, and 2,000 feet, from the ridge at the north end of the lobe along a line that was run across it in a southwest-northeast direction. The samples analysed:

Location	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
500 feet from ridge	12·3	9·0	4·2
800 feet from ridge	10·6	7·7	3·9
1,200 feet from ridge	12·3	9·0	4·9
1,600 feet from ridge	12·3	9·0	4·8
2,000 feet from ridge	10·6	7·7	5·3

The moss is inferior in quality to that on the northern lobe.

The aforementioned creek runs into Little West Brook, a tributary of

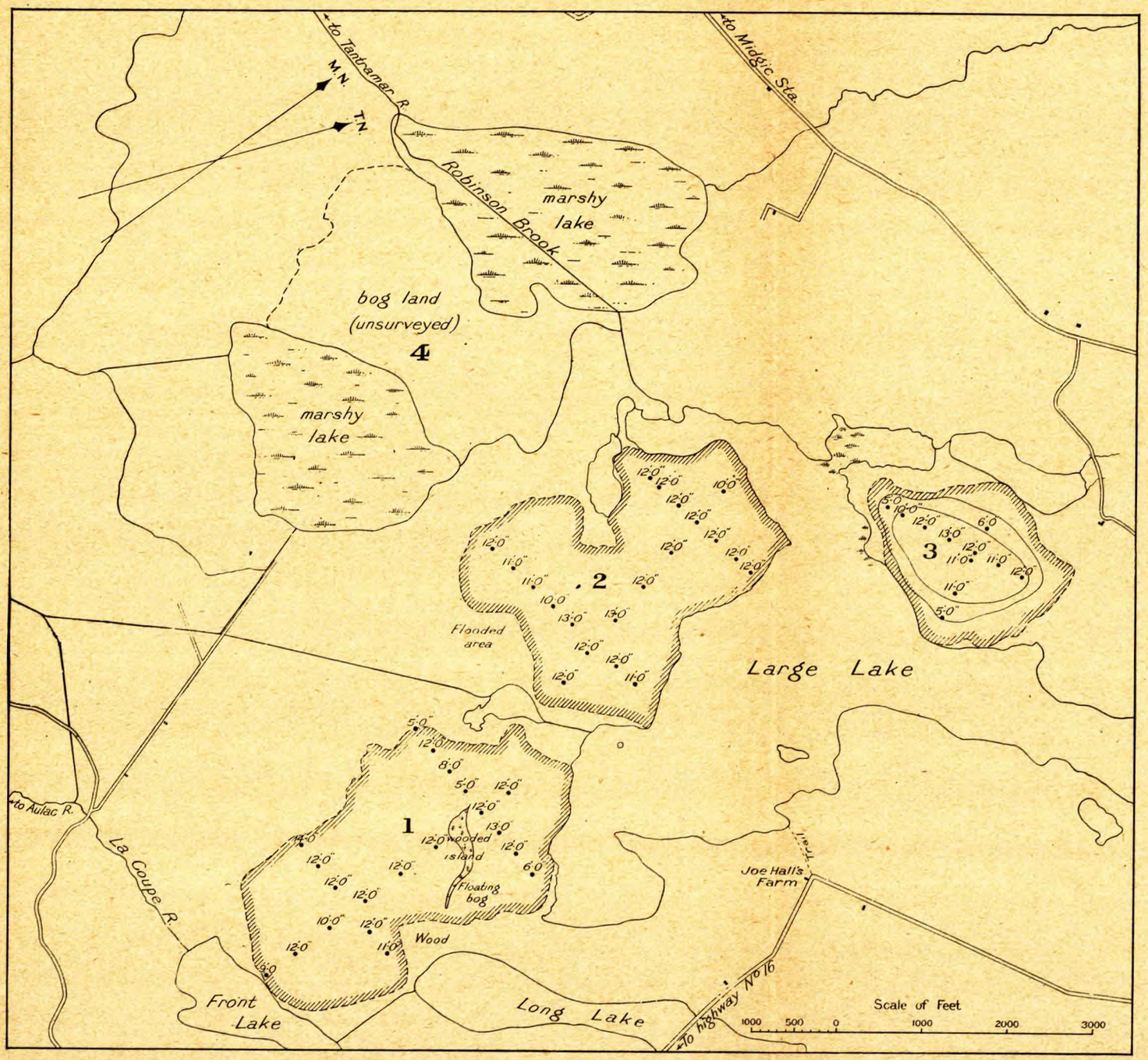


Figure 6. Peat moss bog at Jolicure Lakes, Westmorland county, N.B.

Tidnish River. The creek forms a natural drain for the northern, or main lobe, and if it were cleaned out, good drainage could be had by running the main drain through the summit, with parallel ditches 300 feet apart. Drainage of the southern lobe might be difficult.

It would probably be best to operate the Twin Plain and Big Plain bogs as a unit, in which case there would be a sufficient supply of raw material to assure continuous operation on a large scale for several years. Such an operation would involve the reconditioning of the Marine Railway road-bed for a distance of 1½ miles and the building of about 700 feet of new road from the north end of the Twin Plain bog.

WESTMORLAND COUNTY, N.B.

Shemogue Bog

This bog is 1½ miles west of K. R. Brine's farm and 12 miles from Port Elgin, New Brunswick, the nearest shipping point. It can be reached by a forest trail leading from the farm. The open part of the bog has an area of only 20 acres and is oval in shape. It runs north and south and is 1,800 feet long and 500 feet wide. The growth is sphagnum intermixed with labrador tea, bog rosemary, etc. Test-holes were drilled at regular intervals along a line run from the south through the centre of the bog to the wooded area at the north end, a distance of 1,800 feet, and a composite sample was made of the peat obtained from the test-holes. The sample analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
10·7	7·8	3·5

The bog contains about 5 feet of moss of rather inferior quality, and is too small for profitable development.

Jolicure Bogs

The Jolicure bogs (Figure 6) are in the Jolicure Lakes area of Westmorland county, at the headwaters of the Tantramar and the Aulac Rivers between Midgic and Jolicure. The bogs can be reached by a good country road that runs within half a mile of No. 1 bog, and connects with No. 16 Highway 2 miles away. As a further means of access, No. 2 bog could be connected with the Brooklyn road by the construction of a road one-half mile long. Under normal weather conditions, No. 1 bog can be entered by crossing the marshy strip of land between Long Lake and Large Lake. During the summer of 1941, the level of the lakes had risen 4 feet and a boat was needed to reach the bogs, the most convenient way being from the landing leading to Joe Hall's farm. No. 4 bog could not be entered, as the waterway leading to it was choked by a heavy growth of reed.

A narrow channel connecting Large Lake with a small lake separates the main deposit into two bogs, No. 1 and No. 2. If the bogs were to be worked, this channel of about 500 feet would have to be bridged. A spruce island crosses two-thirds of the north half of No. 1 bog. Between this island and Long Lake the bog is mostly soft and marshy, with numerous pools of surface water. The two bogs have nearly the same level. At the cross-section running close to the top of the spruce island (*see* Figure 6) the level of the bottom rises for a distance of about 500 feet westward. Notwithstanding the exceptionally high level of the lakes, the bogs were traversable, with only scattered impassable areas and a few pools of surface water. The growth on the bogs is chiefly sphagnum moss with some eriophorum, occasional clumps of dwarf spruce, and a few aquatic plants. Samples of the strata of bogs No. 1 and No. 2 analysed as follows:

Average depth	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
Bog No. 1:			
Feet			
0– 5	21·0	15·5	4·9
5–10	18·1	13·3	4·3
10–13	17·7	13·0	10·6
Bog No. 2:			
Feet			
0– 5	21·5	15·9	3·8
5–10	15·9	11·7	5·3
10–13	17·0	12·5	19·0

Bogs No. 1 and No. 2 have an almost uniform depth of 13 feet of moss throughout their respective areas of 175 acres and 155 acres. This represents a workable depth of 10 feet, making allowance for drainage, and on this basis bog No. 1 is estimated to contain 2,800,000 cubic yards (350,000 tons) of standard commercial peat moss; the estimated content of bog No. 2 being 2,500,000 cubic yards (310,000 tons); or a total of 660,000 tons for the two bogs. The high ash content below the 10-foot stratum, however, suggests that it would not be advisable to drain the bogs below 8 feet.

No. 3 bog is oval and is a slightly dome-shaped, high moor, with six small lakes. It is difficult to traverse. The bog is open land and is fringed with spruce trees, except at the north end where the land becomes higher and abuts the fields of a farm. The growth is sphagnum moss with some eriophorum and aquatic plants. Samples of the strata of bog No. 3 analysed:

Average depth	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
Bog No. 3:			
Feet			
0– 5	22·2	16·4	5·0
5–13	11·1	8·1	9·9

Bog No. 3 has a total area of 75 acres, of which 54 acres are workable. The available quantity of standard commercial peat moss in the bog is estimated as follows:

Area and depth	Average depth when drained, feet	Contents, cu. yds.
Feet		
26 acres: 5–10	5	210,000
28 acres: 10–13	10	450,000

or a total of 660,000 cubic yards (82,000 tons).

Thus, bogs Nos. 1, 2, and 3 are estimated to contain a total of 742,000 tons of commercial peat moss.

The surface of the Jolicure bogs is barely 2 feet above the level of the lakes, and development of the bogs is largely a matter of whether the surrounding area, which is flat and marshy, can be properly drained. Considerable work would be necessary to put the system of drainage canals and ditches that connect with the Tantramar and Aulac Rivers into working order; and, in any event, a survey would have to be made to determine how far the water level in the lakes and bogs could be lowered.

The bogs are favourably located in regard to transportation and only short roads would have to be built to connect with the nearest railway.

CHAPTER VII

PEAT BOGS IN NEW BRUNSWICK

The peat moss deposits of New Brunswick are among the largest in Canada and many of them probably compare favourably in size and quality with some of the large bogs producing peat moss in Europe. They cover very large areas in Gloucester, Kent, Northumberland, Westmorland, St. John, and Charlotte counties, the Eel River bog alone, which has an area of more than 15,000 acres, being sufficiently large to supply the present requirements of peat moss in Canada and the United States for over 300 years. Many smaller bogs of 100 acres and over contain moss of high quality. The bogs occur in groups, and the group comprising the largest number of bogs follows the coast line from the Miscou lighthouse to Burnt Church. A second group extends from Escuminac lighthouse southward in Northumberland and Kent counties; a third is at Canaan and vicinity in Westmorland county; and a fourth group is in Charlotte county.

Many of the bogs are favourably situated for transportation by water, and some are crossed by, or are near railways, highways, and good roads, so that little new road-building would be necessary. The peat moss in most of the deposits is of excellent quality, but the deposits have not received the attention they appear to deserve in view of the increasing demand for peat moss in the United States in recent years. Should operations at the Pokemouche and Shippigan bogs prove economically successful, development of other bogs within easy access of transportation facilities may follow.

If the larger bogs become big producers, owners of smaller bogs within a reasonable trucking distance of large peat moss baling mills should benefit by becoming subsidiary producers. In this connection it should be noted that large peat-producing companies, especially in Europe, generally depend upon smaller producers for large quantities of air-dried peat moss sods, which are shredded, sized, and baled in their baling mills. Farmers owning small bogs are encouraged to work them in their spare time, to cut and stack peat moss sods, and, when these become sufficiently dry, to deliver them to the baling mill for processing.

CHARLOTTE COUNTY

St. Stephen Bog

This bog lies near the highway, 4 miles north of St. Stephen in Charlotte county. It has an estimated area of 150 acres, of which 70 acres contain peat moss to a depth varying from 12 to 30 feet,[1] and the remaining 80 acres fuel peat. It can be entered by a wagon road that continues across the bog, following a drainage ditch on which there are several old workings. It was worked experimentally several years ago when a small plant was erected for dewatering the raw peat by means of a pressing process. During 1941 a quantity of peat moss was dug at the far end of the road crossing the bog.

A sample collected from the working-face of 5 feet analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
12·8	9·4	2·9

The moss is dark and is intermixed with humified peat. It is not of particularly good quality, the absorptive value being below that of the standard of

[1] Anrep, A.: "Investigation of Peat Bogs"; Mines Branch, Dept. of Mines, Canada, Sum. Rept., 1917, p. 56.

commercial moss. It could be used as a soil conditioner, in compost, as a fertilizer filler, and as surface dressing, but the humified peat would cause dust, which would be objectionable if used as stable or pen bedding, or as packing material. No estimate, as far as can be learned, has been made of the tonnage of marketable peat moss.

Seely Cove Bog

This deposit is about 1 mile north of Seely Cove settlement and 3 miles northeast of Black Harbour. It can be easily reached by a good country road. It is a high moor with two dome-shaped hillocks, the larger of which slopes toward the west where the deposit becomes low and shallow. The peat moss in that area is strongly intermixed with humified peat. Three samples were taken, 500 feet apart, at a depth of 5 feet in a line running north and south across the highest point of the larger dome. A composite of these samples analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
14·5	10·6	1·5

The moss is sphagnum, somewhat dark, and at greater depth becomes intermixed with humified peat. It is of fair quality and the bog might be worked on a small scale for a local market. Fish-packing plants in the neighbourhood might use the peat as a filler and deodorizer in manufacturing fish waste fertilizer which is rich in phosphate and nitrate.

Pennfield Bog

This bog is east of St. George, in a small basin about three-quarters of a mile long and one-half mile wide. It can be approached only at the north end from the highway by a small, rough, and boggy path about 1 mile long. Some old workings were noticed at the north end, about 10 by 10 feet in size, apparently for the production of peat fuel. The bog is flat and the growth is mostly sphagnum moss, which in the main is intermixed with humified peat and is decidedly dark. The area of the bog and the quality of the peat would not justify the erection of even a small plant for the manufacture of peat litter.

Pocologan Bog

This bog is 8 miles east of St. George and stretches northeast to southwest between the old Saint John Highway and the Canadian Pacific Railway, which crosses the southern part. The workable parts are not easily accessible except from the railway. The surface is much broken by spruce islands, by shallow bog land, and by a winding creek tributary to the Pocologan River. The quality of the moss varies in this deposit. There are large areas of humified peat, but three dome-shaped hillocks contain peat moss. The samples taken from the hillocks were medium dark in colour.

Two composite samples were taken representing the peat moss areas, one from a line run east and west across the eastern part of the bog, and the other from a line run north and south across the western part. These samples analysed:

Sample from	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
East part of bog...	14·5	10·7	1·6
West part of bog ..	13·8	10·1	1·3

If a peat moss plant were erected on this bog, account would have to be taken of the spotty quality of the deposit and of the wide, winding brook running through it that cuts deeply into the drying-field. The bog can be easily drained.

ST. JOHN AND SUNBURY COUNTIES

Musquash Bog

This bog is in St. John county, 2 miles east of Prince of Wales station on the Canadian Pacific Railway, and 11 miles from Saint John. It can be entered from No. 1 Highway, which skirts the north end of the bog for about a mile. It has a workable area of about 300 acres[1] and has two slight elevations, one near the highway and the other on the west side between two small lakes. Its surface is broken by one large and two small lakes, by old workings filled with water, and by pools of surface water. The growth is mainly sphagnum moss with some spruce trees and aquatic plants.

The bog was worked several years ago and two pits at the south end are evidence of a sizable production. Four ditches at the south end drain into the largest lake, which in turn discharges into a tributary to Spruce Lake. Notwithstanding this drainage, the bog was soft and impassable in several places. Samples were collected from drill-holes 500 feet apart along a north and south line across the centre of the bog and along a cross-line at right angles. The composite of these samples representing a depth of 10 feet analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
15·6	11·4	3·1

The moss is of somewhat better quality than that of the St. Stephen bog, but does not compare with those on the Gulf of St. Lawrence. It is rather dark in colour and is intermixed with humified peat. The moss over the workable area has a thickness of 5 to 14 feet. No estimate was made of the tonnage of peat moss. If properly drained the bog could be worked to supply a local market.

Maugerville Bog

This bog is near No. 9 Highway less than a mile from the York county line. The Canadian Pacific Railway crosses its southwest edge. It has an area estimated at about 300 acres, only a small part of which is open bog. Test-holes bored on a line parallel to, and 200 feet north of the railway showed only 1 to 3 feet of peat, less than 1 foot of which was moss resting on well-humified peat. The moss is mainly sphagnum, but with an appreciable intermixture of carex and other marsh sedges and some eriophorum. The bog was flooded and impassable beyond the line of test-holes and it was impossible to determine the depth of peat moss toward the centre. It can be drained in a southerly direction into a creek tributary to St. John River.

WESTMORLAND COUNTY

Canaan Bog

This 1,000-acre bog is 1½ miles south of Canaan Station, and the Canadian National Railway crosses its western part. It is one of a chain of five deposits of peat moss in the area, the others (*see* description below) being the Gades, Hicks, and Cudmore, and a small bog between Canaan and Hicks bogs. The Canaan bog has wide stretches of open land which are comparatively free from wooded growth except near the edges. The bog at the time of the visit was barely traversable.

[1]Anrep, A.: "Investigation of Peat Bogs"; Mines Branch, Dept. of Mines, Canada, Sum. Rept. 1917, p. 57.

Five holes were drilled on a line running due north across the centre. The first hole, 200 feet west of the railway, revealed a depth of 7 feet. Between this and the edge of the south part the bog becomes shallow, with 2 feet of moss, underneath which is 1 foot of humified peat. Holes drilled 800 feet apart on the northern part of the bog showed depths of 9 feet of unhumified moss for the first hole, 300 feet from the track, and for the others 12, 10, and 9 feet.

Samples collected from various parts of the bog analysed:

Sample from	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
South section	17·0	12·5	3·4
Main bog, north of railway	28·1	20·8	5·7
Section of headwaters of Buctouche River	10·9	7·9	4·9

In the area are the headwaters of the Buctouche River, which would have to be deepened for some distance to obtain an adequate fall for drainage of the bog. The centre of the bog drains into Canaan Creek, which runs close to the railway.

Gades Bog

This bog is less than three-quarters of a mile in a southwesterly direction from the south end of the Canaan bog. It has an area of over 1,000 acres and is accessible by a road from Scotland village that crosses the railway and ends at a sand pit a short distance from where the bog abuts a meadow. It was flooded at the time of the visit, and a wide brook made entrance to the main part of the bog impossible. Test-holes bored in the area between the edge of the bog and the brook revealed depths of 1 to 4 feet of humified peat, with only a slight cover of sphagnum moss. A fire ranger living near the bog stated that its west end lies high and is traversable. This part can be reached by trails through the surrounding forest, a distance of 6 to 7 miles, but is difficult to find without a guide.

Hicks Bog

This bog lies 1 mile northwest of Canaan station. It is about $1\frac{1}{2}$ miles long and $\frac{1}{2}$ mile wide and contains 100 acres of open workable peat land running in an east and west direction, close, and parallel, to the county line. The open bog is nearly devoid of trees and is of the high-bog type, with two hillocks. Two holes were drilled, one showed a depth of 15 feet of peat moss at the centre of the hillock in the eastern part, and the other, 2,000 feet farther west, a depth of 10 feet. The moss is sphagnum, fairly light in colour, and should yield a good product. The bog can be drained to the south and east. A sample analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
18·0	13·3	3·5

Small Bog between Hicks and Canaan Bogs

This bog is west of and near the railway, and is $\frac{1}{2}$ mile long and 1,500 feet wide. It is almost entirely covered with trees and is of little value as a peat moss prospect.

Cudmore Bog

This bog lies directly west of the Hicks bog close to the border line of Moncton and Salisbury parishes. It can be approached by a rough and very wet trail

3 miles from the main road. The bog was impassable and its drainage possibilities could not be determined, nor was sampling possible.

KENT AND NORTHUMBERLAND COUNTIES

Eel River Bog

This bog is the largest deposit of peat moss of industrial importance in Canada that has been investigated so far. The area[1] of the bog workable for peat moss over 5 feet in depth is 15,500 acres, and this is estimated to contain 21,000,000 tons of peat moss of 20 per cent moisture content. The bog is only a short distance southwest of the Escuminac bog and 20 miles from Loggieville on the peninsula between Bay St. Anne, Miramichi Bay, and the Gulf of St. Lawrence. It and the Escuminac bog occupy together about one-half of the peninsula. A third of the bog lies in Northumberland county and two-thirds in Kent county. The north end can be reached by forest trail via a branch road from Hardwood Settlement, and the southeast end by the Escuminac - Point Sapin road. The Escuminac and Eel River bogs are 2 miles apart.

The bog is of the high-moor type and consists of three lobes containing some large and many small lakes and pools. All three lobes are large, the northern having a length of 5½ miles and a width of over 3 miles; the eastern, a length of 6 miles and a width of 1½ miles; and the western, a length of 5 miles and a width of over 1 mile. On the northern or main lobe are three domes which contain moss to a depth of over 20 feet, and there is a large wooded island (Coffee Island) southwest of the second dome. On the western lobe the land rises gradually to form two domes, having a heavy deposit of moss. On the eastern lobe the land rises gradually to form an elongated dome. The growth is mainly sphagnum moss and there is some spruce, criophorum, and other aquatic plants.

When visited in October 1939, July 1940, and in August 1941, the northern lobe was impassable in many places, but the east and west lobes were fairly dry. All the lobes have natural drainage. In Northumberland county, Eel River and its tributary, Two Mile Brook, almost cross the west lobe, the former in a northwest and the latter in a due north direction. Both flow into Bay St. Anne. Portage Brook crosses the north lobe and connects with a small lake to enter Bay St. Anne; and in Kent county, Eel River and a tributary run into the east lobe for a distance of 1½ miles. The proper drainage of a deposit of such large dimensions as the Eel River bog needs careful investigation, particularly in regard to the great number of lakes and surface waters. The east lobe probably offers the best possibilities for drainage into the Gulf of St. Lawrence.

Samples were collected from drill-holes 1,000 feet apart along two lines, one of which was run from the end of the trail leading to Hardwood Settlement to the lakes northwest of Coffee Island (beyond which the bog became impassable), and the other from the Point Sapin road over the summit on the east lobe. A composite was made for each lobe representing a stratum to 10 feet in depth. Analyses of samples:

Sample from	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
North lobe	21·0	15·5	3·1
East lobe	21·5	16·0	3·0

The analyses of this moss show a surprising uniformity of quality for such a large deposit. It is fairly light brown and only slightly humified. The peat moss would have to be trucked 20 miles to Loggieville, the nearest railway station, where there is also a deep-sea harbour. Good roads lead to the bog,

[1]Anrep, A.: Geol. Surv., Canada, Sum. Rept. 1923, pt. C II, p. 17.

however, especially to the eastern lobe. Working the bog from the Point Sapin road would increase the distance to Loggieville by 8 or 9 miles.

The Eel River and Escuminac bogs together form a reserve of moss equal to any of the large European deposits and a production of a million bales (50,000 tons) a year could be maintained for hundreds of years. For their exploitation an extension of the railway from Loggieville might be warranted. If worked on a large scale, the proper procedure would be to operate the Escuminac deposit and to keep the Eel River bog in reserve. Should this procedure be followed, the surface of the Eel River bog would be improved by a growth of moss filling many of the surface water pools and small lakes by the time the Escuminac bog is depleted.

Escuminac Bog

This bog is 2½ miles east of Escuminac village. It occupies almost the entire peninsula between the estuary of Escuminac River and Miramichi River in Northumberland county and extends over a mile south into Kent county. It can be reached by the wagon road from Escuminac village that extends to Point Escuminac lighthouse. The bog has a large area, 2,000 acres of which contain peat moss to a depth of more than 5 feet. It is a high moor with wide open areas and no obstructions such as spruce islands or lakes, and is wooded only along the southwest and the west borders. The surface was generally dry. The growth is mostly sphagnum moss, labrador tea, and bog rosemary. There are a few patches of eriophorum, and there is carex grass in the shallow part of the southern area. The north part of the bog ends abruptly at Miramichi Bay, where there is an exposure of peat moss 12 feet thick caused by marine erosion. The bog can be drained to the Gulf of St. Lawrence and Miramichi Bay. Natural drainage is by Escuminac River at the south end, but this part of the bog is shallow and the moss is of inferior quality.

A line was run through the centre of the deposit across the summit, commencing at the entrance of the road to the bog and continuing to the lighthouse, a distance of about 2 miles, and samples were collected at 1,000-foot intervals. They were made into a composite sample, representing a moss stratum 10 feet thick, that analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
19·4	14·3	6·0

The moss is of good quality, light in weight, light yellowish brown, and only slightly humified. The bog is estimated to contain 41½ million cubic yards (3,000,000 tons) of peat moss of 20 per cent moisture[1] content. It would have to be trucked to Loggieville, the nearest railway station and deep-sea harbour, 26 miles distant.

Burnt Church Bog

Three miles southwest of Burnt Church village in Alnwick parish, Northumberland county, is a bog of about 800 acres extending to the shoreline of the Gulf of St. Lawrence, where exposures of 8 to 10 feet of solid peat moss are seen. The bog can be reached by road to a small fishing hamlet and then by following the shoreline for about 1 mile. The deposit has wide open spaces with little wooded growth and is of the high-moor type, with its highest point at the centre. The moss is chiefly sphagnum and there is some eriophorum.

Three test-holes were drilled 1,000 feet apart along a line that was run due north from the shore over the summit of the bog, the first hole being 500

[1]Anrep, A.: Geol. Surv., Canada, Sum. Rept. 1923, pt. C II, p. 15.

feet from the shore. They revealed depths of 15, over 15, and over 15 feet respectively, of a uniformly good quality of sphagnum moss, only slightly humified, and light in colour. A sample analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
21·5	15·9	5·9

For the development of the bog, a road about 1 mile long would have to be built to connect with the road to Burnt Church village, which is 27 miles to Newcastle, the nearest railway station and deep-sea harbour.

The bog is comparatively dry and can be drained into Miramichi Bay.

Portage Bog

This bog is near the estuary of the Tabusintac River in Alnwick parish, Northumberland county, and contains about 500 acres of workable peat moss. The moss is fairly free from humus on the hillocks, but is somewhat heavily intermixed with humified peat at the lower levels. The bog can be drained into the Tabusintac Lagoon. A sample of the moss, representing a 10-foot stratum, was analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
18·0	13·5	2·2

Tabusintac Bog

This deposit is close to No. 11 Highway, a short distance north of Tabusintac village and is between the Tabusintac and Neguac Lagoons in Northumberland county. It is one of the largest bogs in Canada and has a workable area of over 3,200 acres with a depth of moss of over 5 feet. It is estimated to contain 62½ million cubic yards (4½ million tons) of peat moss of 20 per cent moisture[1] content. The best part of the bog is reached most conveniently by crossing the Tabusintac Lagoon and landing opposite Crab Island. The bog extends from the highway for a distance of 3 miles to the edge of the seashore, where a peat stratum 3 to 12 feet thick is visible along the shoreline for 7 miles. The deposit is of the high-moor type with two large domes, the larger at the southeast end and the smaller at the southern end. The domes are separated by a depression, about 1,500 feet wide, of rather shallow bog, on which is a small lake draining southward into the Gulf of St. Lawrence. From the summit northwards, the moss bed gradually becomes thinner until the edge of the bog is reached, about 1,000 feet from the highway. The surface is open and the growth is mainly sphagnum moss with some eriophorum and aquatic plants. The floor is blue clay and sand.

Samples were collected from drill-holes 1,000 feet apart and to a depth of 10 feet along a line across the summit from a point opposite Crab Island at the southern end of the bog. These samples analysed:

Composite of	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
20 drill-holes	18·1	13·3	2·3

[1]Anrep, A.: Geol. Surv., Canada, Sum. Rept. 1925, pt. C., p. 144.

The moss is only slightly humified, somewhat darker in colour than that from Gloucester county, light in weight, and should produce a good standard grade of peat moss.

Natural drainage is by a creek running southeast in the depression between the two large domes. The deposit can be drained in several directions to both lagoons, as there is a slope shoreward along the entire shoreline.

Shipping facilities are not advantageous. The lagoons are shallow and even small vessels would have to anchor off-shore and be loaded from scows. The product would otherwise have to be shipped by truck 18 miles to Tracadie, the nearest railway station, or 30 miles to Newcastle, the nearest deep-sea harbour.

GLOUCESTER COUNTY

Shippigan Bog

This deposit is at the northeast point of land in Gloucester county, about two-thirds of a mile due south of Shippigan station on the Canadian National Railway. It is the high-moor type of bog and has a workable area of about 1,300 acres with a depth of more than 5 feet of peat moss. This area is estimated[1] to contain 20 million cubic yards (1½ million tons) of peat moss of 20 per cent moisture content. It is free from obstructions, lakes, and spruce islands; and the land rises toward the centre to a large dome having moss 20 feet in depth. Southeast of this is a similar but smaller dome, with the same depth of moss. There is only one lake, this being in the southwest part of the bog, which is partly wooded.

The moss is almost pure sphagnum with scarcely any intermixture of other plant remains. It is light in weight, light yellowish, and there is virtually no humification to a depth of 10 feet, except in the depression between the two domes, where the moss is darker and is partly humified below 8 feet for a distance of 1,000 feet. This stratum was not included in the composite from 20 holes that were drilled along a line run in a southeasterly direction over the summit. Analysis of this sample, representing the light-coloured unhumified 10-foot stratum, gave the following results:

Absorptive value		Ash %	Nitrogen %
Dry basis	25% moisture basis	Dry basis	Dry basis
25·6	19·0	3·6	0·7

The bog can be easily drained in several directions. The most convenient drainage, assuming that the bog will be worked from the north, would be into the bight of Indian Point of the Shippigan Strait. Should the bog be worked from the southern end, drainage to the creek into the Gulf of St. Lawrence would be most suitable. The bog is under development by the Western Peat Company.

Pokemouche Bog

This bog is 4 miles southwest of the deep-sea harbour at Shippigan, and is between Pokemouche Gully and St. Simon Inlet. The Canadian National Railway and New Brunswick Highway No. 13, running parallel, traverse the deposit lengthwise. The bog is fairly level with a slight rise toward the southwest end. Two domes are separated by a small lake in a depression where the moss is rather shallow. That part of the bog over 5 feet in depth covers about 500 acres and is estimated to contain 7,000,000 cubic yards (500,000 tons) of peat moss of 20 per cent moisture content[2]. The growth is mainly sphagnum moss, with some bog rosemary, labrador tea, and small spruce trees. The moss is of

[1]Anrep, A.: "Shippigan Peat Litter Bog," Geol. Surv., Canada, Sum. Rept. 1923, pt. C II, p. 18.

[2]Anrep, A.: Geol. Surv., Canada, Sum. Rept. 1923, pt. C II, p. 19.

good quality, slightly darker than that from the Shippigan bog, light in weight, and only slightly humified. Samples from drill-holes 10 feet deep and 500 feet apart were collected along a line that was run 500 feet south of and parallel to the road, and along a cross-line over the summit between Pokemouche Gully and St. Simon Inlet. These samples analysed:

	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Base-line	23·2	17·2	5·5	0·8
Cross-line	22·2	16·4	6·3	...

The bog is partly drained by a ditch that is parallel to the road, and by a cross-ditch running at right angles a short distance into the bog. It would be necessary to extend the cross-drain and to have some lateral ditches at right angles to it. Drainage can be obtained also into Pokemouche Gully.

The area is sparsely settled and labourers would have to be obtained from Shippigan or neighbouring villages. The bog is operated by Fafard Peat Moss Company. There has been no production since 1943.

Green Point Bog

This bog lies 1½ miles south of Inkerman station and can be reached by a good road that crosses the eastern end, or by another that skirts the northwest edge. The Canadian National Railway parallels the latter road. The deposit is of the high-moor type with a gradual rise toward the centre, and the summit forms a large oblong dome.

It has an area of about 1,300 acres of over 5 feet of moss and is estimated to contain 22 million cubic yards (1½ million tons) of peat moss of 20 per cent moisture content.[1] The surface has no obstructions such as spruce islands, lakes, or shallow depressions. The growth is mostly sphagnum moss, with some labrador tea, bog rosemary, dwarf spruce, and eriophorum. The bog is fairly dry.

The moss is of a very good quality, especially in the western half of the bog, is light in weight, only slightly humified, and is light yellowish brown. Toward the edges it becomes more humified. Two composite samples representing the east and the west halves of the bog were made from drill-holes 1,000 feet apart on a line starting at the bend of the road and continuing across the east end of the bog along the summit to within 600 feet of the railway. At this latter point the moss stratum becomes shallow, dark, and more humified. The drill-holes were 10 feet in depth. The samples analysed as follows:

Sample from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
East half of bog	19·6	14·5	3·5	0·6
West half of bog	23·7	17·5	3·4	0·6

The bog can be drained in several directions, the most convenient being toward the Gulf of St. Lawrence. The product would have to be trucked about 8 miles to the railway station and the deep-sea harbour at Shippigan.

Lamek Bog

This is one of the largest deposits of high-grade peat moss in Canada and its workable area of about 3,000 acres is estimated to contain 4,000,000 tons of peat moss of 20 per cent moisture content.[2] The bog has a depth of more than

[1] Anrep, A.: Geol. Surv., Sum. Rept. 1925, pt. C, p. 151.
[2] Anrep, A.: Geol. Surv., Sum. Rept. 1923, pt. C II, p. 20.

5 feet over this area. It is at the southern end of Shippigan Island and occupies most of the point of land between Lamek Bay and the Gulf of St. Lawrence. Entrance may be had at several places from the highway, connecting with the ferry, that cuts the bog at three points. The deposit begins a third of a mile from the ferry landing. The main deposit extends over 4 miles eastward and one arm is $2\frac{1}{2}$ miles long with a bend northward. The bog is of the high-moor type with a dome-shaped elevation at the southwestern end, a second in the centre, a third about $1\frac{1}{2}$ miles east of this, and a fourth at the northeast end on the north side of the road crossing the island from Lamek village in a southeasterly direction.

The surface is dry and the growth is sphagnum moss with some eriophorum and dwarf spruce and a few types of aquatic plants. The main part of the bog is open space without spruce islands and with only one lake, which is at the southeast end of the bog and which drains into the Gulf of St. Lawrence.

Holes were drilled 1,000 feet apart along a line run east and west over the summit from the road at the southwest end, and along another run north and northeast over the summit on the north arm of the deposit. Two composite samples made of the stratum, representing a depth of 10 feet, were analysed as follows:

	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
North arm	23·1	17·1	7·4	0·8
Main deposit	20·2	14·9	3·5	0·7

The moss is light in colour and weight, is only slightly humified, and should yield a uniformly high-grade commercial product.

The northeastern part of the bog can be drained in the direction of Legrand Lake by deepening the natural drain to the Gulf of St. Lawrence, and the main part of the deposit in southerly and westerly directions to Lamek Bay and to the strait between the island and the mainland.

Although good roads almost encircle the deposit it is at some disadvantage, compared with the Shippigan bog, in that output from a mill on the island would have to be ferried across the strait to Shippigan Harbour, or to the railway on the mainland. The nearby labour supply is sufficient to maintain a large production.

Miscou Bog

This bog is on Miscou Island, at the extreme north end of Gloucester county, and has an estimated area of 5,000 acres, covering almost half the island and extending from the south shore to the Miscou lighthouse in the north. There is a good road along the north, west, and half of the south, borders of the bog, and from this road it can be entered at any point.

Test-holes were drilled on a line run from the lighthouse in a straight westerly direction to the height of land; on a line run southwest from this point; on a line over the centre of the bog from a point on the road halfway between Lake Chenier and Big Lake; and on a line run due north from the road at the southern part of the deposit to Bridge Lake. The first hole on the first-mentioned line was 300 feet from the edge of the bog near the lighthouse and showed a depth of 8 feet of moss, and the other two, 1,000 feet apart, showed depths of 11 and 12 feet respectively. The first hole on the second line showed a depth of 15 feet of moss and the other two, 1,000 feet from the first hole and the same distance apart, showed depths of over 15 feet. The three holes on the third line were 1,000 feet apart and showed depths of 15 feet, over 15 feet, and over 15 feet, respectively. Those on the fourth line were also 1,000 feet apart and showed depths of 14 feet, over 15 feet, and over 15 feet, respectively. In all cases the

samples indicate that the material is a uniformly good quality sphagnum moss almost to the bottom of the drill-holes. The samples analysed as follows:-

Sample from	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
Section SW. of Miscou lighthouse	22·1	16·3	4·6
Section between Lake Chenier and Big Lake	17·7	13·0	3·3
Section south of Bridge Lake	18·4	13·6	3·9

The bog was mostly dry with wide open areas between numerous lakes and there was only little growth of trees and bush. It can be drained in several directions. Although it is a large bog and contains moss of good quality the deposit is not well situated for development, as two straits have to be crossed by ferries to reach the mainland. Smaller vessels might load at the schooner wharf at Miscou Harbour.

Lozier Bog

This bog is 1 mile north of Lozier Settlement in Inkerman parish. It has an area of about 100 acres of open and workable peat land. The moss is mainly sphagnum and has a depth of 15 feet at the summit. It is intermixed with humified peat and is rather dark and of inferior quality. The deposit was formerly worked to produce compost peat. Analysis of a sample was as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
10·7	7·8	7·3

Boulou Point Bog

This bog is 2 miles south of Tracadie village, half a mile from the highway by good road. It has a workable area of 100 acres. The deposit contains humified peat at the edges and in some parts this extends well into the bog. On the summit, however, there is a good grade of peat moss to a depth of 15 feet. The bog was very wet, especially around the edges, but it became fairly traversable about 600 feet from the edge. It can be drained into creeks on the west end and into Tracadie Lagoon from the northeast end. The sample collected from the drill-hole showed increased humification below the 7-foot stratum. Analysis of the sample was as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
16·7	12·3	2·1

Little Tracadie Bog

This deposit is 2 miles north of Tracadie village and is east of Gaspereau Creek. A good road leads up to its edge. The deposit has a workable area of about 150 acres. The sphagnum is slightly humified in the upper strata, but becomes intermixed with humified peat below 7 feet and is dark. A sample analysed as follows:-

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
15·6	11·5	1·8

The bog is fairly high, was dry, and can be drained in an easterly direction.

Tracadie Beach Bog

This bog is 4 miles southeast of Tracadie village and can be reached by a good road that crosses the northwest end of the bog. It has a workable area of about 100 acres. Much of this area, however, is overgrown with small trees. A hole drilled 300 feet from the road on a line that was run from the west end in a southwest direction over the summit showed a depth of 12 feet of moss, and another hole 800 feet farther along the same line showed a depth of 15 feet. A composite sample analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
16·1	11·8	2·1

The moss is sphagnum, fairly free from humus, light in colour, and is of good quality.

CHAPTER VIII

PEAT BOGS IN QUEBEC

Quebec has large resources of peat including many important deposits of peat moss. Moss is being produced from several of these deposits, the output from two of them being large. There is also a small production of peat humus for horticultural use and for use as a filler for artificial fertilizers. Peat fuel is produced on a small scale. Peat moss deposits of industrial importance are situated on the south shore of St. Lawrence River in Matane, Rimouski, Rivière du Loup, and Kamouraska counties. On the north shore is the large bog at Les Escoumains, and bogs near Portneuf in Saguenay county and in Chicoutimi county are reported to contain good peat moss. No peat moss bog of importance was found in the Eastern Townships.

SAGUENAY COUNTY

Les Escoumains Bog

This bog is 1½ miles west of Baie des Escoumains on high ground, and its southwest end abuts the Maritime Highway. It is the largest of its kind known to occur in Quebec. The bog is accessible from the south by means of a small road branching from the highway and by a rough, narrow road connecting the northeast end of the bog with a country road running northwest from Baie des Escoumains along the boundary line of the Bergeronnes parish. In Les Escoumains parish the bog occupies lots 1 to 8, range I; and in Bergeronnes parish, lots 1 to 9, range II, and lots 3 to 10, range III; and has an area of between 2 and 3 square miles. It is of the high-moor type, has a fairly uniform depth of 11 to 18 feet, rises gradually from the southeast and ends abruptly at the northwest and northeast ends. The growth is chiefly sphagnum moss and there is some rosemary, labrador tea, an abundance of blueberry bush, occasional small spruce islands, and scattered clumps of spruce trees. There are many small and a few large lakes, which, in some parts of the bog, lie close together. This is rather exceptional, as in most bogs the accumulation of water is usually confined to one or more larger lakes. The bog is so large, however, that there should be sufficient clear surface for large-scale operations. The surface was generally dry, except in depressions near some of the lakes.

Samples were collected every 500 feet from three strata along a line (No.1) that was run from the highway to the trail where it enters the north part of the bog, and from a cross-line (No. 2). Composites were made of the samples taken along line No. 1 and of those taken from the east and west halves of the cross-line. These gave on analysis:

Sample		Absorptive value		Ash %
		Dry basis	25% moisture basis	Dry basis
No. 1:	Feet			
(Base-line)	0– 5	13·6	9·9	3·9
	5–10	14·2	10·4	3·1
	10–15 and over	13·8	10·1	4·0
No. 2:				
(Cross-line	0– 5	14·4	10·6	...
east of	5–10	13·7	10·0	6·3
base-line)	10–15 and over	13·7	10·0	3·7
No. 3:				
(Cross-line	0– 5	14·4	10·6	4·0
west of	5–10	14·4	10·5	4·1
base-line)	10–15 and over	15·8	11·6	3·1

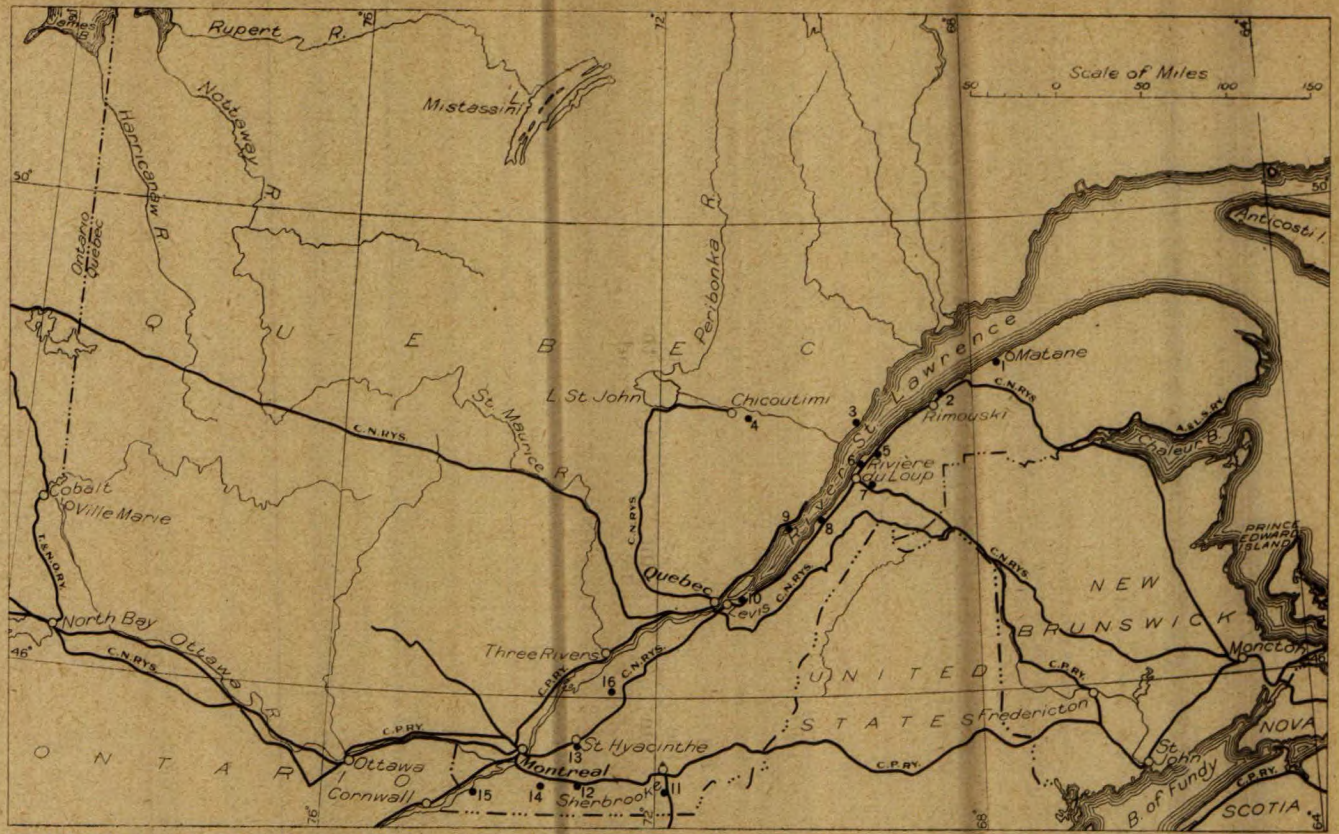


Figure 7. Index map of southern Quebec showing locations of peat bogs. **1,** Rivière Blanche (St. Ulric); **2,** St. Anaclet; **3,** Les Escoumains; **4,** Chicoutimi; **5,** Isle Verte; **6,** Cacouna; **7,** Rivière du Loup; **8,** Rivière Ouelle; **9,** Isle aux Coudres; **10,** Clair; **11,** Waterville; **12,** Farnham; **13,** St. Hyacinthe; **14,** Napierville; **15,** Tea Field; **16,** St. Guillaume.

The peat moss is of fair grade, but it has a slightly lower absorptive value than what is usually rated as a standard commercial moss. The part of the deposit represented by the above analyses shows an unusual regularity in composition.

At the north end are two natural drains, tributaries to the Grand River of Escoumains, which extend well into the deposit and each of which is somewhat less than a mile long. There was an appreciable current in these brooks even a short distance from the edge of the bog, indicating a fair drainage. At the northwest end a brook skirts the bog for a mile or more and connects with a lake at the head of the bog. A ditch has been dug on lot 3, range I, in Les Escoumains parish, to a depth of 5 feet and at right angles to the highway. It extends only 400 feet into the bog and its drainage is poor. If this ditch were extended one-half mile farther into the bog with a westerly deflection, and if lateral ditches were dug at right angles, a sufficient area could be drained to maintain production for a considerable time. Elsewhere in the bog advantage should be taken of the natural avenues of drainage eastward and westward.

Operations should begin near the provincial highway. The road leading into the bog from this highway could be improved at a small cost. A baling plant should be erected on the firm ground near the highway and it would then be 2 miles from the wharf on the Baie des Escoumains. All shipping would have to be by water, but St. Lawrence River at this point is usually ice-bound in the early spring, when the largest transport of peat moss occurs.

CHICOUTIMI COUNTY

Bagotville Bog

This bog is situated 4 miles from Bagotville on the Bagotville-Chicoutimi Highway, and according to Anrep, who mapped the bog in 1926, has an area of about 2,800 acres. In 1943 a section at the south end was operated for the manufacture of peat fuel, but in 1944 a small plant was built at the east end to utilize the surface layer of floral moss. A vertical section of the bog in this area consists of 12 inches of floral moss, 12 inches of horticultural moss, and then 24 inches of well-humified peat.

The ground is first cleared of the surface growth of small bushes and trees by means of a bulldozer, and the floral moss is then loosened by dragging over it a large log with spikes set spirally along its length. The loose moss is then forked on to wire screen drying-racks, and when dry is hauled on a sled to the baling shed, which houses three hand-operated baling presses. The moss is packed in 7-ply paper bags holding about 30 pounds. The darker, lower grade, material is disposed of for stable litter. About 10,000 feet of drying-racks are in use and in August 1944, 8 men and 25 boys were employed. This plant is capable of producing about 150 bags a day. After the moss has been removed it is hoped to use the land for agricultural purposes.

MATANE COUNTY

Rivière Blanche Bog

This bog is half a mile south of the village of St. Ulric (also known as Rivière Blanche), is circular in shape, with an area of about 600 acres. It is of the high-moor type, free of obstruction, and rises gradually to the east where the peat moss becomes thicker.

The deposit contains a good quality peat moss and is being developed by Mr. L. Roy and his son. Operations were started in 1943 and the main drainage ditch and some laterals have been dug. A small baling plant containing four presses has been built in the village of St. Ulric and the annual output is estimated at 4,000 bales. Owing to the difficulty of obtaining fibreboard cartons the moss is baled in cartons made of thin slats. Unfortunately, in this lower part of St. Lawrence River the drying season is short and the air is generally humid, so that proper drying of the peat may be difficult.

RIMOUSKI COUNTY

St. Anaclet Bog

This bog is 1 mile south of Father Point, in the Seigneuries of Lessard and Le Page-Thivierge, and can be reached by three roads running south from Rivière du Loup- Rimouski Highway. The deposit is over 7 miles long and consists of two lobes connected by a long, narrow strip of bog. The western lobe, west of the road that connects St. Anaclet station with Father Point, contains a good grade of moss to a depth of 5 to 13 feet, but eastward the bog becomes shallow, being of a maximum depth of 5 to 6 feet, and is partly wooded. The moss is of inferior grade and passes into well-humified fuel peat.

On the western lobe the peat moss occupies the centre of that part of the bog and has an estimated area of 1 square mile. This area was estimated by Anrep[1] to contain about 325,000 tons of standard commercial moss.

Five samples collected from holes, 5 feet in depth, on a line run due west for a distance of 3,000 feet from the road over the summit, gave on analysis:

Sample	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
No. 1: 100 feet west of road...	15·7	11·5	4·4
No. 2: 800 feet west of road...	22·6	16·7	3·5
No. 3: 1,500 feet west of road...	27·5	20·4	3·3
No. 4: 2,200 feet west of road...	25·1	18·5	5·6
No. 5: 3,000 feet west of road...	22·8	16·8	4·2

Judging from the above analyses the deposit should yield the best grade of standard commercial peat moss. These samples represent only the upper stratum of a small area, however, and if the whole deposit were sampled in the usual manner the analyses might not be so favourable.

RIVIÈRE DU LOUP COUNTY

Isle Verte Bogs

There are two bogs on a high ridge of land 1 mile east of Isle Verte station on the Canadian National Railway. The larger bog is close to the station and can be reached by country roads from the Rivière du Loup-Rimouski Highway. A good road constructed alongside the railway runs well into the bog. It has an area of 500 acres, of which from one-third to one-half is workable for peat moss. Part of the bog is fairly heavily wooded and is shallow. The bog is composed of sphagnum moss, the upper stratum of which is of very good quality, light in colour, and only slightly humified. Below a depth of 4 to 5 feet it becomes more humified, but not sufficiently so to be classified as a fuel peat.

The bog has been worked for peat moss for several years for use in the production of insulating material, and during an earlier period, for the production of insulating boards, and of moss for agricultural use. The production was small until recent years, however, when Premier Peat Moss, Limited took over the property and erected a modern baling mill, improved the drainage system, modernized the field equipment for a large-scale production with permanent and movable tracks, acquired a large number of side-dumping cars and gasoline tractors, and, more recently, field conveyers for harvesting the sods. The company erected a large storage shed for the sods, adjacent to the baling mill, and also several field sheds with open sides.

As the drying season is relatively short in that area it has been necessary to place part of the year's cut of sods on racks to speed up the drying of sods cut during the later part of the season. The sods cut earlier are handled in the usual

[1]Anrep, A.: Sum. Rept., Geol. Surv., Canada, 1919, pt. E., p. 45.

way, placed flat on the ground and turned and stacked in chimneys to give them free access to the air currents.

A sample of peat moss from No. 1 bog analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
23·6	17·4	3·3

The other bog is close by, in a southeast direction. It is somewhat less than 200 acres, about two-thirds of which is heavily wooded and shallow. It can be entered from roads at the east and south ends. The deposit is dome-shaped, but has no appreciable cover of moss at its summit. The southwest part contains peat moss similar in quality to that of the larger bog. The peat from the higher levels of the east part might be used for peat fuel, but is not of very high grade, being a mixture of humified and less humified peat. A creek skirting the entire south end forms a natural drain.

Rivière du Loup Bog

This bog has an estimated total area of 7,000 acres. It is 2 miles south of the city of Rivière du Loup and is crossed by the main highway to Edmundston. There is a good wharf 2 miles north of the city, on St. Lawrence River. A large part of the bog is wooded, chiefly with spruce and tamarack. Although mainly a fuel peat bog, a large area east of the highway contains unhumified moss, and in a recent survey by Canada Peat Company, Limited, the owners of the property, this was estimated at 1,700 acres, of which 1,000 acres, having an average depth of 6 feet, are workable for peat moss. Below this level the moss becomes more humified and runs into fuel peat, or has sufficient intermixture of this to produce a dark, dusty peat moss.

The moss in the workable area is chiefly sphagnum intermixed with eriophorum and carex. In the upper bed it is fairly light in colour, is of fair quality, and produces a marketable product. The bog is drained by a main canal running through its centre at right angles to the highway. Laterals at right angles with the main canal and 300 feet apart drain the drying-fields.

Unlike the field operation on the Isle Verte bog, racks only are used for drying and the sods are placed on trays piled ten high. The average content of a rack is one cubic yard of raw peat, which yields two and a half bales of commercial moss of 100 pounds each. In most other respects the two plants are similar. The dried sods are kept on the drying-field in storage sheds with open sides, and are transported to the mill by a narrow gauge field railway where they are carried by a conveyer to a shredder. The shredded moss is screened to three sizes, namely, coarse stable litter, medium poultry litter, and fine horticultural moss. It then goes to the baling presses which have a capacity of 75 to 100 bales an hour. Samples analysed as follows:

Sample from	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
East section	14·2	10·4	4·0
Main bog, centre	15·5	11·3	2·5

Cacouna Bog

This bog is in Le Parc parish, Rivière du Loup county, and its western border abuts the Canadian National Railway station. The railway runs through the centre of the bog. It has an estimated area of 800 acres, two-thirds of which is

wooded with small spruce and tamarack, the open areas being of fair size. The peat moss is mainly sphagnum with some intermixture of carex, sedges, and other bog plants, the stratum being about 3 feet thick. The quality of the moss is somewhat irregular, being too humified in some parts to yield a high-grade product. The bog was operated for a time on a small scale, but, probably because of the humified character of the moss and of the shallow depth of the deposit, operations were discontinued. The eastern end has been drained and is dry. A sample of the moss from that area analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
15·7	11·5	4·2

KAMOURASKA COUNTY

Rivière Ouelle Bog

This bog is about three-quarters of a mile northwest of Rivière Ouelle Station on the Canadian National Railway, in Kamouraska county, and is almost encircled by good roads. Its area is over 4,000 acres, and it contains peat moss and fuel peat, the peat moss occupying about 1,500 acres at the centre of the bog. The moss is principally sphagnum with an intermixture of eriophorum and other bog plants. It is only slightly humified in the upper bed and produces a marketable product. A small plant on the bog is equipped with a shredder, a screen, and a baling press. A sample of the moss analysed as follows:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
14·6	10·7	4·4

CHARLEVOIX COUNTY

Isle aux Coudres Bog

The peat bog at Isle aux Coudres, an island in St. Lawrence River, about 60 miles below Quebec, is being developed by Excel Peat Company (Mr. Blaise Fournier).

The property consists of about 600 acres, at the northeast end of the island, of good quality peat moss 5 to 10 feet thick. Drainage operations were started in 1943 and the main drain and several laterals have been dug. A considerable amount of peat, already excavated, is drying on the bog in piles. The mill and storage shed have been built and special snowmobiles or trucks with tracked drive have been built for transporting the dried moss from the bog to the mill. Chicken litter and horticultural peat are produced. The product has to be trucked and ferried to the mainland for shipment by rail, or taken by schooner to Baie St. Paul and rehandled there.

The inhabitants of this island are somewhat isolated, the only connection with the mainland being a small ferry, and the starting of this peat development has been of great assistance to the general economy of the island A sample of peat moss taken from the storage shed analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
17·0	12·5	5·3

LEVIS COUNTY

St. Bernard Bog

Near St. Bernard, about 20 miles south of Quebec city, P. R. Murphy operates a peat moss property for the production of floral and horticultural moss.

The loose surface moss is raked by hand and then dried on racks made of ordinary chicken wire, and when dry the moss is taken to the storage shed where it is compressed in a hand-baling machine and packed in 7-ply paper bags holding about 30 pounds of moss.

The capacity of the plant is about one carload a week and there is apparently a good market for this material

SHERBROOKE COUNTY

Waterville Bog

This bog is 2 miles south of the village of Waterville, in Sherbrooke county, and a road in fair condition crosses its southern end. The bog comprises 200 acres of a heavy growth of sphagnum moss. Samples collected at 200-foot intervals along a base-line 1,500 feet in length that was run across the deposit and along a cross-line of the same length showed a thickness of from 5 to 8 inches of sphagnum moss of good quality. The moss analysed:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
18·0	13·5	4·0

For the past several years a production of about 1,000 bales of moss a year has been obtained from the bog, the greater part of the output being floral (dried top) moss. No sample of the floral moss was collected.

MISSISQUOI COUNTY

Farnham Bog

This bog was visited at the request of the owner, to whom the occurrence of large areas of peat moss had been reported, although all reports of earlier investigations and of development of the bog made no reference to the presence of such areas. The bog is a short distance west of Farnham and can be entered by good country roads from several directions. It consists of three lobes, namely the northern lobe, the southwestern lobe, and the eastern lobe.

Part of the northern lobe was at one time worked for peat fuel. Canals half a mile long run south from the Canadian Pacific Railway and are presumably old workings. This lobe contains no peat moss.

The southwestern lobe is the largest in area and is crossed by two good country roads. When visited, fires were burning in several parts of the bog. There is a heavy growth of sphagnum moss among small poplar and birch trees. The underlying stratum is well humified and is a good fuel peat. No evidence was found of any stratum of dead moss, the raw material used in the manufacture of standard commercial peat moss. Thus the reported occurrence of peat moss probably originated from the live moss being mistaken for peat moss.

The surface of the eastern lobe is somewhat softer than the rest of the deposit and the peat is less humified, but is unsuitable for the manufacture of marketable peat moss. At the northeast end of this part of the bog are numerous stumps and the bog becomes shallow and almost impassable. The peat is less humified, but the quantity is small and the quality is inferior. It is not likely that peat moss occurs in the areas that were on fire.

Five samples collected from different parts of the bog, at a depth of 3 feet, gave on analysis:

Sample from	Moisture %	Ash %	Volatile matter %	Fixed carbon %	Sulphur %	B.T.U. per lb., gross	Absorptive value
Line between highway and C.P.R. track:							
As received	9·8	3·4	....	....	....	....	....
Dry	....	3·7	....	....	....	....	....
SE. section:							
As received	10·3	5·1	....	....	....	....	....
Dry	....	5·7	....	....	....	....	....
SW. section, south of road:							
As received	8·2	8·4	....	....	....	....	....
Dry	....	9·1	....	....	....	....	....
SW. section, north of road:							
As received	9·3	3·3	....	....	....	....	....
Dry	....	3·6	....	....	....	....	....
Composite of the above samples:							
As received	25·0	5·3	46·5	23·2	0·5	7·270	4·2*
Dry	....	7·1	62·0	30·0	0·7	9·700	5·9

(*The sample was analysed when dried after the determination of absorptive value, the values being quite different from those to be expected with air-dried peat. Accordingly, the values were recalculated to the basis of 25 per cent moisture or a representative figure for air-dried peat.)

The low absorption value precludes the use of the material as peat moss.

ST. JOHNS COUNTY

St. Blaise Bog

This bog is 2 miles west of Girard station on the Canadian National Railway. The centre of the bog is of the floating form, very wet, resilient, and difficult to traverse. It is an open bog with a small lake at the centre and another farther south. From the lake the bog continues open for a distance of 1,700 feet southward, after which the surface growth becomes a mixture of moss, grass, and sedges, with small birch and tamarack to the end of the bog.

The central part of the deposit, which was expected to yield good peat moss, has only a cover of 2 feet of live moss, and, beneath this, 7 feet of well-humified peat. The northern part of the bog is dry and firm and contains only well-humified fuel peat of good quality. The moss of the southern part is of much the same character as that of the centre and extends 4,800 feet southward from the lake.

A line was run in a north-south direction through the centre of the deposit, and samples were collected every 1,000 feet. These samples analysed as follows:

Sample from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
North part of bog	4·2	2·9	4·9	1·6
Centre part of bog	5·6	3·9	6·3	1·6
South part of bog	6·0	4·2	6·4	2·2

The peat is of inferior quality and is unsuitable for use as a litter, or in agriculture.

NAPIERVILLE COUNTY

Napierville Bog

This bog had been reported to contain a cover of unhumified peat, although reports of earlier investigations make no reference to this. It is 4 miles southwest of Napierville, and the new Montreal-Champlain (N.Y.) Highway crosses the

deposit. It is mostly covered with wood and bush and its area as estimated by Anrep is 7,000 acres. Much of the area is partly drained by a canal and by the Little Montreal River. It has a 6- to 8-inch cover of partly humified sedge peat. Two composite samples were collected from this top stratum, sample No.-1 on the line parallel to and on the west side of the new highway, and sample No. 2 from the east part of the bog along the Little Montreal River. These samples of unhumified peat gave on analysis:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
No. 1	8·8	6·4	8·8	2·0
No. 2	8·5	6·1	8·0	2·1

The unhumified peat is thus appreciably below standard requirements. It is unsuitable for stable litter, but the nitrogen content is fairly high, and the peat is suitable for local use as a compost. It is dark with some intermixture of humified peat and is composed mainly of residues of sedges and grasses. The bog, however, contains good fuel peat to a depth of 5 to 10 feet. The analyses show an unusual similarity in the composition of the two samples, considering that they represent different areas of the bog.

HUNTINGDON COUNTY

Large Tea Field and Small Tea Field Bogs

These bogs are about 2 miles north of Huntingdon in Huntingdon county, and are over 5,000 acres in area. The growth is mainly sphagnum moss, in addition to which are other peat bog plants, low bush bog rosemary, labrador tea, and eriophorum. Since the building of the large drainage canal from Logan River to St. Louis River, which skirts both bogs, they have become very dry and the top moss has almost disappeared. About 300 acres of bog has been reclaimed for agricultural land and large crops of oats, barley, and buckwheat are grown. The bogs could be developed for the production of peat fuel.

Figure 8. Index map of southern Ontario showing locations of peat bogs. **1,** Alfred; **2,** Richmond; **3,** Newington; **4,** Holland; **5,** Luther and Amaranth; **6,** Welland; **7,** Beverley (Westover); **8,** Brunner; **9,** Rondeau; **10,** Pelee; **11,** Victoria Road.

CHAPTER IX

PEAT BOGS IN ONTARIO

The few bogs that have been investigated in southwestern and in eastern Ontario are mostly small, but they have undergone a more varied development and a wider range of products has been marketed from them than in any other province. Some of the fairly large bogs have only a light cover of marketable peat moss. Erie Peat, Limited, at Welland, has the only bog that produces commercial peat moss on a large scale and with modern machinery.

The investigation did not reveal any deposits in the Thunder Bay and the Kenora areas containing a good grade of peat moss. Several deposits near Port Arthur and Fort William are not described in this report as they are of little or no commercial value, being usually heavily wooded, the peat being of inferior quality and generally well humified. Peat moss deposits have been reported west of Fort William and on St. Ignace Island by timber cruisers of a large Fort William lumber company. Some deposits in Rainy River district have received considerable attention and several undeveloped bogs carry a good grade of moss. There are good prospects of finding others in the western part of the district.

SOUTHERN (OLD) ONTARIO

Alfred Bog

This bog is in Prescott county and extends from Alfred station in a southerly direction for about 5 miles. The eastern part is wooded with spruce and is shallow in depth. The total area is estimated at 7,000 acres. The Ottawa-Montreal line of the Canadian Pacific Railway crosses the bog in the northwest.

The bog consists almost entirely of humified peat and from it several thousand tons of peat fuel have been produced. In the southwest part, south of the Canadian Pacific Railway, surrounding a small pond, is about 25 acres of unhumified peat moss to a depth of 8 feet, the lower bed of which consists of peat wool intermixed with fine, granular, humified peat. The upper bed is light in colour, and is mostly sphagnum intermixed with sedge and carex from which a good grade of peat moss has been produced. This part of the bog has been drained by a system of ditches with outlet to the pond and the creek at the northwest end. It was brought into production in 1941 and the supply of moss is nearing depletion.

Analysis of samples collected from the stock-pile of air-dried sods:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
23·4	17·3	5·5

Newington Bog

This bog is a quarter of a mile southeast of Newington station, Stormont county. The bog consists of three lobes, western, central, and eastern. The Ottawa Branch of the New York Central Railway crosses its western lobe. It has an area of about 4,000 acres, the greater part of which is heavily wooded. The western lobe has an area of 200 acres, and the central lobe an area of 1,500 acres. The western lobe contains well-humified peat which was used for experimental work in the production of humus by the hydro-peat process. About two-thirds

of the area of the central lobe is peat moss to depths ranging from 6 to 10 feet. The moss is a good quality sphagnum, especially in the upper stratum, and should produce a good grade of marketable peat moss. The eastern lobe is heavily wooded and is unsuitable for the production of peat of any kind.

Analysis of peat moss of the central lobe, average of 5-foot depth, is:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
15·6	11·5	4·0

Richmond Bog

This bog is 2 miles south of Richmond in Carleton county and has an area of over 5,000 acres, most of which is rather shallow and is heavily wooded. In the centre of the bog, east of the Canadian National Railway, is a large, open but rather shallow area. The growth is mainly carex sedges and eriophorum, and there is some hypnum moss. The deposit passes into humified peat immediately below the live-growth cover. Drainage of the bog would likely be an expensive undertaking.

Brockville Bog

This bog is a short distance north of Brockville and can be reached by a good road. It has an area of about 1,000 acres and was worked about 35 years ago for peat fuel. Little remains of the old plant, nor are there any signs of old workings near it.

The western part of the bog had been reported to contain unhumified peat, but drainage of the bog by cultivation and by adjoining fields for several years has dried the surface and the fibrous peat has been destroyed.

Bogs on Oaklake Road

Bogs containing unhumified moss have been reported on the Oaklake road, which runs north from Havelock on No. 7 Highway. Several were visited within a comparatively small area 25 miles north of Havelock. All are of the beaver meadow type. One bog of about 3 acres contains slightly humified moss of rather dark colour to a depth of 3 feet, but the other deposits consist of humified peat below the cover of live moss. The growth on the bogs is spotty, some areas are covered with thick sphagnum moss and others with marsh grasses, sedge, etc. The live sphagnum moss was harvested on a small scale, dried on racks, and baled for the market. The dried moss was shipped to florists and nurseries.

Victoria Road Bog

This bog is 1 mile north of Victoria Road Village in Victoria county and has an area of 70 acres. A good road crosses its east side. Only small areas east of the road and at the edges of the bog are wooded. The deposit is well-humified peat and was worked at one time for peat fuel. Recent development, however, reveals only 2 feet of well-humified peat overlying 6 feet of only partly humified moss of sphagnum and hypnum origin. The bog cannot be drained below 4 to 5 feet except at considerable expense, and in excavating at that drainage level equal quantities of both kinds of peat would be produced.

In 1940, the bog was worked on a small scale to produce top-moss, humus, and peat moss, but production was soon discontinued. The working-face at a depth of 8 feet was kept dry by pumping. The humus was obtained from the 2-foot humified stratum. It was then dried, ground, and sold as a dry powder. The moss was cut in sods 5 by 5 by 18 inches, dried on the bog, stacked, shredded, and bagged. A sample analysed as follows:

Absorptive value		Ash-%
Dry basis	25% moisture basis	Dry basis
8·7	6·2	4·0

The moss is of an inferior quality.

Marsh Hill Bog

This long, narrow bog extends for seventeen concessions from the town of Uxbridge through Reach and Brock townships, Ontario county. The Canadian National Railway follows the deposit along its entire length and crosses it at several places. The bog has an estimated area of 5,000 acres and is almost entirely overgrown with trees and bushes. The growth is mostly marsh sedge, carex, and hypnum, but there is some sphagnum. The bog was mostly wet and impassable.

The deposit was entered at the concession road between Brock and Reach townships, where unhumified moss was reported and a clearance had been made a few years ago when developing the bog. Several holes were bored in that part, but no unhumified peat was found; nor was any noted when entering from Marsh Hill Post Office road, from the road 1 mile north of Wick Post Office; nor from the road entering the bog half a mile north of Blackwater Junction.

Scarborough Junction Bog

This bog is near Scarborough Junction, York county, and has an area of about 20 acres. It was being worked by W. A. Krudup for the production of humus, all of which has been used for growing mushrooms. The humus is mixed with manure in the proportion of 15 cubic yards of humus to 80 tons of manure and is placed in large shallow trays in dark, heated buildings. This mixture furnishes a fertile soil for growing mushrooms, but after one year in use its fertility declines and it must be replaced by a fresh mixture. The spent soil was being sold for use in flower gardens, market gardens, etc.

Holland Bog

This bog is close to the town of Bradford and No. 11 Highway crosses it at Holland River. Its area is estimated by the engineers reclaiming the land at 27,000 acres. Extensive drainage has resulted in the reclaiming of not less than 7,000 acres of farm land on which large crops of market garden products are grown. As this land was sold at $100 an acre it is doubtful if any part of the deposit that is suitable for reclaiming can be profitably used for the production of peat. Much of the undrained part of the bog alongside the reclaimed area across the highway and the Canadian National Railway was wet and mostly impassable. Drainage would be expensive and is not being considered.

The deposit has only a slight cover of unhumified moss.

Brampton Bog

Near Brampton a few tons of peat moss a year is produced from a 20-acre bog and is sold in the loose state to adjacent greenhouses.

Westover Bog

This bog occupies lots 27 and 28 in concession VII, Beverly township, Wentworth county, 17 miles northwest of Hamilton. No sphagnum moss was noticed, the growth being mainly carex sedges and aquatic plants, with some hypnum moss. The peat is well humified and of granular consistency at the surface under the marsh grass roots. Underneath, it is more coherent and of colloidal consistency and the ash content is high. The peat would be of no value were it not for a fairly high nitrogen content, its unusually limy ash, and for an

underlying marl, which make possible the production of a soil conditioner having the desired proportion of alkaline earths and humus. The limy material neutralizes the acidity of the peat, making it what is commonly termed a "sweet" soil. It also accelerates the conversion of nitrogen, making an otherwise insoluble nitrogen available for absorption by the plant roots.

Canadian Humus Products, Registered has operated the bog for the past few years producing Hu-Mar, a mixture of humified peat and marl. Development of the bog has consisted of the following successive operations: drainage; excavation of the wet material; transportation to the drying-field; and grinding, mixing, and bagging. A railway about 3 miles long and a power line have been built across the bog, and a large mixing shed, office, and residence have been erected. The bog is drained to Spencer's Creek, which flows close to the company's property.

Six test-holes were bored along the railway, 500 feet apart, and one at the other end of the bog in line with the track. They showed a uniform thickness of about 5 feet of peat and $2\frac{1}{2}$ feet of marl, indicating a comparatively level bottom, which should facilitate the excavation of the peat and marl in the right proportion. Analyses of samples:

		Peat	Marl	Mixture of peat and marl
As received				
Moisture	%	70·9	41·3	36·1
Ash	%	6·6	41·6	29·8
Nitrogen	%	0·6	0·2	0·8
Dry basis				
Ash	%	22·5	70·8	46·7
Loss on ignition	%	77·5	29·2	53·3
Nitrogen	%	2·1	0·4	1·3
Analysis of Peat and Marl ignited at about 850° C.				
SiO_2	%	33·8	42·0	51·3
CaO	%	33·8	37·1	24·4
MgO	%	4·3	3·4	3·3
SO_3	%	....	2·9	2·4

Welland Bog

This bog is in Wainfleet and Humberstone townships, between the Welland Canal and the feeder to the old canal, and has an estimated area of 3,500 acres. In Wainfleet township, a 2,700-acre portion of the bog contains an appreciable cover of unhumified moss and is operated by Erie Peat, Limited for the production of peat moss. About 800 acres contains peat moss to a depth of 3 to 7 feet, the lesser thickness beginning 300 to 700 feet from the edge of the bog. The peat moss is mainly light brown sphagnum with a small intermixture of eriophorum and other sedges. The deposit is estimated to contain 3,000,000 standard bales (150,000 tons) of processed moss.

The developed area is divided into 80-acre drying-fields, each of which is surrounded by drains. Lateral ditches, cut 300 feet apart, drain into the main ditch.

The peat is cut by hand in the usual way, stacked on the sides of the ditches and, after drying for two to three weeks, is piled. When fully dry the peat is loaded on to light trucks and transferred to cars on the field railway. It is then taken direct to the mill or is built into large stacks, according to operating requirements. Shelters have been erected for the comfort of the men at various points on the bog and are connected by telephone. An office, a tool shed, and a blacksmith shop have been erected. The mill has a yearly capacity of 100,000

standard bales of moss. It has a floor space of 50 feet by 50 feet, and houses the conveyer elevator, shredder screen, and two presses.

The company ships large quantities of peat moss (horticultural and chicken litter) to the United States.

Analysis of the moss:

Absorptive value		Ash %
Dry basis	25% moisture basis	Dry basis
17·5	12·9	3·9

Amaranth Bog

This deposit consists of the large and the small Amaranth bogs in Amaranth township, Dufferin county. The larger bog has an area of nearly 200 acres of workable peat land and a fair depth of peat that can be drained in a westerly direction. The smaller bog, much of which is overgrown with trees and bush, is about 40 acres in area.

The growth is sphagnum moss intermixed with hypnum moss and other plants common to peat bogs. The same peculiar formation exists here as in the Brunner and Victoria Road bogs, namely, well-humified peat, beneath which lies a stratum of felty fibrous peat intermixed with finely divided granular humified peat. The bog was being worked experimentally by a method similar to the hydro-peat process.

Luther Bog

This bog is 7 miles west of Grand Valley in East and West Luther townships, Wellington and Dufferin counties, and has an area of nearly 5,000 acres, four-fifths of which has a fair depth. The growth is mainly hypnum moss and aquatic plants, and there are small areas of sphagnum moss. There is a cover of 18 inches of unhumified moss of fair quality. The bog was worked experimentally for several years for the production of chemicals from humified peat, the raw material for which was obtained by the Nyboe hydro-peat method for the production of peat fuel. Results obtained by these experiments apparently did not warrant further development. The property was later taken over by a company which did a considerable amount of development work. This consisted principally of draining part of the bog by a main drain, 3 to 4 feet in depth, that extends about 2,500 feet to a lake running north and south, and by lateral drains 300 feet apart running east and west. From these, cutting-lanes extend at right angles. This drainage system has produced a dry surface without pools of surface water or soft patches, and the bog has become of sufficient buoyancy to support the weight of a tractor and trailers.

The thickness of the stratum of unhumified moss mentioned above appears to be uniform for the 400 acres of the drained area. Underlying this is a 6-inch stratum composed of partly humified peat intermixed with small branches and roots, probably residues from surface growth of small bushes and dwarf trees. Below this 6-inch stratum lies well-humified fuel peat of good quality to a depth of 5 to 7 feet, which forms the bulk of the deposit.

Analyses of samples:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
No. 1	13·8	10·8	4·5	....
No. 2	12·8	9·3	3·6	....
No. 3	16·0	11·7	4·0	0·9

No. 1. General sample of 18-inch peat moss stratum, south part of bog.
No. 2. General sample of 18-inch peat moss stratum, from cutting-lane east and west.
No. 3. General sample of 18-inch peat moss stratum, between lake and concession VI east.

Branchton Bog

This bog is on Peter Di Maggio's farm on the south half of lot 6, concession VII, near Dumfries, Waterloo county. It covers only a few acres, but is of appreciable depth and contains a good grade of sphagnum peat moss, light yellow, light in weight, elastic, and high in nitrogen. The moss was being produced for local consumption on a comparatively small scale.

Analyses of samples of the peat moss:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
0–3 feet	18·1	13·4	5·2	1·9
3–6 feet	16·8	12·3	7·5	1·9
Bottom stratum	10·9	7·9	3·7	2·2

Brunner Bog

This bog lies 1 mile northwest of Gads Hill Station, near Stratford on the Canadian National Railway, which crosses its east end. Its area of over 2,000 acres extends from the road near Gads Hill Station for 4 miles in a northeasterly direction. A stone road at right angles to the highway, 1 mile north of Gads Hill Station, crosses the narrow part of the southern end. The deposit consists of humified peat 2 to 3 feet thick, below which unhumified moss 4 feet thick rests on blue clay; a peculiar mode of occurrence, as the moss usually lies on top of the humified peat. In the middle of the bog near the road is a peat plant that produces air-dried peat fuel. The peat is stripped from the surface to a depth of 1 foot and after being macerated in a pug-mill, is placed on racks and air-dried.

The peat growth, mainly hypnum, eriophorum, and carex, would yield a rather inferior grade of moss. Moreover, the bog would have to be stripped of the humified peat to reach the unhumified moss, so that the present system of working would have to be entirely changed. Drainage of the bog would be difficult and would not likely be effective below the 3-foot level.

Analyses of the moss:

Sample from	Absorptive value		Ash %
	Dry basis	25% moisture basis	Dry basis
Section near Gads Hill	10·1	7·5	8·6
Section south of road to Gads Hill	7·5	5·4	8·3

Clinton Bog

This 8-acre bog is on the McKenzie farm near the east end of the town limits of Clinton. It has been worked on a small scale for several years for the production of peat moss for insulating material in the building trade. The annual production, sufficient for the insulation of 15 to 20 houses, is shipped in the loose state.

Analysis of sample:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Average of moss stratum	9·3	6·7	10·9	2·1

The moss is not suitable for use as a litter. Its high value as plant food, however, would make it suitable in gardens for compost and top dressings.

Komoka Bog

This bog is about 2 miles from Komoka Station, 10 miles west of London, on the Canadian Pacific Railway. It is large and is heavily wooded and only a small part in concession III, in Lobe township, has a depth of more than 5 feet, the peat being mainly sphagnum. No live growth of sphagnum moss was found. The bog is of no commercial importance.

Rondeau Bog

The Rondeau, or Ericau, bog is on the west side of Rondeau Bay, Lake Erie. A drainage system with a main canal of 18 miles has been constructed and several hundred acres of land has been reclaimed, from which abundant crops of onions and other vegetables thriving on an acid soil have been obtained.

The level of the canal surface is at times below that of the lake and the water has to be pumped over the dykes into Lake Erie. The undrained part of the bog is of no value for peat, as it would be drainable only at great expense, and the peat, being residue from marsh grasses, is inferior either as fuel or as litter. Canadian Industries, Limited has been producing peat humus from a large field near the canal on the Pere Marquette Railway. The humus is used in the company's plant at Chatham, as filler in the manufacture of artificial fertilizers. The deposit is worked on the same principle as that of the Peco process. The surface is cleared of all growth. It is then harrowed and milled and the loose, fine peat is exposed to the sun and wind to dry; after which the dried material is skimmed off the surface, collected, and shipped to the factory.

Pelee Bog

This bog at Pelee Point, 3 miles south of Leamington, is very similar to the Rondeau bog but is more difficult to drain. The lakes within the area of the bog maintain the same level as Lake Erie. The peat is of the same quality as that of the Rondeau bog.

Harrow Marsh Bog

This bog is 7 miles west of Harrow on Highway No. 18. It is an undrainable marsh of little or no value as a peat prospect.

MacTier Bog and Bogs on the Torrance-Southend Road

Several bogs reported to contain peat moss were visited in the Muskoka district. Some of these are small with no moss cover; some are peat fuel bogs with and without live sphagnum moss cover, but having no peat moss strata; and many of the others are reed marshes containing neither peat moss nor fuel peat.

A small bog and a larger bog, 2 miles and 4 miles respectively from MacTier Station, Canadian National Railway, northwest of Gravenhurst, were flooded when visited and were impassable. The green top moss is harvested by being spread on racks to dry, and is then baled. It is used to a limited extent in nurseries and as packing material in the shipment of shrubs, trees, roots, etc.

Along the road from Torrance station to Southend for a distance of 6 miles is a chain of five bogs which are connected with the road by wagon roads. They have a heavy top-growth of sphagnum moss; but were flooded when visited and the drilling of test-holes was impossible. The operator of MacTier deposits also harvests the top-moss from these five bogs, an average harvest being 5,000 to 6,000 bales of moss.

NORTHWESTERN ONTARIO

Arthur Bog

This bog is 9 miles west of Fort William on the road forming the continuation westward of Arthur Street. The Canadian National Railway crosses the south end of the bog, and the Canadian Pacific the north end. The area of the bog con-

taining peat of more than 5 feet in depth is 900 acres. The bog is heavily wooded and, when drilling, it was difficult to reach the bottom of the bog without striking a tree root.

Several test-holes were drilled and two composite samples were made. One of these, representing the northern part, was collected on a line running through the centre of the bog and parallel to the road that crosses the Canadian Pacific Railway. The other, representing the southern part, was collected from a line that was run north and south to Slate River station on the Canadian National Railway. Other approaches to the bog were difficult owing to the heavy growth of trees and bush. The samples were collected from a stratum of 3 feet consisting of a mixture of humified and fibrous peat, with a preponderance of the former. Underlying this is well-humified fuel peat. Examination of the drill-hole samples at various depths showed no stratum of unhumified or slightly humified peat. Analyses of peat from the Arthur bog were as follows:

Sample from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
North part of bog....	7·2	5·2	14·4	1·6
South part of bog....	6·4	4·6	19·5	2·3

Thus, the peat is of rather poor grade and is unsuitable for litter or agricultural moss owing to its low absorptive value and its high degree of humification. It is also unsuitable as a fuel.

Twin Cities Bog

This bog is within the city limits of Fort William. Shortly after the 1914-1918 war, it was laid out for improved city land as a garden city, but the project was dropped after the surface had been cleared of trees and bush and had been partly drained. As estimated by Anrep,[1] the bog has an area of 895 acres, only about 100 acres of which has a depth of 5 feet and over. It has a cover of growing sphagnum moss and is sparsely wooded with small spruce and tamarack. Within the 100-acre area the peat moss cover is $3\frac{1}{2}$ feet in depth.

Samples were taken of the moss stratum along a line running southward at right angles to the road crossing the bog, and another running east and west on the north side and parallel to the same road. Composite samples were made. Analyses of the Twin City bog moss stratum were as follows:

Sample from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
South line.....	11·9	8·7	8·1	1·1
East and west line....	10·4	7·5	7·4	1·2

As the analyses of the two samples differ little, there appears to be small possibility of finding better grade moss stratum. From the appearance of the bog when sampled better results were expected, as the moss was light yellow, only slightly humified, and when air-dried was light in weight and elastic.

Crozier Bog

The Crozier or Arctic bog is in sections 5 and 8, Crozier township, and is 9 miles southwest of Fort Frances. It can be reached by a good road that crosses the bog. It has an area of 1 square mile and was brought into production by Arctic Peat Moss Corporation, Ltd., Winnipeg, in 1942. The bog is drained by a canal discharging into Rainy River, with lateral ditches at right angles. The surface is dry and firm and can support tractors and trailers for bringing the air-dried moss sods to the baling mill. This obviates the much more expensive field

[1] Geol. Surv., Canada, Sum. Rept. 1921, pt. D, p. 9.

railway equipment. The property is equipped with a baling mill containing a hammer mill for disintegrating the sods, shaking screens, and four baling presses.

The peat moss stratum has a depth of about 4 feet, is light brown, and at the lower level is intermixed with roots of trees and undecomposed woody material. The moss is composed mainly of sphagnum, with some hypnum, and a smaller quantity of carex and aquatic plant residues. Analyses of samples were as follows:

Sample of	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Working-face, west end of bog	10·1	7·3	6·2	1·3
Poultry litter, average runs	12·2	8·9	6·1	1·3
Peat mull	14·2	10·4	5·0	1·1

Polar Bear Bog

This bog is in sections 19 and 30, Pattullo township, and in Nelles township, Rainy River district. It can be reached by a country road extending through its length northwards. Since 1942, it has been operated by Polar Bear Peat Moss, Registered. It covers the larger part of four sections, but the area bearing peat moss has not been determined. It is slightly dome-shaped and slopes northward towards Pine River and its tributaries. The surface growth is mainly sphagnum moss that is intermixed with hypnum moss and sedges, labrador tea, bog rosemary, and aquatic plants. The bog ranges in depth from 4 to 12 feet. There is plenty of good moss in most parts of the deposit and, by judicious cutting and by avoiding pockets of humified moss, it should be possible to obtain a fair overall grade of commercial peat moss. The stratum of 4 feet being worked consists of a fairly good quality moss, but becomes somewhat more humified at lower levels. Sufficient peat moss is available, however, in the 4-foot stratum to maintain a fairly large production throughout the life of the plant.

About 200 acres have been drained. The main ditch is 2 miles long and runs north and south, and there are thirteen lateral ditches at right angles on both sides of the road, 500 feet apart on the area east of the road and 1,000 feet apart on the area west of the road.

Because of the irregular quality, the samples of the 4-foot stratum taken at each 500 feet were analysed separately. They were collected along a line run north and south parallel to and west of the road, beginning at the north end. These analyses were as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
No. 1 (north end)	12·9	9·4	6·7	....
No. 2	13·0	9·5	6·1	....
No. 3	17·2	12·7	4·8	....
No. 4	13·9	10·2	5·6	....
No. 5	12·3	9·0	5·6	....
No. 6	13·4	9·8	3·9	....
No. 7	12·0	8·8	5·1	....
No. 8	16·5	12·1	6·6	....
No. 9	15·8	11·6	5·5	....
Bottom stratum at 12 feet, composite sample	10·7	7·8	6·7	....
Composite of above samples	....	....	5·0	1·2

The moss is light brown, light in weight, and elastic. The company has shipped several cars of peat moss to the United States, and there is a fair local

demand for horticultural moss and poultry litter. Analyses of processed moss from a new section of the bog were as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Poultry litter, light colour	16·3	12·0	5·2	0·9
Poultry litter, dark colour	12·8	9·4	6·6	1·2

The moss, especially the light-coloured litter, is a good commercial grade, light in weight, and elastic.

Bog in Carpenter Township

In Carpenter township, Rainy River district, on range V, a large bog extends from the Kenora Highway to the road leading from Emo to Barnhart. The bog probably covers more than 2 square miles, but how much is moss-bearing has not been determined. There are large open spaces, wooded at the edges, and occasional clumps of dwarf spruce and tamarack. The bog is broken up by a ridge of wooded land which runs eastward for 2 miles, and there is a large spruce island near the middle of the township. The surface growth is chiefly sphagnum moss and there is some eriophorum and the usual aquatic plants.

Samples were collected from the eastern section on a line southwestward from the Emo-Barnhart road, and on the western section on both sides of the Kenora Highway.

Several holes drilled at the west end, east of the Kenora Highway, showed an average depth of 6 feet of peat stratum, of which 3 feet was fairly good, light brown moss, only slightly humified. The underlying stratum is darker, however, and is a mixture of humified and fibrous peat. The deposit at the east end averages 15 feet in depth, a 4-foot stratum of which is very good moss, light yellow, elastic, and light in weight. The moss at the 8-foot and 12-foot levels is somewhat darker and contains humified peat. The 12- to 15-foot bottom stratum is fairly well humified. The samples analysed as follows:

Sample from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
East end, line parallel to corduroy road running at right angles to Emo-Barnhart road:				
Depth: Feet				
0– 4	16·2	11·9	6·6	0·8
4– 8	12·1	8·8	4·4	0·9
8–12	13·0	9·5	6·9	0·8
3-foot stratum, line centre of bog westward: Feet				
0–3	7·7	5·5	9·0	1·4
West end, line east of and at right angles to Kenora Highway: Feet				
(1942) 0–3	14·5	10·6	6·6	1·3
(1943)	14·4	10·5	6·1	0·8
(1942) 3–5	11·4	8·3	6·0	1·0
(1942) 5–6	9·1	6·6	5·2	0·8
West of Kenora Highway: Feet				
(1943) 1–3	11·5	8·4	8·8	1·0

The moss from the eastern section, which near the corduroy road showed promise of a good grade for that part of the bog, becomes dark in colour less than 1,000 feet westward. It is a mixture of humified and fibrous peat and is high in ash and of inferior quality, as is also the moss of the part of the bog west of Kenora Highway. These peats have possibilities for local uses for gardens and for sanitary purposes. The western section east of the Kenora Highway would yield a marketable peat moss.

Drainage of the bog is possible westward into a creek crossing the western part of the bog and discharging into Everett Creek. The east end of the bog at Barnhart drains into La Vallee River and both streams empty into Rainy River.

Bog in Blue Township

A fairly large bog of undetermined area covers parts of sections 38 and 39 in Blue township, Rainy River district. It can be reached by the Spohn road, which crosses the bog in a north-south direction. Samples were collected along a line 500 feet east of and parallel to the road, the average depth recorded being 6 feet, 2 to 3 feet of which consists of only slightly humified, fairly light brown moss, light in weight, and elastic. In the 3- to 6-foot stratum there is an admixture of humified peat, and the colour of the moss becomes appreciably darker and the ash content increases. The samples analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Average from 3-foot top cover	13·0	9·5	5·0	0·9
3–6 feet	9·2	6·7	8·5	1·7

The quality of the moss in the top stratum approaches the lower limit set by United States specifications in regard to absorptive value; but the ash content would be acceptable. Below the 3-foot level, however, the quality is much lower. As the bog is large, moss of higher grade may yet be found and further exploratory work is merited. The only development work has been the digging of the ditches along the Spohn road, which to some extent drain the adjacent bog. If the ditches were deepened they could be used to drain the bog southward.

Bog in Shenston Township

This bog of about 160 acres covers the northwest corner of section 24 and part of section 25, Shenston township, and is 4 miles north and ½ mile west of Barwick. It can be reached by a good country road which crosses the bog. The surface is open and the bog is wooded at the edges. The top growth is mainly sphagnum moss and there is some eriophorum, bog rosemary, and labrador tea. The bog is already partly drained by ditches that run on each side of the road and that empty into a creek. Apart from this there has been no development.

Test-holes drilled along a line parallel to the road record a 6-foot cover of moss fairly uniform in quality, light brown, light in weight, and only slightly humified. A sample analysed as follows:

Composite of	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
6-foot stratum	13·9	10·2	7·2	0·9

The absorptive value and the ash content are higher than was expected from the examination of the moss when sampled, and a check sampling is, therefore, desirable. The deposit merits further investigatory work.

Grass Bog

This large bog land, in Rainy River district, covers sections 10, 11, and 12, Curran township; sections 7 and 8, Worthington township; sections 17 and 18, Blue township; and sections 45, 46, and 47, Wild Land township. Part of this area has been drained for agriculture and pasture. Where examined the peat was found to be well humified and unsuitable for litter. The vegetation appears to be mainly grasses and sedges and there is no sign of growing mosses.

Bog in Mather Township

This is a fairly large bog of undetermined area in ranges II and III, lot 10, Mather township, Rainy River district, 1 mile east and 2½ miles north of Chapple. It has wide open areas and the edges are fairly heavily wooded. The growth is heavy sphagnum moss with some eriophorum, and immediately underlying the top growth is well-humified fuel peat. Only the southern part of the bog was examined. In view of the heavy growth of sphagnum the deposit may contain peat moss in other areas, and deserves further investigation.

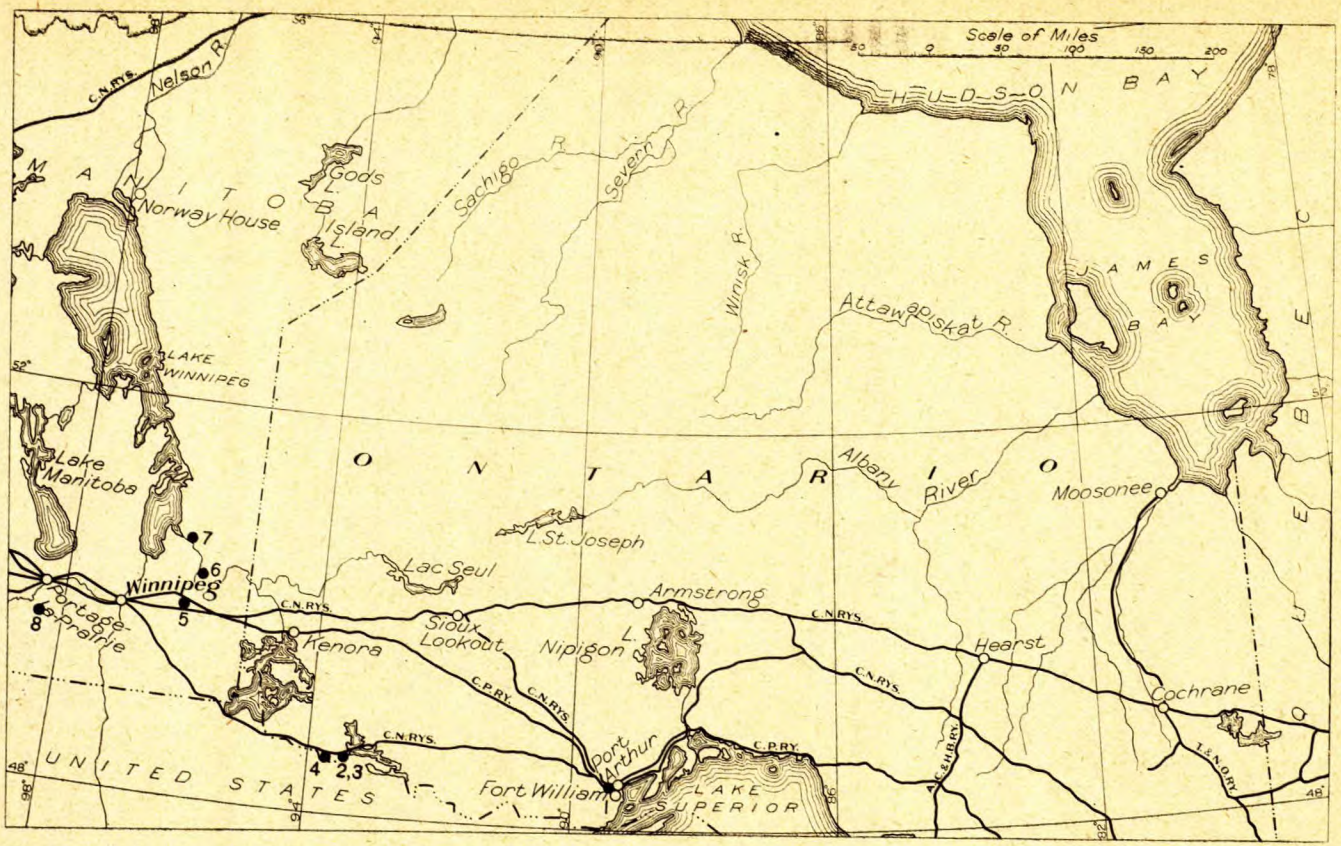


Figure 9. Index map of northern Ontario and Manitoba showing locations of peat bogs. **1,** Arthur and Twin Cities; **2,** Fort Frances; **3,** Crozier or Arctic; **4,** Polar Bear and Carpenter twp., etc.; **5,** Julius; **6,** Lac du Bonnet, Brightstone, Transmission, etc.; **7,** Pine Falls; **8,** Leclair.

CHAPTER X

PEAT BOGS IN MANITOBA

There are several large deposits containing peat moss in Manitoba, but the Julius bog is the only deposit that is being operated on a large scale. From two smaller bogs an occasional carload or truckload of bales or loose moss is produced.

The peat moss on the large bog on the Mafeking - The Pas Highway appears to be of low quality, though several months would be required to examine the deposit in sufficient detail to arrive at any definite opinion as to the quality of the moss. Some of the bogs in the Lac du Bonnet area merit attention, and the large bog at Pine Falls may warrant development for the production of a certain type of peat. In the main, however, the results of investigations in this area and in the area south of Portage La Prairie are not encouraging.

Julius Bog

The Julius, or Shelley bog, is 42 miles east of Winnipeg, between the Julius and Whitemouth stations on the Canadian Pacific Railway and extends over wide areas north and south of the railway. Its total area was estimated by Anrep[1] at 4,000 acres. It was later estimated that an area of about 1 square mile contains sufficient moss for profitable operation. Winnipeg Supply and Fuel Company has acquired the part of this area north of the railway, comprising 500 acres; and McCabe Bros. Grain Company, the part south of the track, comprising about 120 acres.

The square mile of workable bog forms a single block of high moor, and has a large open area in the middle. The depth at the centre of this open area is 15 feet, of which 10 feet is moss of very good quality. Toward the edges, however, the depth decreases and the moss becomes darker and more humified with an intermixture of carex, peat, and roots of trees. The growth in the open area is chiefly sphagnum moss, with some carex towards the edges, and a smaller amount of aquatic plants. The moss is light yellow, only slightly humified, elastic, porous, and appreciably lighter in weight than the mosses produced in Eastern Canada. Beyond the open area are wooded areas of spruce, tamarack, poplar, and low bush, with an insignificant cover of moss.

Analyses of peat products from the Julius bog were as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Top 4-foot stratum, centre of bog	21·2	15·7	3·7	0·9
Processed peat moss mull	15·6	11·4	6·9	0·7
Poultry litter	21·3	15·7	4·9	0·5

The absorptive value is quite high for the raw peat and the poultry litter; it is satisfactory for the mull, which usually runs higher in ash and lower in absorptive value than is shown in the above analyses.

The north end of the bog is drained by a large drainage canal that runs east and west, with laterals running north and south. The main canal is 8 feet deep, 4 feet wide, and 8,000 feet long, and it connects with Whitemouth River. The drainage system on the south end of the bog has not been completed. It cannot

[1]Anrep, A.: "Investigation of Peat Bogs and Peat Industry of Canada"; Mines Branch, Dept. of Mines, Canada, Rept. No. 151, p. 24 (1910-11).

be connected with the main drain on the north end of the bog because of the absence of culverts under the railroad bed, and, accordingly, it is carried eastward toward Shelley.

The surface of the workable parts of the areas acquired by the two above-mentioned companies has been cleared of trees and bush. It is dry and is of sufficient bouyancy to support tractors and trailers for transportation of the dried sods to the storage piles.

The equipment on the part of the bog north of the railway consists of Ford tractors and trailers and of large stack sheds, with covered sides, loaded by portable conveyers. Permanent conveyer belts bring the sods from the sheds to the baling plant, which is equipped with a shredder, shaking screens, and a baling press.

McCabe Bros. Grain Company, Limited erected a similar plant at Shelley station in 1942. The air-dried sods, of which the company had produced a considerable quantity, are stored in large stacks on the drying-field.

Transmission Bog

This bog is in sections 19 to 21 and 28 to 30, township 15, range XII. The total area was estimated by Anrep[1] at 1,375 acres. The peat is chiefly fuel peat and is not of very good quality because of its high ash content, as shown in the analysis below.

Analysis of peat (dry basis):

	Per cent
Volatile matter	56·8
Fixed carbon	24·2
Ash	19·0
Nitrogen	1·6
Phosphorus	0·047
Fuel ratio: fixed carbon/volatile matter	0·43

Several smaller areas in the bog contain peat moss. On one of these south of the highway, where it crosses the transmission line, is a stratum of moss of 2 to 3 feet deep. The moss, especially the 1-foot top stratum, is of good quality, light yellow, elastic, and light in weight. A sample of the peat moss analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
1-foot top stratum	22·1	16·3	3·9	0·6
2-foot underlying stratum	13·3	9·6	9·2	1·3

The moss-bearing area cannot be easily estimated because of the heavy growth of trees and bush. Notwithstanding its high quality the deposit could be worked on a small scale only, and it is questionable whether the expense of clearing the surface would be warranted.

Lac du Bonnet Bog

This fairly large bog west of the village of Lac du Bonnet consists chiefly of fuel peat, except for an area of 30 to 40 acres that has a good grade of peat moss. This area can be approached by a road from Lac du Bonnet railway station, running west of and parallel to the railway track for 2 miles, and then runs ½ mile south. The cover of peat moss has a depth of 2 to 5 feet and underneath is a stratum of well-humified peat. A sample of the moss analysed as follows:

[1]Anrep, A.: "Investigation of Peat Bogs and Peat Industry of Canada"; Mines Branch, Dept. of Mines, Canada pt. No. 151, p. 19 (1910-11).

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Average of the moss cover.....	23·0	17·0	3·2	0·5

The peat moss is of excellent quality. It is light brown, elastic, and light in weight. The bog is operated by Norman McMillan, Lac du Bonnet, Manitoba.

Brightstone Bog

This bog is on section 14, township 15, range X, in the Lac du Bonnet area and can be reached by a good road running 1½ miles north from Lac du Bonnet village, then 1½ miles west. The area is about 600 acres. The bog is level and has some spruce islands and extends beyond these for about 1 mile. The growth consists almost entirely of sedges, though there are some aquatic plants. No cover of moss was noticed.

The peat strata are rather shallow, the upper, of a thickness of 2 feet, being fibrous peat, and the underlying 2 feet, well-humified peat. The fibrous peat structure is rather compact. It is dark in colour and is a mixture of fibrous and humified peat. Samples were collected of the 2-foot stratum on a line in the centre of the bog at right angles to the road. These analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
2-foot stratum.....	11·9	8·7	8·1	2·4

The peat is composed of residues of sedges. The absorptive value approaches the lower permissible limit, and the ash content is quite high. The percentage of nitrogen indicates high value as a plant food. Presence of humified peat would tend to make a dusty bedding litter. It is not a particularly good peat, but is suitable for local uses in market gardens, horticulture, and for sanitary purposes. It is not suitable for export.

Bog East of Winnipeg River

This bog is 2 miles east of Winnipeg River in a direct line east of Lac du Bonnet village. It has an estimated area of more than 1,000 acres, but is broken by ridges of rock and gravel. On the bog is a heavy growth of tamarack and spruce, with occasional small clearings. The surface growth is sphagnum moss, some hypnum moss, and sedges. The bog is traversed by a road running east and west. It is very wet and impassable and, accordingly, samples could be collected only along the road. The stratum of moss has a depth of from 4 to 5 feet, and underlying this is peat of higher humification to a depth of 2 to 3 feet. The upper peat stratum is dark brown and becomes darker with depth. A sample of the lighter-coloured peat analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Lighter-coloured peat.	9·8	7·1	8·3	2·0

The moss is of inferior grade and is not suitable for export.

Bog West of Winnipeg River and Brookville Road

This bog is in township 14, range XI, and is estimated to be about 6 miles long and 3 miles wide. It can be entered from a point on the Brookville road

near the power plant between Sieg Corner and Lac du Bonnet, then by forest trail for about 1½ miles. It has a heavy cover of live sphagnum moss with virtually no other growth of low plants. There are occasional fair-sized clear spaces. The bog was dry when visited.

Samples were collected from the southeast corner of section 6 and from section 5 on a line continuing westward. The depth at both localities is fairly uniform, the depth of moss stratum recorded by drilling being from 4 to 5 feet. The samples analysed:

Samples from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Section 5, SE. quarter:				
0-3 foot	10·6	7·7	7·4	0·8
Section 6, SE. corner:				
0-3 foot	14·4	10·6	11·0	1·2
3-5 foot	11·7	8·5	12·0	1·2

The composition is fairly uniform. The absorptive value is rather low and the ash content is quite high. This is surprising, judging from the appearance of the bog, and as the samples when collected in drilling showed promise of a much higher grade of moss. A systematic sampling covering the entire bog might yield better results both as to depth and the quality of the moss. A 2-mile road would have to be built to connect with the Brookfield road and from there it is 12 miles to Molson, the nearest railway station. Drainage can be had east to a creek discharging into Winnipeg River.

Bog near No. 1 Highway

This bog is on section 9, township 13, range X, Lac du Bonnet area, and lies 1 mile north of Highway No. 1 from Winnipeg to Kenora. It can be reached from the highway by a road running northward between sections 2 and 3 for 1 mile to a gravel pit, thence west across country for about half a mile. The deposit consists of a chain of three bogs running northwest and southeast, the southern part covering 160 acres, the centre part 320 acres, and the northwestern part 80 acres. Though there were heavy rainfalls just before the visit in September 1942, and a summer that was generally wet, the bogs were traversable dry shod, indicating natural drainage. Further drainage is possible for the southern and central lobes to a creek running in an easterly direction to Winnipeg River, and from the northern lobe to a creek on section line 9, running east into Winnipeg River.

The surface is covered with a heavy growth of sphagnum and there is only a slight growth of other bog plants. The southern part is open and has a depth of 5 feet of a mixture of fibrous and humified peat, which becomes less humified as it approaches the centre bog. The latter is covered with trees, mostly spruce 8 to 10 feet high, and can be traversed without difficulty.

Several holes were drilled and samples were collected on the centre bog to an average depth of 15 feet. In drilling the holes no roots were encountered below the top cover.

Analyses of the peat moss of the centre bog:

Composite sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Feet				
0– 4	16·8	12·3	3·9	0·8
4– 8	17·2	12·6	3·9	0·7
8–12	15·6	11·4	6·9	0·7

The stratum to the 12-foot level is uniform in composition and of very good quality, low in ash, and of high absorptive value. The peat moss is light yellowish brown, only slightly humified, light in weight, and should yield a good grade of commercial moss. Below this is a 3-foot stratum that is darker and is much humified.

The northwestern lobe is somewhat spotty in quality, but good moss is obtainable above the 7-foot level, similar in quality to that of the centre lobe.

The deposit appears to be a good prospect for a fair-sized production of good quality peat moss and, accordingly, merits attention.

Pine Falls Bog

This bog begins 2½ miles southwest of the Canadian National Railway station at Pine Falls. It extends 7 miles east and west and 10 miles north and south, and has a flat surface. The railway crosses the bog and there is a long siding at Milepost 12. In the main it is an open bog, the growth being chiefly sedge and reed, with some small birch and tamarack and spruce. No growing sphagnum moss was noted. Several rock islands emerge from the deposit. Holes drilled parallel to the track revealed depths of 3 to 5 feet. The upper stratum of 2 feet is only slightly humified and is light brown and fairly elastic. Underlying this is a bed of fairly well-humified peat, the upper part of which is somewhat granular and intermixed with fibrous peat. Analyses of the peats were as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Upper stratum, 2 feet	14·4	10·6	8·9	2·7
Lower stratum, 2-5 feet	8·9	6·5	8·4	3·4

The upper stratum is of fair quality in regard to absorptive value, but the lower stratum is well below standard requirements of a good peat moss. Ash content and the plant food value in both samples are high, this being the usual condition with peats composed of the residues of sedges and reeds. The lower stratum is of inferior value as a litter, owing to its low absorptive value.

Near the railway the bog is partly drained by ditches connected with streams, one running north at Milepost 12 and the other at Milepost 17. Both ditches empty into Winnipeg River.

The bog is undeveloped. Though the unhumified peat stratum is shallow it may be possible to work the top stratum for horticultural and compost peat, as the deposit is very large, easily drained, and transportation facilities are favourable. Sedge peats are not considered suitable for litter because of the friability of their fibres and the high ash content.

Bog on Henry Leclair's Farm

This bog is 5 miles north of Highway No. 2, on a country road 3 miles east of St. Claude, which is about 20 miles south of Portage la Prairie. It has neither drains nor buildings. The sods are dug and transferred to high ground to dry. A sample of the peat moss analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
2-foot stratum	16·7	12·3	7·6	1·7

The moss is of good quality in regard to absorptive value and plant food, but the ash content is somewhat high. The moss is fairly light brown, light in weight, and elastic.

Cowan Bog

This bog is on the west side of No. 10 Highway, 2 miles north of the hamlet of Cowan. It is a small bog with a pool in the middle. At one time it was worked for the production of insulating material and supplied insulation for several buildings in towns in Saskatchewan. Unfavourable working conditions on the wet, undrained bog and the long distance to the market made operation unprofitable.

Novra Bog

This bog is due east of Novra station on the Canadian National Railway and can be reached by a secondary road off No. 10 Highway, then by forest trail for about 1 mile east of the track, from where it extends toward Swan Lake. The bog is large, but its area has not been determined. The northwestern part is heavily timbered and cannot be cleared except at high cost. On the eastern part there are fewer trees and they are appreciably smaller. The growth consists of a heavy cover of sphagnum moss, labrador tea, and of sedges in the open spaces, especially where large and small pools of surface water prevail. In the main the bog is wet and is difficult to traverse.

Samples were collected from several drill-holes on a line run due eastward through the centre of the bog for about three-quarters of a mile. The holes showed an average depth of 4½ feet of fibrous moss with an underlying stratum of 2 feet of partly humified peat.

Samples of the moss taken of the 4½-foot stratum of fibrous peat analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
4½-foot stratum.....	8·7	6·3	15·8	1·6

The peat moss is dark brown, and consists of an intermixture of humified and fibrous peat. It is of little or no commercial value, especially since it lies in a sparsely inhabited district.

Bog on Mafeking-The Pas Highway

This bog extends from Mileage 42 on Mafeking-The Pas Highway northwestward on both sides of the highway to Mile 53. Some estimates place the total area at over 100 square miles. Owing to the deep drainage canals on each side of the highway, access to the bog was possible at two places only, namely, on the east side at Mile 49 and on the southwest side at Mile 52½. Examination was made and samples were taken from these points of access on lines that were run to a fairly representative part of the bog.

The part east of the highway is being used by the Manitoba Government as a preserve for fur-bearing animals, the growth being sedges and sphagnum moss in isolated patches. It is heavily timbered with tamarack and spruce. The drill-holes record a total depth of 4 to 4½ feet of peat stratum that rests on blue clay. The top 3 feet is fibrous and the moss becomes darker and more humified toward the bottom.

The area southwest of the highway consists of large open spaces fringed with trees, which are larger towards the edge of the bog. Entrance was made at a culvert at Mile 52½, where there is a rather heavy growth of tamarack and spruce for about a quarter of a mile into the bog. Beyond this, are wide open areas. The growth is a heavy cover of sphagnum moss, labrador tea, bog

rosemary, sedges in patches, and occasional dwarf spruce. The peat moss stratum as recorded by several drill-holes has a fairly uniform depth of 4½ feet, of which 3 feet is fibrous moss of light colour, the remainder being a mixture of fibrous and humified peat. The fibrous peat is identical in appearance with that from the east part of the bog.

Analyses of the samples from the two localities were as follows:

Samples from	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
East of highway at Mile 49	8·2	5·9	9·6	2·5
Southwest of highway at Mile 52½	8·6	6·2	21·4	2·3

The ash content of the peat moss from the area southwest of the highway is excessively high, but in all other respects the peats are identical. The peat moss is of inferior quality. The examination of this bog, like that of the preceding one, was cursory, however, as it would take months to examine the entire area. Thus, it is possible that the bog contains a greater thickness of moss, although this does not seem likely, especially in view of the similarity in quality of the samples from the two areas 4 miles apart.

Early development of the bog is not likely, in view of the apparently low quality of the peat moss within convenient distance of the highway, the scarcity of labour in the area, climatic conditions, which are probably less favourable than those in the southwestern part of the province, and the necessity of a haulage by road of over 50 miles to the nearest railway station at Mafeking, which lies far distant from the market for peat moss. Drainage of the bog would be difficult, as there is a ridge of high land between the bog and Overflowing River. Ditches 7 to 8 feet deep and 10 feet wide, with a depth of water of 5 to 6 feet, follow the highway. At the south end of the bog are two lateral ditches at right angles to the main drains, in which the flow of water is barely perceptible. Efficient drainage to a 4-foot level would thus involve an appreciable outlay in lowering the drains.

Whirlpool Lake

Peat moss was reported to have been discovered in the vicinity of Whirlpool Lake in Riding Mountain Park, but a visit revealed no peat moss deposit. Some marshland almost surrounds the lake and there are occasional patches of sphagnum moss in the timbered area south of it.

Douglas Marsh

No moss was found at Douglas. The reported bog land is a marsh with growth of reed and some sedge.

CHAPTER XI

PEAT BOGS IN SASKATCHEWAN AND ALBERTA

The investigation yielded no practical results beyond ascertaining the extent of the peat moss deposits and the classification of the peats they contain. No new deposits of commercial grades of peat moss were recorded within reasonable shipping distance of the available market. Few of the bogs contain a good grade of peat moss and where such was found the depth of the peat moss strata is 2 to 4 feet only. Many were heavily timbered and the clearance of trees, roots, and thick bushes would require a considerable outlay.

SASKATCHEWAN

Bog in Township 15

This bog covers the northwest half of section 13 and the southwest part of section 24, township 15, range X, west of 2nd meridian, the distance to the Canadian National Railway being 14 miles. The greater part of the bog is heavily timbered with the same type of trees as the bog in township 50, described below, the growth being so dense that tree roots made drilling to the bottom stratum impossible in most cases. The growth between the trees is chiefly a heavy cover of sphagnum moss.

The peat has a depth of 2 feet in the central part of the bog and is a mixture of fibrous and humified peat of inferior quality. A sample analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
2-foot peat stratum...	7·3	5·3	13·0	2·6

Bog South of Mistatim and Peesane

According to the Provincial Forest Service this bog is 10 to 12 miles in length and 6 miles in width. It runs south of and parallel to the Canadian National Railway between Mistatim and Peesane. It is heavily wooded with small spruce, tamarack, and birch. The bog was soft and wet and was difficult to traverse. The growth is chiefly sphagnum moss, with hypnum and sedge in the open spaces. The moss stratum is 4½ to 5 feet in depth and rests on well-humified peat that is packed so solidly that it could not be penetrated with the sampler drill. Samples were collected along a winter road crossing the centre of the bog due south from a point half a mile south of Fraser's lumber mill near Mistatim. A sample of 4-foot peat moss analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
4-foot stratum.....	11·7	8·6	11·1	1·5

The peat moss is of inferior quality.

Kinistino Bog

This bog is 4 miles south of the village of Kinistino on the Canadian National Railway. Most of it has been reclaimed for agricultural use, the water being

held back by a dam 4 miles farther south. The reclaimed land below the dam is well drained and is used for growing hay. Above the dam the land is flooded. There are some small marshy islands with growth of reed and sedge. No growth of sphagnum or other mosses was noticed.

Carrot River Bogs

The bog land begins about 6 miles west of Carrot River village and with some interruptions continues for about 16 miles farther eastward. A large part of this area has been drained and reclaimed for agricultural use. The peat ploughed in and mixed with the loam produces a very fertile, moisture-retaining, light soil in an area of 145 square miles which is under cultivation. This is probably the first large-scale test in Canada of the beneficial effect of peat moss on farmland. Results have been very gratifying and the yield from this soil remarkably high. The larger part of the reclaimed land is producing heavy crops of oats, barley, and potatoes, and the remainder wheat, and forage crops.

Bog No. 1

This bog is in township 50, range IX, sections 2, 3, 4, 9, 10, 13, 14, and 15. Section 2 was selected for examination, as it is most favourably situated in regard to transportation, being traversed by the highway 4 miles from the gate entering the Pasquia Provincial Forest.

The bog is heavily timbered with black spruce and tamarack. The 4-foot stratum of peat moss in the timbered area was sampled on a line run for about 2,500 feet through the centre of section 2. A sample of peat moss analysed as follows:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Peat moss.....	16·3	12·0	9·5	1·1

Apart from the rather high ash content the quality appears good. It is possible that a 3-foot, or even a 3½-foot stratum of peat moss would have an appreciably lower ash content, as this content has a tendency to increase toward the bottom. In any event it is doubtful whether this bog would be an attractive prospect owing to the rather long haul to the railway, the long distance by rail to the nearest market, and the high cost of clearing the bog.

Bog near Prince Albert

This bog is in the southwest section of Prince Albert and has an area of about 300 acres. It is heavily timbered with fair-sized trees and has a thin cover of sphagnum moss, immediately underlying which is a stratum of black well-humified peat. The deposit is not of commercial importance, nor are two small bogs in the same vicinity that contain well-humified peat.

Bittern Creek Bog

This bog is 14 miles northeast of Waskesiu, and there is no road or trail leading to it. Forest rangers of the Lands, Parks, and Forests Branch at Ottawa state that it is a floating bog and that it is impassable between the spring freshet and the freeze-up.

Waskesiu Bog

This bog is 7 miles northwest of Waskesiu on the north side of the Waskesiu-Montreal Lake Road in Prince Albert National Park and has an area of about 500 acres. There is an appreciable growth of large trees. A heavy cover of sphagnum moss rests on a stratum of black, well-humified peat clay subsoil.

The deposit is of no commercial value. There are several smaller sedge bogs between this bog and Waskesiu, but they are not of commercial importance.

ALBERTA

A peat moss bog 5 miles west of Edmonton on the Jasper Highway has been operated for some several years by Moss-Tex, Limited, of Edmonton. The company produced horticultural moss, poultry litter, insulating boards, and loose moss for the building trade, and moss pads. The pads are used in packing asparagus cuttings for shipment to keep the vegetable moist and fresh until marketed. The bog has an area of 60 acres, with a cover of peat moss of good quality to a depth of 3 feet. Below this the peat becomes darker and more humified and is used as raw material for the manufacture of insulating boards. Analyses of peat moss products of Moss-Tex, Limited:

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Poultry litter.....	17·5	12·8	8·0	1·0
Horticultural moss....	15·6	11·5	7·5	0·9
Peat moss pads.....	12·8	9·4	9·2	0·9

As the analyses were made on air-dried products the absorptive values are appreciably lower than those of the moss in its natural state. The ash content is rather high. The moss is light greyish yellow, light in weight, and elastic.

The deposit is nearly depleted. In the adjacent bogs the long period of dry weather prior to 1939 caused the destruction of the fibrous peat. Operations ceased at this bog in 1944.

No other bogs have been examined in Alberta. Requests had been made for the investigation of bogs south of Edson on the Canadian National Railway, between Edmonton and Jasper, but botanists of the University of Alberta stated that the bogs are not accessible by road and that the type of moss is preponderantly hypnum, reed, and sedge, and is of inferior quality.

CHAPTER XII

PEAT BOGS IN BRITISH COLUMBIA

FRASER VALLEY

The largest scale peat moss operations in Canada are those in the Fraser River delta near New Westminster. Two or three companies were operating in this area prior to 1939, but the large-scale exploitation of these deposits dates from 1941-42, and by 1944 slightly more than half the Canadian production came from this small area.

Because of the large production by many operators within a comparatively small area in British Columbia, speculation as to the probable time of depletion of these deposits has assumed importance. Earlier estimates placed the tonnage for this area at a very large figure, but they were based on much greater depth of the peat moss than will produce a moss of a quality acceptable to the trade. The stratum of moss of high quality varies in depth. In some places it is as much as 7 feet, but a depth of 3 feet is considered the average. As this stratum is of exceptionally high grade, very low in ash, and of high absorptive value, the inclusion of one foot from the underlying stratum of somewhat inferior quality would still yield a very good grade of peat moss, readily acceptable by the export and domestic market. Below the 4-foot level there is an appreciable drop in the quality of the peat moss. Some producers estimate that, at the rate of production in 1943, this 4-foot stratum of the bog will be depleted in 10 years. The land stripped of its best peat moss, however, becomes valuable farm land, suitable for growing small fruit and vegetables that thrive on an acid soil, especially since it has become well drained in working the bog for peat moss.

One of the largest peat companies, which has been in production for several years, is utilizing the depleted part of the bog for growing blueberries, and has for some years been planting 15,000 cuttings of blueberry bush from plants obtained by cross-breeding at the company's experimental farm on the bog.

The peat bogs in this area were examined and reported on by A. Anrep in 1927,[1] and those under development in 1944 were the Pitt Meadows, Byrne Road, Lulu Island, and Delta or Burns Bog.

Pitt Meadows

This bog is situated on the south bank of Alouette River near its junction with Pitt River, a tributary of the Fraser. It is one of the smaller bogs, having an area of about 600 acres, and has been worked for some years, producing peat moss and asparagus pads for the export trade. The bog yields a good quality moss with an absorptive value of 20 to 25 on the dry basis, but it is not so favourably situated in regard to drying conditions as are the bogs farther down the valley.

Byrne Road Peat Bog

This bog lies southwest of, and close to, New Westminster on the north bank of the north arm of Fraser River. According to Anrep it has an area of approximately 1,500 acres, of which 800 are under cultivation. The remaining 700 acres contains high-grade moss with a maximum absorption factor of about 23. The originally estimated content of 6 million cubic yards of peat moss in this bog is subject to considerable reduction, since it was based on a much greater depth of peat moss than will produce a moss of a quality acceptable to the

[1]Geol. Surv., Canada, Sum. Rept. 1927, pt. A, pp. 53–61.

trade. Four companies are operating on the bog, producing horticultural and poultry litter.

The quality of the moss is shown by the analyses in the following table:[1]

—	Samples from depths of		
	0–3 feet	3–7 feet	0–6 feet
Sample No. I, from south of B.C. electric railway—			
Absorption factor for moisture-free peat	23·2	14·6	....
Absorption factor for peat with 20 per cent moisture	18·5	11·7	....
Ash (dried at 105° C.)	....	3·4%	....
Sample No. II, from north of B.C. electric railway, east part of bog—			
Absorption factor for moisture-free peat	....	....	9·3
Absorption factor for peat with 20 per cent moisture	....	....	7·4
Ash (dried at 105° C.)	....	....	4·3%
Sample No. III, from north of B.C. electric railway, west part of bog—			
Absorption factor for moisture-free peat	....	....	11·5
Absorption factor for peat with 20 per cent moisture	....	....	9·2
Ash (dried at 105° C.)	....	....	4·3%

[1]Geol. Surv., Canada, Sum. Rept. 1927, pt. A, p. 56.

Lulu Island Bog

This bog lies at the eastern end of Lulu Island on the south bank of the north arm of Fraser River. According to Anrep it has a total area of 3,300 acres, of which 1,600 acres have been destroyed by fire. At present, the peat on the northern and southern edges is being developed. Drillings indicate a thickness of peat varying from 2 to 20 feet. The lower sections are quite highly humified, but the upper layers consist of good grade moss. Three plants are operating on the northern section and three on the southern. They produce litter and asparagus pads.

The quality of the moss is shown by the analyses in the following table:[1]

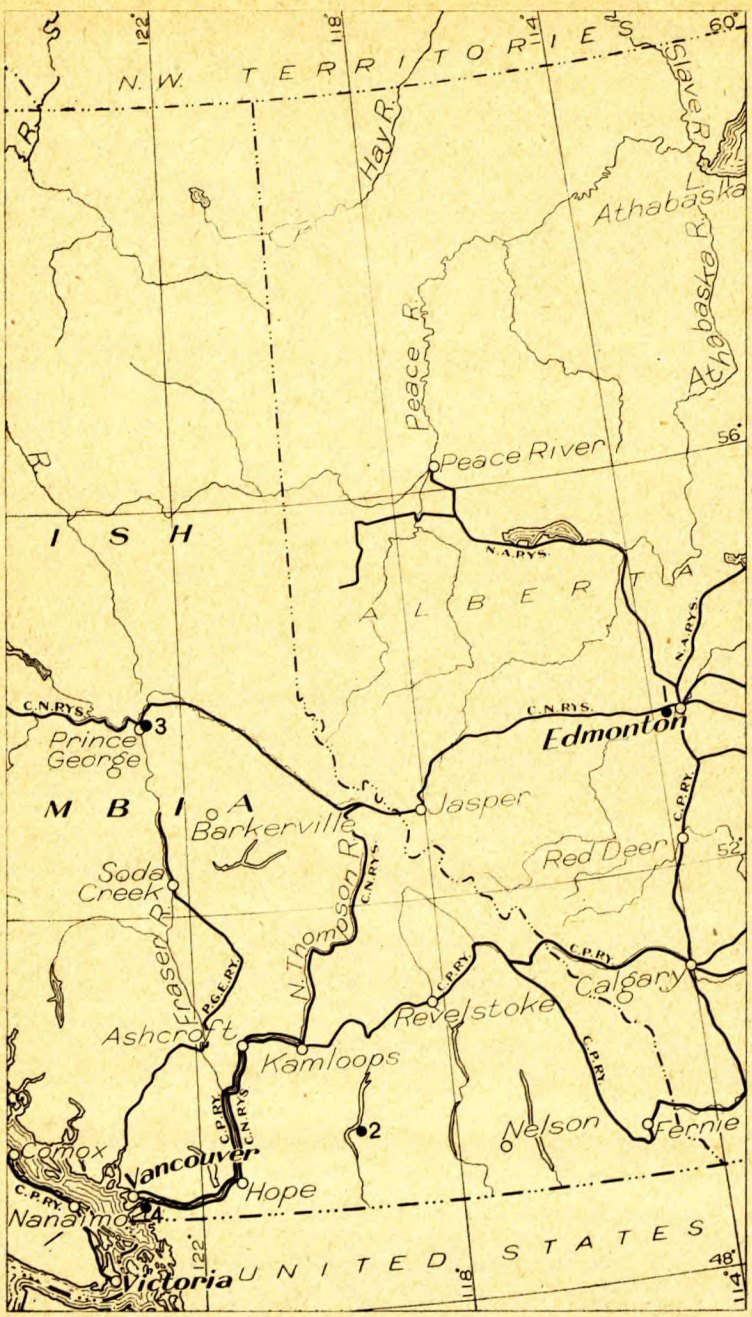
—	Samples from depth of		
	0–3 feet	3–7 feet	0–6 feet
Sample No. I, from southeast part of bog—			
Absorption factor for moisture-free peat	16·3	14·0	....
Absorption factor for peat with 20 per cent moisture	13·0	11·2	....
Ash (dried at 105° C.)	....	2·6%	....
Sample No. II, from central part of bog—			
Absorption factor for moisture-free peat	17·7	14·2	....
Absorption factor for peat with 20 per cent moisture	14·1	11·3	....
Ash (dried at 105° C.)	....	3·0%	....
Sample No. III, from western part of bog—			
Absorption factor for moisture-free peat	....	....	9·8
Absorption factor for peat with 20 per cent moisture	....	....	7·9
Ash (dried at 105° C.)	....	....	5·6%

[1]Geol. Surv., Canada, Sum. Rept. 1927, pt. A, p. 57.

Delta or Burns Bog

This is the largest bog in this area and it lies on the south bank of the main Fraser River. It is favourably situated as regards transportation facilities, and

Figure 10. Index map of Alberta and British Columbia showing locations of peat bogs. **5,** Graham Island.



1, Edmonton; 2, Kelowna; 3, Prince George; 4, Delta, Pitt Meadows, Lulu Island, etc.;

good roads almost encircle the deposit. The main line of the Great Northern Railway skirts the eastern boundary.

The total area was estimated by Anrep to be over 10,000 acres, but the present estimate of moss-bearing area is 5,000 acres, with a depth of from 2 to 10 feet. The quality of the moss is very high in the upper stratum, but there is a marked decrease in quality below the 3-foot level, as shown by the following analyses.

Depth	Absorptive value		Ash %
	Dry basis	20% moisture basis	Dry basis
Feet			
0– 3	25·5	20·6	1·6
3– 6	15·9	12·7	2·6
6– 9	12·7	10·2	3·7
9–12	11·3	9·0	5·3

Two companies were operating on the bog: the one operating at the eastern end, which produced moss for use in the production of magnesium during World War II, was the largest individual producer in Canada; the other produced moss by an artificial drying method, details of which are given in paragraph (3) below.

NOTES REGARDING OPERATIONS IN THE FRASER VALLEY AREA

(1) As a result of the short harvesting season in the Fraser Valley, where the autumn rains start about the middle of September, harvesting operations have been largely mechanized. The general system of operation requires a field railway or permanent conveyer system extending from the storage sheds, or baling mills, to the end of the bog. Movable conveyer belts, made of heavy chicken wire and steel cable, feed the main conveying system. These conveyer belts are moved down the field as harvesting proceeds, and, given an adequate supply of labour, the whole season's cut can be harvested in two or three weeks. This system is practically universal on all the bogs. However, two other methods are also in use.

(2) At one bog the peat is harrowed to a depth of 2 or 3 inches, allowed to dry, raked up into windrows and then hauled to the storage sheds. This system has several advantages, but is not applicable to all bogs.

(3) At another bog the peat is excavated hydraulically with high-pressure water jets and the slurry, consisting of a mixture of water and peat, is pumped to the factory where it is first screened. Then it is dried artificially by passing it through vacuum filters and press rolls similar to those in a paper-making machine. The peat leaves the machine in the form of a mat about a quarter of an inch thick. This is disintegrated and then shredded to the required sizes and baled for shipment. This method has the advantage of being independent of the weather, but the water requirements are large. In addition, coal or fuel oil is required to supply the necessary heat.

(4) In view of the probable depletion of high-grade moss in the Fraser Valley, much attention has been given to other deposits in British Columbia that have been reported to contain peat moss, principally on Graham Island, the northern island of the Queen Charlotte Islands group, and in the vicinity of Prince George. Investigations of these deposits, however, do not hold out much hope of any large supply of moss.

BOGS ON GRAHAM ISLAND

Some small bogs are situated between Tlell and Port Clement. They begin about 2 miles northwest of Tlell and continue, with interruptions, northwestward to Woodpile Creek. The topography is rolling land with occasional small deposits of peat in the depressions between the ridges of dry land. The land is difficult

to traverse owing to fallen trees, and this state must have existed for some time past as the trunks of the trees are bare of bark and are of light grey colour. These show up white on the aerial photographs taken shortly before the investigation, suggesting open spaces of about 12 square miles that do not exist, and so gave a misleading idea of the nature of the bog lands.

A road crosses the centre of the bog land northwestward from Tlell to Port Clement. A few miles at each end it is gravelled, but on the bog for about 6 miles it consists of planks laid on ties with occasional meeting places for cars to pass. Samples were collected from a line parallel with the road from small pockety deposits of peat moss. There is little likelihood that the bog will be developed for production of peat moss, unless areas inaccessible at the time of the investigation are found to contain large spaces of open bog. Judging from the nature of the bog land in general, such expectations are unwarranted.

The bog is a splendid feeding ground for wild life, of which there is great abundance—deer, bear, and game birds—and its existence, undisturbed as it is at present, serves an important purpose in contributing to the meat supply for the inhabitants on the island.

The bogs, wherever entered, were dry and traversable, pools of surface water were found only in occasional low parts. Several creeks and rivers run from the bogs. The Tlell River crosses the bog land in two places and one of its tributaries makes a deep bend through the southeast end. One of the two tributaries of the Mayer River penetrates to the centre, and the other traverses the entire width at the middle of the bog. Woodpile Creek crosses the northwest end. The flow in these creeks is very slow and sufficient fall of land for good drainage is questionable.

Descriptions of the deposits of peat moss on the Tlell-Port Clement road follow.

Woodpile Creek Bog

The bog begins 200 yards east of Woodpile Creek. It is a small open bog of about 20 acres, surrounded by brush country with trunks of dead, fallen, and upright trees up to 8 inches in diameter. The surface growth is sphagnum moss, a heavy cover of 18 inches of top moss, bog rosemary, labrador tea, crowberry, and sedges. The bog is slightly dome-shaped at the summit, at which the moss cover is thickest. Underlying the moss cover is fairly well-humified peat. The total depth of the deposit is 10 feet, consisting of humified peat, with no stratum of peat moss. The abundance of roots makes it difficult to drill a hole to the bottom with the peat sampler. The bog was dry and easily traversable, with no evidence of surface water.

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Live top moss, 18 inches thick.....	23·6	17·7	5·8	0·8
2-foot underlying stratum.....	4·7	3·3	5·8	1·3

The deposit is of no commercial value.

Gold Creek Bog

The bog at Gold Creek has an open area of 20 acres. The surface is firm and dry, with no pools of surface water although the season had been very wet. The growth in places is a light cover of sphagnum and hypnum moss, labrador tea, dwarf spruce, and sedge, the latter especially toward the edges where there is no other type of vegetation. The deposit is of no commercial value.

Bogs east of Gold Creek Bridge

The first bog, 0·6 mile east of Gold Creek Bridge, has an open area of possibly 30 acres. It is slightly domed towards the centre. The growth is similar to that of the domed part of the Woodpile Creek bog, with a fair amount of dwarf pine and cedar averaging 3 feet in height. The growth of top moss appears in hummocks about 12 inches thick, and underlying it is a 2-foot stratum of partly humified peat. The bog was dry, with no surface water pools.

Sample	Absorptive value		Ash %	Nitrogen %
	Dry basis	25% moisture basis	Dry basis	Dry basis
Live top moss.....	20·0	15·0	3·5	1·0
2-foot underlying stratum.....	10·0	7·5	4·0	1·2

The deposit is of no commercial value.

The second bog, 1 mile east of Gold Creek Bridge, is about 500 feet wide and $\frac{3}{4}$ mile long. It constitutes another domed occurrence similar in growth and quality to the foregoing and is of no commercial value.

The third bog, $1\frac{1}{4}$ miles east of Gold Creek Bridge, is about 500 feet wide and has a length of 1,000 feet. For 500 feet it is similar to the bog previously described, and beyond that for another 500 feet it becomes low and wet with a heavy growth of sedge, and finally runs into a heavily timbered area. The total area of the bog would barely exceed 5 acres, with a variegated growth of sphagnum moss, cotton grass and other sedges, and dwarf conifers. Immediately below the top moss cover of 6 inches in depth is well-humified peat to a depth of 3 feet. The deposit is of no commercial value.

Prince George

Peat moss deposits have been reported in the areas adjacent to the town of Prince George. Inquiry from the Dominion soil expert in Kelowna, B.C., revealed that the bogs referred to were most likely those situated between Prince George and Summit Lake. He had examined that area and stated that the deposits cannot be reached except by long forest trails. The deposits are floating bogs and, where there is a heavy cover of live sphagnum moss, the underlying stratum invariably is black, well-humified peat. Further information on these deposits would add no information of value to the peat moss industry.

OKANAGAN VALLEY

Penticton

Two bogs in the Penticton district were investigated. Both cover only a few acres and the peat is well humified and of no commercial value.

Kelowna

A large bog, 4 miles west of Kelowna, reported to contain peat moss was investigated. Part of it has been reclaimed for agriculture, and on it are raised large crops of vegetables, mainly celery. The other part contains mostly sedge peat of shallow depth and of rather poor grade. It might be of local use as a soil conditioner and for compost, but is unsuitable for export. Two other deposits in the same vicinity are small and similar to those near Penticton.

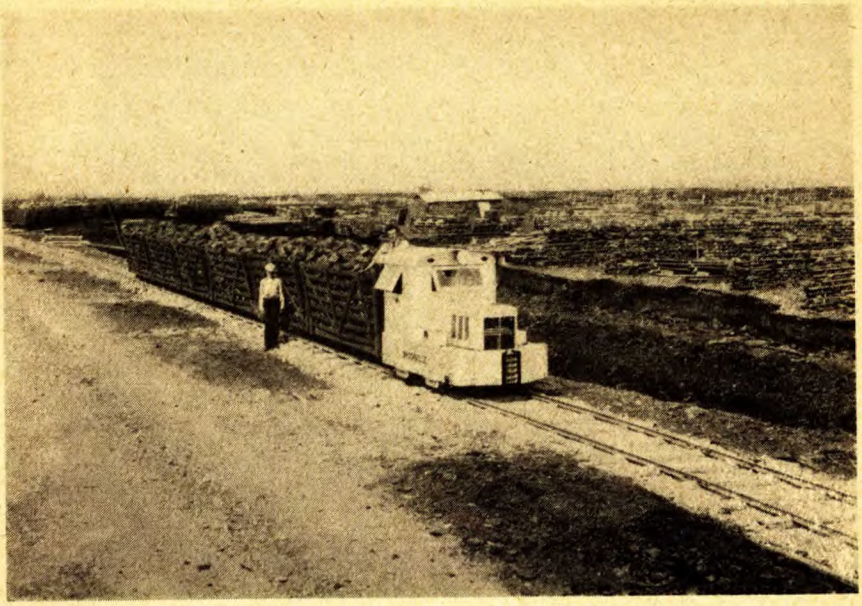
PLATE II

A. East Bideford peat bog, Prince Edward Island.

B. Excavating peat moss, Isle aux Coudres, P.Q.

A. Drying floral moss (top moss) on racks, Bagotville, P.Q.

B. Drying peat on stakes, St Anaclet, P.Q.



Courtesy of Premier Peat Moss, Ltd.

A. Transporting dried peat moss to factory.

Courtesy of Premier Peat Moss, Ltd.

B. Digging a ditch, with peat sods piled at sides.

Courtesy of Premier Peat Moss, Ltd.

A. Belt conveyer taking peat to field storage sheds.

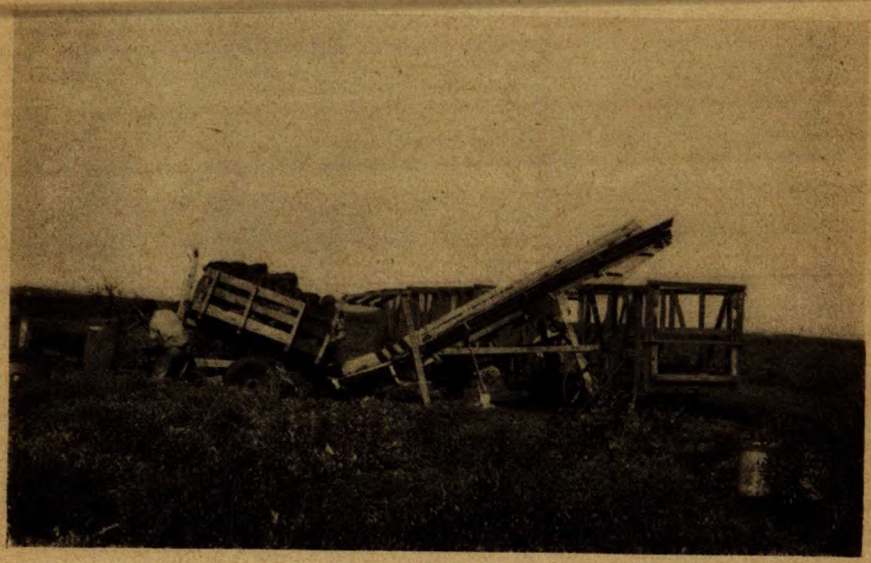
Courtesy of Premier Peat Moss, Ltd.

B. Peat drying on racks.

A. Stack of dry peat moss, Pokemouche, N.B.

B. Peat plant with peat drying on racks (in foreground), Pokemouche, N.B.

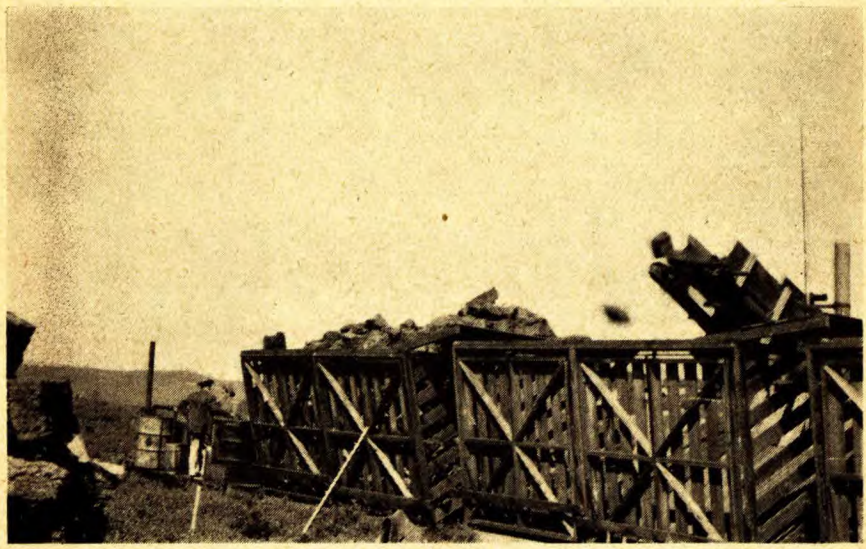
A. Harvesting peat, Welland, Ont.



B. Loading field railway car, Welland, Ont.

PLATE VIII

A. Harvesting dry peat moss with portable conveyer belt, New Westminster, B.C.



B. Loading field railway cars from conveyer belt, New Westminster, B.C.

A. Stock-piling peat moss, New Westminster, B.C.

B. Baling peat moss.

Page 97, Multilithed Reports - English,

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Technical Paper No. 1 - The Determination of Thorium in Ores by the Column Method, by R.J. Guest, Radioactivity Division.

Memorandum Series No. 117 - Preliminary Report on Coated Lightweight Concrete Aggregate from Canadian Clays and Shales, Part I, Alberta, by J.G. Matthews, Industrial Minerals Division.

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