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PEAT MOSS DEPOSITS IN EASTERN CANADA

A Survey of Areas Offering Industrial Possibilities

by

H. A. Leverin

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BUREAU OF MINES

DEPARTMENT OF MINES AND RESOURCES, OTTAWA, CANADA

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Memorandum Series

March 1940

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PEAT MOSS DEPOSITS IN EASTERN CANADA

A Survey of Areas Offering Industrial Possibilities

by

H. A. Leverin \*

During the summer of 1940, from the 17th of June to the 21st of September, a survey was made of peat deposits in Eastern Canada reported to contain unhumified or slightly humified peat moss, suitable for the production of commercial peat moss. As the area covered is very large and the time allowed for the investigation limited, it is apparent that such a survey could be of a cursory nature only, detailed work being omitted. This report therefore deals merely with a classification of the bogs as regards the quality of the peat, whether they yield peat moss or fuel peat, the quality of the peats, and their industrial uses, and the situation of the deposits as regards proximity to shipping facilities. It was not possible to visit every bog in the area, so a selection had to be made of such localities as might offer fair industrial possibilities.

During the investigation five bogs were located that had not previously been investigated. They are the East Bideford bog at Malpeque Bay, Prince Edward Island, The Black

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M.S. 80.

Point bog in Digby county near the Yarmouth county line on the Bay of Fundy, Nova Scotia; two bogs on the isthmus between Northumberland Strait and Cumberland Basin on the Nova Scotia side of the provincial boundary line, one at the headwaters of La Planche River and the other to the northwest of Plain Bay between Tidnish River and Missaguash River; and the Jolicure bog on the same isthmus in Westmoreland county, New Brunswick.

Two bogs previously rated as fuel bogs were found to be preponderantly of peat moss; and they are the Miscou bog on Miscou Island, Gloucester county, New Brunswick, and the centre of a chain of three bogs at Newington, in Stormont County, Ontario.

The first five peat bogs mentioned contain a high grade of moss. They are large with extensive open areas free from interfering growth, are situated favourably in relation to transportation facilities, and may in every respect be considered important deposits of peat moss.

Of the other two deposits the Miscou bog contains a very large tonnage of good quality peat moss but is poorly situated in regard to shipping facilities, two straits having to be crossed to reach the mainland, unless smaller vessels could load at the schooner wharf at Miscou Landing. The Newington bog contains peat moss of a good quality, but may be found difficult and costly to drain. During this investigation 91 deposits were examined. The names are as follows:

Nova Scotia

- |                 |                 |               |
|-----------------|-----------------|---------------|
| Caribou bog     | Latour bog      | Lily Pond bog |
| Black Point bog | Burnt Marsh bog | Reynolds bog  |

Nova Scotia

Tusket bog	Cherryfield bog	Yellow Marsh bog
Makoke bog	Isaac Harbour 3 bogs	La Planche Headwater bog
Heath bog	Seal Harbour 2 bogs	Round Lake Bog
Port Clyde bog	Canso bog	North West Plain bog
Clyde Bog		

New Brunswick

Miscou bog	Tracadie Beach bog	Hicks bog
Lozier bog	Portage bog	Cudmore bog
Boulou bog	Burnt Church bog	Maugerville bog
Little Tracadie bog	Canaan bog	Jolicure bog
	Gades bog	

Prince Edward Island

Black Marsh bog	Miscouche bog	Angus Matheson's farm bog
Black Banks bog	Muddy Creek bog	Little Pond bog
East Bideford bog	High Banks bog	Bracket Farm bog
Portage bog	Iris Station bog	Mount Stewart bogs
		Mermaid bog

Quebec

Waterville bog	Riviere Ouelle bog	Large Tea bog
Riviere du Loup bog		Little Tea bog
Cacouna bog		
Isle Verte, 2 bogs		

Ontario

Alfred bog	Marsh, west of Harrow
Newington bog	Brunner bog

Ontario

Brockville bog	McKenzie farm bog	Holland bog
Welland bog	Luther bog	Brampton bog
Westover bog	Anaxanthe bog	Scarboro Junction bog
Komoko bog	McTier, 2 bogs	Marsh Hill bog
Rondeau bog	Torrence Road, 6 bogs	Oakhill Road 4 bogs
Polce bog	Victoria Road bog	Richmond bog

From these bogs 50 samples of peat moss were collected, each sample representing a composite sample from one or several bore-holes at each bog. Owing to prolonged heavy rains several bogs had become impassible and could not be sampled, and at others because of poor accessibility or inferior quality of the moss, or because the deposit proved to be humified peat with no moss cover or of insignificant thickness, sampling was deemed unnecessary.

Samples of peat moss were taken with a peat drill at intervals of  $3\frac{1}{2}$  feet in depth. Strata below 15 feet were not sampled and, when found, depths of such deposits are reported as over 15 feet. When sampling deposits considered of importance to an eventual peat moss industry, notes were taken of the quality of the moss at each  $3\frac{1}{2}$  feet stratum. Observations are also made at each deposit as regards possibility of efficient drainage.

The following is a brief description of the above peat bogs.

Nova Scotia  
The Caribou Bog

This bog is situated in Kings County, between the villages of Berwick and Aylesford. The main highway from Halifax to Yarmouth crosses the bog at the southwest corner parallel with the Dominion Atlantic Railway Track, which later skirts the entire distance of the southern edge of the bog. The deposit is consequently favourably situated as regards transportation facilities, and moreover the distance to nearest deep sea harbour at Windsor is 40 miles.

The Caribou bog is a large deposit of an area of 1,000 acres, and consists largely of fuel peat, well humified and of good quality. The centre of the deposit on the height of land, however, contains peat moss to an appreciable depth, over an area of 300 acres.

A line was run east and west over the centre of the bog on the north side of the Caribou Lake and almost parallel with the Dominion Atlantic Railway track. Five test holes were bored, one 100 feet from the edge of the bog disclosing a depth of  $3\frac{1}{2}$  feet of peat moss and the other four taken at the height of land 800 feet apart, all proving a depth of over 15 feet of moss.

The moss is of a good quality sphagnum and of light brown colour. 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 fairly slight, so that most of the deposit should yield a fairly good grade peat moss.

The bog slopes in two directions east and west and

can be efficiently drained into the Annapolis and the Cornwallis rivers.

Analysis of Peat Moss

Absorptive Value, dry basis	16.2
" " 25 per cent moisture basis	11.9
Ash, dry basis	11.2 per cent

Black Point Bog

The Black Point bog is situated in Digby county on the shore of Bay of Fundy, near the boundary of Yarmouth county, about a half mile from Beaver River village. The Digby-Yarmouth highway runs near and parallel with the deposit, from which two good roads run to the bog at its north and south ends. The nearest shipping port by water is Port Maitland, about two miles south, and a deep sea harbour lies 13 miles distant at Yarmouth, which is also likely to be most convenient for the railway, being reached by paved road, whereas a smaller railway station only a few miles nearer entails using a country road. The deposit is consequently favourably situated as regards shipping facilities.

The Black Point bog has an estimated area of 800 acres. It has wide open spaces with almost no interfering growth of spruce islands or low bush. The moss is almost entirely sphagnum with some eriophorum (cotton grass), which although of less absorptive capacity than the sphagnum is generally conceded beneficial, as it furnishes a bond that contributes towards a more coherent bale and a resilient litter for stable bedding.. Four test holes 1000 feet apart

were bored on a line run over the height of land north and south, the first hole 300 feet from the edge of the bog. The depth of the moss along this line was over 15 feet in all bore-holes and the quality of the moss, ~~at~~ a very good grade, light in colour and uniform in quality for the entire depth of 15 feet.

Notwithstanding a very rainy season, the bog was dry and passable. It could be easily drained with outlets at the Bay of Fundy and Bartletts Creek.

#### Analysis of Peat Moss

Absorptive value, dry basis	17.9
" " 25 per cent moisture basis	13.2
Ash, dry basis	5.6 per cent

#### Tusket Peat Bog

This bog is situated a short distance south of Tusket Station and close to Highway No. 3.

It is a small bog with a workable area of about 150 acres. The peat is well humified and the deposit contains no appreciable quantity of peat moss. The bog has been worked for peat fuel but the operation ceased several years ago. The fuel peat is somewhat high in ash content.

#### Makoke Peat Bog

The Makoke bog lies a half mile southeast of Tusket Post Office. It is accessible by road traversing the middle of the bog and by roads north, west, south and east at distances of less than half a mile.

This is a medium sized bog of about 300 acres of workable area. The peat is composed of sphagnum intermixed M.S.80.



with other mosses, carex, grass and eriophorum, and is well humified. The deposit carries no appreciable quantity of peat moss.

#### The Heath Bog

The Heath deposit consists of a chain of bogs running south from Sand Point for 7 miles. East of the Canadian National Railway at Argyle, is the main part of the deposit called the Great Heath, which contains peat moss in the centre of the bog, over an area estimated at 125 acres. This part of the deposit can be reached by forest trail east of the bog, the distance being 4 miles from Sand Point.

The bog is flat with growth of sphagnum moss eriophorum, hypnum moss, intermixed with other peat bog plants, carex and marsh grasses. The deposit of moss is shallow, several drill holes showing only 2 to 3 feet of moss. The moss is of a decidedly brown colour in the upper strata and becomes darker and more humified at lower depths.

The bog was very wet but passable. In the event of development it would have to be drained, which may be possible towards a creek following the eastern edge of Great Heath with outlet in Goose Lake. A road would have to be built from the railway or highway in the vicinity of Central Argyle in an easterly direction.

#### Analysis of Peat Moss

Absorptive value, dry basis	15.8
" " 25 per cent moisture basis	11.7
Ash, dry basis	4.2 per cent

### The Latour bog

The Latour bog is situated in Shelburne county,  $1\frac{1}{2}$  miles southwest from Port Latour. A good road skirts and in part traverses the south and the east end of the deposit. This section forms the main part of the bog where less humified moss is found. It has a workable area of about 150 acres. The growth on the bog is sphagnum moss, carex, eriophorum, and other grasses. The deposit is rather shallow and four test holes along a line parallel with and 800 feet from the road showed depths of moss of 5 to 7 feet. The moss is dark in colour intermixed with humus and would yield a second grade of litter peat.

The bog was wet but passable and can be drained to a creek at the north end of the bog.

#### Analysis of Peat Moss

Absorptive value, dry basis	14.3
" " 25 per cent moisture basis	10.5
Ash, dry basis	7.3 per cent

### Port Clyde Peat Bog

This bog is situated 3 miles southwest from Port Clyde Station in Shelburne county. The Canadian National Railway crosses the northern end of the bog 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 on the bog is mainly sphagnum moss intermixed with eriophorum, carex, and other marsh plants. Nearly all the peat is well humified. Unhumified moss in the eastern section of the deposit contained no appreciable quantity of peat moss.

The bog at the time of the visit was wet and impassable in many places. Drainage of the bog in case of utilization for production of peat fuel, is possible in a southerly direction but at considerable expense.

#### Clyde Peat Bog

This deposit lies due north from Clyde River village, Shelburne County, and can be approached by two roads, the post road from Clyde River village crossing the southeast portion of the bog and the road following Clyde River and the edge of the central part of the bog.

The bog is large, being estimated at over 2000 acres, about half of which is workable for production of peat-fuel. The peat is well humified and would yield a very good peat-fuel but contains no appreciable stratum of unhumified moss.

The bog can be easily drained into Clyde River by tributaries running through most parts of the deposit.

#### Cherryfield Bog

This deposit is near the 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 was dry and could be further drained into a creek running southeast through the bog.

The bog contains no appreciable quantity of unhumified moss; it consists principally of well humified peat that should yield a very good peat-fuel.

Burnt Marsh Peat Bog

This deposit lies 3 miles north of Mahone Bay. The bog was very wet and impassable at the time of the visit, and could be entered only for a short distance from the edge. From observations possible under such conditions it would appear to consist mainly of fairly well humified peat.

Isaac Harbour Bog

This deposit consists of a chain of three bogs called North Glade, Centre Glade, and South Glade, and is situated 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  $\frac{3}{4}$  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 of these bogs are clear of trees and in most part are dry enough to traverse dry shod. The growth on the bogs is mainly sphagnum with some eriophorum. A test hole ~~was~~ bored in the centre of each bog showed 10 feet of moss, with only slight humification, light in colour and uniform in quality for at least 7 feet depth; it should produce 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

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to Isaac Harbour would be down hill 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 this and in the Canso district.

Analysis of Peat Moss  
from composite sample of the three Glade Bogs

Absorptive value, dry basis	19.6
" " 25 per cent moisture basis	14.4
Ash, dry basis	4.4 per cent

Seal Harbour Bog

At Seal Harbour are two bogs, one at Seal Harbour Mine, which 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 mine drains the bog to a depth of 4 feet, below which no further drainage is possible as 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 somewhat intermixed with humified peat. The deposit is of small value.

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, sphagnum and eriophorum, 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 presents 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, development  
M.S.80.



of these last two deposits would appear remote.

Analysis of Peat Moss  
Bog at Seal Harbour Mine.

Absorptive Value, dry basis	18.8
" " 25 per cent moisture basis	13.8
Ash, dry basis	6.1 per cent

Canso Bog

The Canso bog is a short distance south of the town of Canso, Guysborough county. It can be reached from the main highway at Canso by road, a distance of half a mile, which runs to the eastern edge of the bog. This road, especially where it nears the bog, becomes rough and would have to be improved to serve the need of any operation for peat moss on the bog.

The Canso bog is of fair size, comprising 300 acres of open land free from interfering vegetation, spruce islands, dwarf spruce, etc. The growth on the bog is sphagnum moss with some eriophorum and a smaller quantity of the usual bog growth, small vines, etc. The peat moss is mainly sphagnum moss of fairly good quality, somewhat darkish in colour, only slightly humified, and should yield a marketable peat moss.

A line was run over the height of land in a south-westerly direction and four holes drilled 1000 feet apart yielded the following depth of moss: 10 feet at 200 feet from the edge of the bog, then 12, 12, and 10 feet. The peat moss is uniform in quality to a depth of 7 feet, but below that the beds of moss become more humified. The bog can be efficiently drained in a southwesterly and a northerly direction.

Transportation facilities are by sea from a deep sea

harbour and by road only, for there is no railway connection with Canso.

Analysis of Peat Moss

Absorptive value, dry basis	16.1
" " 25 per cent moisture basis	11.8
Ash, dry basis	4.4 per cent

Glasgow Head Bog

The Glasgow Head bog lies 2 miles east of Canso, near the main highway. It is a small bog of about 50 acres workable for peat moss, entirely free from wooded vegetation, and lies near a deep sea harbour. It could be worked on a small scale in conjunction with other deposits in the same locality. The bog is dry and passable and can be easily drained in two directions, to the sea and to a creek at the west end of the bog.

Three holes, 1000 feet apart, drilled on a line running southwest over the centre of the bog, show at the southeastern end 300 feet from the edge of the bog 15 feet of moss, 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 the beds exposed by the drill. It is light in colour and should produce a very good peat moss.

Analysis of Peat Moss

Absorptive value, dry basis	20.99
" " 25 per cent moisture basis	15.5
Ash, dry basis	4.2 per cent

Yellow Marsh Bog

This bog is 2 miles west of Canso and is traversed by the Canso Highway. It is a small bog of about 40 acres, part of which is wooded, the open areas being rather small. Two test holes were drilled on each side of the road in the centre of the bog, one 250 feet from the road to the south and the other 100 feet from the road to the north. Good peat moss was obtained from these holes at a depth of 10 feet. The moss is clean, fairly light in colour, and similar in quality to that of the Glasgow Head bog.

The bog was dry and passable and can easily be drained to lakes north and south.

Analysis of Peat Moss

Absorptive Value, dry basis	19.0
" " 25 per cent moisture basis	14.0
Ash, dry basis	3.3 per cent.

Lily Pond Bog

The small Lily Pond bog is a short distance north of Canso highway, about 7 miles west of the town of Canso. It is a deposit of about 30 acres and is fairly well wooded. At the time of the visit the bog was very wet and almost impassable. It could be drained in a westerly direction through a brook with outlet to Reynolds brook. This deposit is of little commercial value.

The Reynolds Bog

This bog is situated southwest of the Lily Pond bog, close to the Canso road on the south side. It is small, rather shallow, and about 100 acres is workable and fairly M.S.80.

free from trees. The bog was fairly dry and can be drained to a brook in a northwesterly direction. The bog could not be entered owing to a brook crossing the northern part.

On the isthmus between the Cumberland basin and the Strait of Northumberland, is an abundance of peat land, mostly on the Nova Scotia side of the provincial boundary of New Brunswick. Little attention has been paid to these deposits, probably because they are not easily accessible from the highway, but some can be reached by way of the Marine Railway and it would not take much road building to connect them with railway and highway. Moreover, they are closer to the United States market by road than most other important deposits in the Maritimes. The bogs examined are as follows:

No. 1 Bog at the Head of LaPlanche River

This bog is 3 miles from paved road No.16, and can be reached by forest trails but is more accessible from the Marine Railway where it joins the paved road one mile west of Amherst. Here the north side of the bog can be entered. It is a large bog, estimated at 5,000 acres with wide open areas. The bog was very wet, impassable and is what is termed a floating bog, that is, the cover of moss rests on almost liquid peat containing so much water that the mixture will run out of the sampler. Soundings taken 200 feet from the edge of the bog showed a depth of three feet.

The growth on the bog is mainly carex grass, hypnum, and some sphagnum moss.

The bog, it has been reported, could be drained into the Missaguash River.

No. 2 Bog at the Head of La Planche River

This bog is at the head of La Planche River between Round Lake and the northwest end of Long Lake. It is crossed by the Marine Railway.

The deposit consists of two bogs separated by a narrow strip of land. The area of the two bogs is about 300 acres. The depth is 4 feet of good peat moss resting on one foot of well humified fuel peat, the bottom being hard clay. The surface of the bogs is open and the growth principally sphagnum moss. The peat moss is of very good quality, of light colour, and only slightly humified.

The bog can be drained 4 to 5 feet into the two lakes.

Transportation facilities are obtainable either by reconditioning the Marine Railway or by the Fort Lawrence road. The latter alternative would require the construction of 3 to 4 miles of new road.

Analysis of Peat Moss

Absorptive Value, dry basis	23.6
" " 25 per cent moisture basis	17.4
Ash, dry basis	4.2 per cent

No. 3, North West Plain Bog

This bog is situated on the height of land between Tidnish River and Missaguash River. It is a fair sized bog M.S.80.



of about 250 acres of open surface with one fairly large spruce island in almost the centre of the east end of the bog. The growth on the bog is almost entirely sphagnum moss and a few small patches of dwarf spruce less than one foot high. A line was run over the height of land in an east and west direction, and four test holes were bored, No.1 hole 300 feet from the east edge of the bog showed depths of moss of 12 feet, and the others 15, over 15, and over 15 feet, respectively. The peat moss from these holes is of very good quality, light in colour, only slightly humified and is uniform in quality throughout the entire depth.

The bog was dry and, notwithstanding the rainy weather throughout the summer, passable dry shod. The deposit can be drained into Goose Lake, which is connected with Missaguash River. Transportation will require construction of a road of one and a half miles to Tyndal road or a quarter mile to the Marine Railway or two and a half miles to Uniacke Hill, which would make it  $5\frac{1}{2}$  miles to Bai<sup>e</sup>Verte railway station. This deposit is a good prospect for development and well worth further investigatory work.

Between this bog and Goose Lake there is a chain of peat bogs not easily accessible.

#### Analysis of Peat Moss

Absorptive Value, dry basis	18.7
" " 25 per cent moisture basis	13.8
Ash, dry basis	3.2 per cent

Summary of Nova Scotian Bogs

The majority of the peat deposits in Nova Scotia are peat fuel bogs, but there are also some very important bogs of peat moss of appreciable value to the peat-moss industry that could easily be drained and developed to produce a high-grade product. In order of their importance as peat moss producers, and taking into account the quality of the moss, proximity to transportation facilities, and possibility of drainage, the deposits may be rated thus: Black Point bog, Digby County; the Caribou bog, Kings County; the Northwest Plain bog on the isthmus in Cumberland County; the Canso and the Isaac Harbour bogs in Guysborough County.

New Brunswick

A preliminary survey on similar lines to the present survey was made of certain New Brunswick deposits of peat moss in 1939, and was published in Memorandum Series No.76, January, 1940. Reference should be made to it. It deals with some of the deposits of peat moss in the southern part of the province in Charlotte and St. John Counties, and some of the large deposits in Northumberland and Gloucester Counties. The present report deals with some of the medium-sized and smaller deposits in Gloucester and Northumberland Counties, some of the more important peat moss bogs in Canaan district, and one on the isthmus in Westmoreland County. They are as follows:

The Jolicure Bog

This bog is on the isthmus in Westmoreland county at the headwaters of the Tantemar and the Aulac Rivers between M.S.80.

Midgie and Jolicure. The bog is easily accessible by a fair country road two miles from the paved No.16 highway. Its area is 500 acres. It is an open high bog with only occasional growth of dwarf spruce a foot or two in height. The growth on the bog is chiefly sphagnum moss with some eriophorum and occasional other bog plants. Six test holes were drilled over the height of land along a line run east and west, revealing a depth of moss of 7 feet at the east end 200 feet from the edge of the bog and the others at 1000 feet apart 10, 10, 11, 12, and 10 feet. The moss is only slightly humified, of very good quality, light in colour, and should yield a good marketable moss.

At the time of the visit the bog was comparatively dry and passable in most places, and it can be easily drained to 8 feet, the level of the lake on the northeast side of the bog and possibly at greater depth to the Midgie Canal.

The bog is favourably situated as regards transportation facilities, a good road leading only a short distance to stations on the Canadian National Railway.

#### Analysis of Peat Moss

Absorptive Value, dry basis	19.7
" " 25 per cent moisture basis	14.5
Ash, dry basis	2.8 per cent

Five deposits of peat moss form a chain of bogs near Canaan station on the Canadian National Railway at the boundary of Westmoreland and Kent counties. They are the Canaan, The Gades, the Hicks, and the Cudmore, and a small bog between Canaan and Hicks bogs.

#### Canaan Bog

This is a large bog one and a half miles south of Canaan station. The Canadian National Railway crosses its western part. The area is 1000 acres, and wide stretches of open land are comparatively free from wooded growth except near the edges. The bog at the time of the visit was very wet and soft, especially east of the railway track, and was barely passable. Five holes were bored on a line run over the centre of the bog in a due northerly direction, the first hole being 200 feet west from the railway track and revealing a depth of 7 feet. Between this and the edge of the south part, the bog becomes shallow, with two feet of moss on one foot of humified peat. Drill holes 800 feet apart on the northern part of the bog gave depths of 9 feet for the first hole, 300 feet from the track, and for the others 12, 10, and 9 feet of unhumified moss, light in colour and of very good quality. Entrance to the north end of the bog can be reached from the highway by trail where the bog debouches into a beaver meadow, fairly dry and passable, which at some short distance runs into peat-moss land of insignificant depth, one to three feet of moss for the first 1000 feet, and after that a depth of seven feet at 2000 feet from the edge of the bog.

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In this area are the headwaters of the Buctouche River but the flow is very slight, so that for drainage of the bog this river would have to be deepened for some distance to obtain an effective fall.

The centre of the Canaan bog drains into the Canaan Creek running close to the railway track. The water in the creek is stagnant, which is said to be due to the abundant growth in it and, if it were cleared out, it would provide better drainage. The fall of the land, however, is slight so that for efficient drainage of the bog deepening would be needed for some distance, and the cost would likely be considerable.

#### Analysis of Peat Moss

	South Section	Main bog North of Railway Track	Section of Headwaters of Buctouche River.
Absorptive Value, dry basis	17.0	28.1	10.9
" " 25 per cent moisture basis	12.5	20.8	7.9
Ash, dry basis	3.4 per cent	5.7 per cent	4.9 per cent

#### The Gades Bog

This bog lies less than three-quarters of a mile in a southwesterly direction from the south end of the Canaan bog. In area it is over 1000 acres, and it is accessible by a road from Scotland village that crosses the track and ends at a sand pit, only a short distance from where the bog abutts a meadow.

The bog at the time of the visit was flooded, and a wide brook made entrance to the main part of the bog M.S.80.



impassable. Test holes bored in the area between the edge of the bog and the brook revealed depths of one to four feet of humified peat, with only a light cover of sphagnum moss.

I was informed by a fire ranger living near the bog that its west end lies high and is passable. This part can be reached by trails through the surrounding forest, a distance of 6 to 7 miles, but it is difficult to find without a guide. My informant was unable to go with me; as none was available further investigatory work of the deposit became impossible.

#### Hicks Bog

The Hicks bog lies close to the Canadian National Railway track, one mile northwest of Canaan station. It is a smaller bog, about one and a half miles long and half a mile wide, containing 100 acres of open workable peat land running in an east and west direction, close to and parallel with the county line. It is an open bog nearly devoid of trees and is of the high bog type with two hillocks. Two holes were drilled showing a depth of peat moss of 15 feet at the centre of the hillock in the eastern part, and 10 feet depth 2000 feet further west. The moss is sphagnum of good quality, fairly light in colour, and should yield a good peat moss product. The bog can be efficiently drained in two directions, south and east.

#### Analysis of Peat Moss

Absorptive value, dry basis	18.0
" " 25 per cent moisture basis	13.3
Ash, dry basis	3.5 per cent

Small Bog between Hicks and Canaan Bog

On the west side and near the railway track is a small bog half a mile in length and 1500 feet wide. It is almost entirely covered with trees and of little commercial value as a peat moss prospect.

Cudmore Bog

The Cudmore bog lies straight west from the Hicks bog close to the border line of Moncton and Salisbury parishes. It can be approached by a rough and very wet trail three miles from the main road. The bog was found to be flooded, of flat surface and impassable, consequently its drainage possibilities could not be determined, nor was sampling possible.

Maugerville Bog

This bog is situated near No.9 highway in Sunbury county, somewhat less than a mile from the York county line. The Canadian Pacific Railway track crosses its southwest edge. It has an area estimated at about 300 acres, a large part of which is covered with woods and only a smaller part is open bog. Test holes bored on a line parallel with and 200 feet north of the Canadian Pacific track showed only one to three feet of peat, less than 12 inches of which was moss resting on well humified peat. The moss is mainly sphagnum but with an appreciable inter-mixture of carex and other marsh grasses and some eriophorum.

The bog at the time of the visit was flooded and impassable beyond the line mentioned above, making it impossible to determine if greater depth of peat moss exists toward the centre.

The bog can be drained in a southerly direction into a creek tributary to the St. John River.

#### Miscou Bog

The Miscou bog is on Miscou Island at the extreme north end of Gloucester county. It is a large bog of an estimated area of 5000 acres, covering almost half the island and extending from the south shore to the Miscou lighthouse in the north. A good road encircles the north, west and half of the south sides of the bog, from which the bog can be entered at any point.

Three lines were run, one from the lighthouse in a straight westerly direction until the height of land was reached, and then southwest. Six test holes were bored, the first 300 feet from the edge of the bog near the lighthouse had a depth of 8 feet of moss and the others 1000 feet apart, 11 and 12 feet, and on the southwesterly line three test holes, also 1000 feet apart, showed depths of 15 and over 15 feet of very good quality peat moss. A second line was run over the centre of the bog from a point on the road at half way from Lake Chenier to Big Lake. Three holes bored 1000 feet apart also yielded good quality sphagnum peat moss, light in colour, to depths of over 15, over 15, and over 15 feet, respectively. A third line was run from the road at the southern part of the deposit due north to

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Bridge Lake and three holes bored 1000 feet apart revealed depths of 14, over 15, and over 15 feet, respectively. The moss from this part of the deposit, like other samples from this bog, is a very good quality sphagnum moss, light in colour and uniform in quality, almost to the bottom of the drill holes.

The bog was generally dry with wide open areas between numerous lakes and little growth of trees and bush. It can be drained in several directions.

The Miscou deposit although of importance as regards size and the quality of its moss, is not well situated for the manufacture of peat moss as two straits have to be crossed by ferries to reach the mainland. Smaller vessels might load at the schooner wharf at Miscou Harbour.

Analysis of Peat Moss

	1 Section S.W. of Miscou Lighthouse	2 Section between Lake Chenier and Big Lake	3 Section South of Bridge Lake
Absorptive Value, dry basis	22.1	17.7	18.4
" " 25 per cent moisture basis	16.3	13.0	13.6
Ash, dry basis	4.6 per cent	3.3 per cent	3.9 per cent

Lozier Bog

This bog is one mile north of Lozier Corner by the highway and from thence one mile west on the county road, in Inkerman Parish, Gloucester County. It is a small bog of about 100 acres open and workable peat land.

The moss is mainly sphagnum having a depth at the M.S.80.

height of land of 15 feet. The moss is intermixed with humified peat and is rather dark in colour.

The deposit was worked at one time to produce compost peat.

Analysis of Peat Moss

Absorptive Value, dry basis	10.7
" " 25 per cent moisture basis	7.8
Ash, dry basis	7.3 per cent.

Boulou Point Bog

This is a small bog located 2 miles south of Tracadie village on a good road half a mile from the highway. The area of the workable part is about 100 acres. The quality of the moss is spotty; humified peat at the edges and in some parts well into the bog, but fairly good peat moss at the height of land, at a depth of 15 feet. The sample collected from the drill showed a higher humification of the moss below the 7 feet stratum.

The bog was very wet, especially around the edges but could be entered with some difficulty and became fairly passable about 600 feet from the edge. It could be efficiently drained into creeks on the west end and into Tracadie Lagoon from the northeast end.

Analysis of Peat Moss

Absorptive Value, dry basis	14.0
" " 25 per cent moisture basis	10.5
Ash, dry basis	2.6 per cent

Little Tracadie Bog

This deposit lies 2 miles north of Tracadie village, Inkerman Parish, east of Gaspereau Creek, Gloucester County.

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A good road leads up to the edge of the bog. The deposit is small with a workable area of about 150 acres. The peat moss is sphagnum, slightly humified in the upper strata but becomes intermixed with humified peat below 7 feet depth and is dark in colour.

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

Analysis of Peat Moss

Absorptive Value, dry basis	12.5
" " 25 per cent moisture basis	9.4
Ash, dry basis	1.8 per cent

Tracadie Beach Bog

This bog is situated 4 miles southeast of Tracadie Village in Saumarez Parish. It can be reached by a good road, which crosses the northwest end of the bog. It is a small bog of about 100 acres workable peat land, but much is overgrown with small trees. A line was run from the west end of the bog in a southwest direction over the height of land and two holes were drilled, one 300 feet from the road, 12 feet in depth, and the other 800 feet farther, shows 15 feet of moss.

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

Analysis of Peat Moss

Absorptive Value, dry basis	16.1
" " 25 per cent moisture basis	11.8
Ash, dry basis	3.1 per cent

Portage Bog

The Portage bog is located near the estuary of the Tabusintac River in Alnwick Parish, Northumberland county. It is a fairly large bog of about 500 acres of workable peat moss. The deposit is somewhat spotty, the moss being fairly free from humus on the hillocks but rather heavily intermixed with humified peat at the lower levels.

The bog can be efficiently drained into the Tabusintac Lagoon.

Analysis of Peat Moss

Absorptive Value, dry basis	18.0
" " 25 per cent moisture basis	13.5
Ash, dry basis	2.2 per cent

Burnt Church Bog

This bog lies 3 miles southwest of Burnt Church Village in Alnwick Parish, Northumberland County. It is a large bog of about 800 acres extending to the shore line of the Gulf of St. Lawrence, where exposures of 8 to 10 feet of solid peat moss can be seen, the shore line being eroded by the sea. The bog can be reached by road to a small fishing hamlet and then by following the shore line for about one mile.

The deposit has wide open spaces with very little wooded growth and is of the high <sup>bog</sup> ~~moss~~ type with its highest point in the middle of the bog. The moss is chiefly sphagnum moss with some eriophorum.

A line was run from the shore over the height of M. S. 80.

land of the bog in a direction due north. Three test holes were drilled 1000 feet apart, the first hole 500 feet from shore, and they revealed depths of 15, over 15, and over 15 feet of moss. The peat moss is of a very good quality sphagnum moss, only slightly humified, of light colour, uniform in quality, and should produce a very good marketable peat moss. The bog is comparatively dry, passable in most places and can be efficiently drained into Miramichi Bay.

Transportation facilities are not very favourable. A road of about one mile would have to be built to connect with the road running in a westerly direction from Burnt Church village and from there would be a trucking distance of 27 miles to Newcastle, the nearest railway station and deep sea harbour.

#### Analysis of Peat Moss

Absorptive Value, dry basis	21.5
" " 25 per cent moisture basis	15.9
Ash, dry basis	5.9 per cent

#### Summary of New Brunswick Bogs

As already stated, the largest bogs in the province were investigated in 1939 and the results were published in 1939 in Memorandum Series 76 - 1940. The deposits of peat moss were then classified according to the rating of the quality of the moss, size of the deposit, and proximity to transportation facilities. None of the bogs in the recent report would therefore be rated on an equal basis with those in Gloucester and Northumberland counties investigated in 1939, with such for example, Shippigan, Eel River, Escuminac, Lameck, and Green Point. Few, if any, of the deposits now

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described are likely to be developed for the manufacture of peat moss before some of the larger bogs favourably situated for transportation become producers of processed peat moss. The smaller bogs, within reasonable trucking distance from large baling plants, might however become subsidiary producers, because the large peat moss companies invariably depend on smaller producers for an appreciable quantity of air-dried peat moss, which is shredded, screened, and processed in their baling plant. Farmers are thus able to use their spare time cutting peat moss on their bogs and when it becomes sufficiently dry to deliver it to the baling factory for processing. Many of the bogs described in this report are valuable deposits and would supply good raw material to a peat moss industry, for example the Jolicure bog on the isthmus, and the Miscou and the Burnt Church bogs.

Of the other bogs those near Canaan station in Westmoreland county are of importance, being very large, yielding moss of good quality, and lying closer to the United States border. The drainage of these bogs except that of the small Hicks bog will, however, be costly.

Viewing the province as a whole, her peat moss deposits are the largest in Canada and in all probability can compare favourably in size and quality with many of the large bogs producing peat moss in Europe. It is astonishing that they have not been put to industrial uses, especially in later years when there has been a very large importation of this commodity into the United States.

There is no manufacture of peat moss in the province of New Brunswick except on a small scale and experimentally.

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Prince Edward Island

Black Marsh Bog

The Black Marsh bog is 8 miles northeast of Tignish at North Point in Prince county. It can be reached by good roads skirting the deposit east and west. The bog covers a large area but the greater part is shallow and wooded and perhaps less than 150 acres might be open bog having a depth of over 6 feet. The bog was dry and passable, is of the domed type, and the growth is preponderantly sphagnum moss with some carex grass in the low areas. The peat is chiefly sphagnum and well humified fuel peat. Some partly humified peat moss occurs in the centre of the bog but the moss cover is light and the peat moss of dark colour and passes into humified peat. The bog is of little or no value as regards peat moss, neither would it appear a good prospect for the manufacture of peat fuel, except on a small scale for local use, owing to the shallowness of the deposit.

Black Banks Bogs

The Black Banks deposit consists of two bogs, one on each side of Stephen cove about five miles due south from Alberton in Halifax township, Prince county. Both the bogs extend to the shore with exposures of about ten feet of solid peat moss on a clay bed, caused by the erosion of the sea. Both bogs are similar in appearance, dry, and somewhat dome-shaped with large open areas. The west bog is wooded towards the edges north and south. It has an area of 500 acres of workable peat land, the east bog about 200 acres.

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Lines were run through the heights of land of both bogs, the centres of which lie on a line directly east and west. Depths recorded from two drill holes in the east deposit 800 feet apart were over 15 feet, and in the west bog 3 drill holes, 1000 feet apart, all revealed over 15 feet. The peat moss obtained from these holes was only slightly humified, light in colour, uniform in quality and nearly the entire depth should produce a very good grade of marketable peat moss. The bogs can be efficiently drained to the bay.

Transportation facilities are not so favourable. There are no wharfs for leading near the deposits and the water on the banks of Stephen Cove is shallow. There is a haul of seven miles by road following Foxley River, which crosses the west end of the larger deposit, to the nearest railway station at Conway.

#### Analysis of Peat Moss

	East Bog	West Bog
Absorptive Value, dry basis	19.7	24.1
" " 25 per cent moisture basis	14.5	17.9
Ash, dry basis	4.5 per cent	3.6 per cent

#### East Bideford Bog

This is a large bog near East Bideford, situated one half mile from the road and 3 miles from Ellerslie Railway station. Its area is estimated at 700 acres of workable peat moss land. It is a high bog with large open area devoid of wood or spruce islands on almost the entire surface of the bog. The moss is sphagnum. The bog can be entered from the Russell Ellis' farm by a trail a half mile long, so if it were

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developed it would require very little road building.

A line was run north and south over the height of land and five holes were bored 1000 feet apart. At 300 feet from the edge of the bog the moss was three feet thick, resting on humified peat; the second hole showed 15 feet of moss below which it passed into humified peat, the other three bore-holes all showed over 15 feet of moss. The peat moss is of a very good quality, is light in colour, is only slightly humified, and is uniform in quality throughout its entire depth. The growth on the bog is unusually free from other bog plants, and has very small intermixture of eriophorum and some crowberry and cranberry vines. It is a high bog, which domes towards the centre with a rise of land from the edge of the bog of 15 feet. The deposit can<sup>be</sup> well ~~be~~ drained in southerly and westerly directions.

This deposit is one of the best examined during the investigation and should produce a very high grade of marketable peat mass. If developed, a road half a mile long leading into the bog from the Ellis' farm would have to be built, from which it is  $2\frac{1}{2}$  miles by road to a wharf on the bay at the Biological Station. The bay is reported to be deep water so that ships could load from the wharf, if it were improved for handling bulky freight, or from scows loaded from a small wharf near the deposit and towed to ships at anchor in the bay.

#### Analysis of Peat Moss

Absorptive Value, dry basis	23.4
" " 25 per cent moisture basis	17.3
Ash, dry basis	5.5 per cent

Portage Bog

The Portage bog is situated one mile east of Portage station in Halifax township, Prince County. The Western road and the Canadian National Railway cross the middle of the bog east and west. The deposit runs north and south and is of fairly large size but the part containing peat moss is only 150 acres and lies at the centre of the bog, north of the road. The southern part of the bog is fairly well covered with spruce as is also much of the outlying northern part. The peat in these areas is chiefly well humified fuel-peat. A line was run over the centre of the bog due north, and drill holes 1000 feet apart showed thickness of moss of 7 feet close to highway, 10 feet, and 14 feet, resting on well humified peat. The peat moss showed slight humification, is somewhat dark in colour, but it may produce a fair grade of peat moss. The bog was dry and passable and could be easily drained through a creek running through the centre of the bog in northerly direction to Trout River.

Analysis of Peat Moss

Absorptive Value, dry basis	16.7
" " 25 per cent moisture basis	12.3
Ash, dry basis	5.7per cent

Muddy Creek Bog

This is a small bog of about 50 acres near Sunbury Cove at the junction of Union Corner Road and the road to St.Nicholas railway station. Since the first investigation M.S.80.



in 1913 it has become completely overgrown with heavy growth of spruce, poplar, alder, etc., and contains no open spaces. The clearance of this bog of trees and stumps would be costly. The deposit is of no value for manufacture of peat products.

#### Miscouche Bog

This bog is situated one mile east of St. Nicholas station in Richmond township, Prince county. The Western Road crosses the bog and the railway runs half a mile farther south and parallel with the road. The deposit is large but most of it is shallow and overgrown with trees and only about 300 acres exceeds four feet in depth. This part, which contains moss is in the centre, close to the Western Road, some parts of which are rather 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 may be considered a fair grade of peat moss. The deposit could hardly be considered a good prospect for the manufacture of peat moss, except on a small scale for local use.

The bog was dry and passable and could be well drained in a northerly direction. It is worked intermittently for the production of peat fuel for local use.

#### Analysis of Peat Moss

Absorptive Value, dry basis	13.8
" " 25 per cent moisture basis	10.3
Ash, dry basis	5.0 per cent

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### High Bank Bog

This bog is situated on Lot 64, two miles southeast of Murray River, St. Andrew township, King's county. It can be reached by a good road, which crosses the west end of the bog. It is small with an open area of about 50 acres. The bog is of the floating type, has a flat surface, and is very wet and shallow. The greatest thickness near the lake at the centre of the bog was four feet of almost liquid moss with well humified peat underneath. The growth on the bog is mainly sphagnum moss, eriophorum, and carex, and other marsh grasses towards the edges. Drainage appears to be difficult owing to the low level of the deposit but it may be possible towards an adjacent brook. The available area and the thickness of the moss, which on drainage would settle appreciably, would however hardly warrant improvement of the deposit.

#### Analysis of Peat Moss

Absorptive Value, dry basis	19.9
" " 25 per cent moisture basis	14.7
Ash, dry basis	3.7 per cent

### Iris Station Bogs

In the district near Iris Station, St. John township, King's county, are two small bogs, one at the D.M. Rea farm that is flooded and cannot be drained. Some sphagnum moss on humified peat was noted but it was of insignificant depth and could not be worked commercially.

The other bog has an area of 20 acres on Angus Matheson's farm and contains well humified peat only. It is worked intermittently for peat fuel for local use.

Two bogs on Crown Lands between Howe Bay and Broughton Bay

The Little Pond Bog is about 10 acres and contains only a light cover of moss on humified peat. It is of insignificant value.

No. 2 bog lies near the Bracket property and is a small bog of the same acreage. The deposit consists mainly of humified peat with no noticeable cover of moss and is of little value.

Mount Stewart Bog

This deposit is on Lot 35 about one mile south of Mount Stewart village in Bedford township, Queen's county. It is small, covered with heavy growth of alder and spruce with smaller open patches none over ten acres. The peat is well humified with a cover of two and a half feet of partially humified peat of rather dark colour. The growth on the bog is mainly carex grass.

The bog was rather wet but it could be drained to a creek. The deposit can barely be considered a good prospect for the manufacture of peat products except on a small scale for local use.

Analysis of Peat Moss

Absorptive Value, dry basis	6.2
" " 25 per cent moisture basis	4.4
Ash, dry basis	7.2 per cent

Mermaid Bog

This bog is near Mermaid farm, 2 miles north of Mount Herbert Station. It is small, about 150 acres, most

of which is shallow and is covered with woods, and only a small area is open bog of any appreciable depth. The peat is well humified sphagnum and contains no appreciable cover of moss.

#### Summary for Prince Edward Island Bogs

Prince Edward Island possesses at least two important deposits of peat moss, the East Bideford and the Black Banks bogs. These contain a very large tonnage of high-grade peat moss, sufficient to maintain a large production of processed peat moss for a long time, either for home consumption or for the export trade. Third in rank may be the Portage bog. Of the other bogs examined, all are of inferior value and would hardly warrant development on a manufacturing basis. Small deposits might, however, be worked, cutting and drying the sods, which should find a market in this agricultural province.

Transportation of peat moss from Prince Edward Island by rail to the mainland necessitates crossing the Strait of Northumberland by ferry and consequent increased cost of carriage. The natural method of shipment of bulk freight to an island is by water, coal being carried by ships to Prince Edward Island that take bulky farm products such as potatoes, fodder, etc., as return freight. It would seem reasonable therefore to assume that peat moss could be handled similarly. In Europe, for North Sea traffic, baled peat moss is invariably shipped as deck cargo, the freight

charges for which are less than for under-deck cargo, and for which form of transport it is particularly suited, owing to its light weight and bulk. It would seem, therefore, that ships in both east and west-bound traffic could pick up deck cargoes of processed baled peat at deep sea harbours on the island for delivery by the all-water route to centres on the Great Lakes or Atlantic coast states where there is a good demand for this commodity.

### Q U E B E C

The following descriptions of peat bogs should not be regarded as constituting a survey of the deposits of peat moss in the province of Quebec, for which time did not permit, only a few conveniently placed bogs being visited whilst travelling from Ottawa to the Maritime provinces and back. Those deposits visited were mostly on the south shore of the St. Lawrence River in the Kamouraska, Timiscouata, Sherbrooke and Huntington counties. Large deposits have been reported recently on the north shore of the St. Lawrence River and are said to contain a high-grade peat moss.

#### Waterville Bog

This bog is near Waterville in Sherbrooke county. A fair country road runs across the deposit. It is medium sized, of 300 acres, 200 of which are workable for peat moss. The depth is four feet, 200 feet from the edge of the bog and increases with the height of land to sixteen feet at the centre. The moss is sphagnum of good quality, slightly

humified and fairly light in colour. The bog was worked for some years, producing baled peat moss, about 1000 bales per annum, and also supplying nurseries with dried green top moss.

Analysis of Peat Moss

Absorptive Value, dry basis	16.7
" " 25 per cent moisture basis	12.2
Ash, dry basis	4.4 per cent

Rivière Ouelle Bog

This is a large bog about 3/4 of a mile northwest of Rivière Ouelle Station of the Canadian National Railway in Rivière Ouelle township, Kamouraska County. Its area is over 4000 acres, and it contains both peat moss and fuel peat, the peat moss occupying about 1500 acres at the centre of the bog. The peat moss is principally sphagnum with intermixture of eriophorum and other bog plants. The peat in the upper bed is only slightly humified but that in lower beds becomes more so. It is somewhat dark in colour but produces a marketable peat moss.

The bog is favourably situated, good roads almost encircling the bog, and it lies close to the railway. A small plant has been erected with shredder, screen and one baling press, and produces yearly about 1000 standard bales of peat moss.

Analysis of Peat Moss

Absorptive Value, dry basis	14.6
" " 25 per cent moisture basis	10.7
Ash, dry basis	4.4 per cent

Rivière du Loup Bog

The Rivière du Loup is one of our largest bogs. It is situated two miles south of the city of Rivière du Loup. The main highway to Edmundston and the Temiscouata-Edmundston Railway track runs half a mile from the bog west of the highway on the other side of the Riviere du Loup. There is a good wharf about two miles north of the city on the St. Lawrence River.

The total area of the bog has been estimated at 7000 acres, a large part of which is wooded, chiefly with spruce and larch. The growth on the bog is sphagnum moss with a fairly thick cover of low bush of Labrador Tea. Although mainly a fuel peat bog, a large area east of the highway contains unhumified moss, and on a recent survey by the owners of the property, the Canada Peat Company Limited, this was estimated at 1700 acres of which 1000 acres is workable for peat moss, having a depth of six feet. Below this level, the moss becomes more humified and runs into fuel-peat or an intermixture of this high enough to produce a dark and dusty peat moss.

The moss is chiefly sphagnum with intermixture of eriophorum and carex. In the upper bed it is fairly light in colour, is of fair quality and should produce a marketable article.

The bog has been well drained by a main drainage canal running through its centre at right angles with the highway. Secondary ditches at right angles with the main

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canal and 300 feet apart drain the drying fields of the bog. At these drains, the sods are cut in sizes 6 x 6 x 18 inches, and are put on trays, which are piled ten high for drying. This appears to be necessary in this district, which has a comparatively short drying season, about one month less than for central Ontario, in order to obtain a dry product during a summer's sod-cutting, because the sods will not become dry enough if spread in the usual way on the drying field, and turned and cubed. This increases the cost of production as a rack of ten trays costs \$2.50, and 11,000 trays are required for a yearly production of 100,000 standard bales, and the depreciation of such racks is heavy. On the other hand, sods once placed in a rack need not be handled again until dry and are then transported to the storage sheds or the baling mill.

At the time of my visit, 250 men were employed on the deposit, of which 125 men were cutting sods, others were moving trays to make up the racks or transferring the dry sods to the storage stacks, and the rest were making the racks or employed in the construction of the mill.

The plant was built and part of the machinery erected. It is designed for two presses of an estimated output of 100 to 110 standard bales per hour. The sods are brought from the field or storage sheds to the mill by a narrow-gauge railway in side-dumping cars, they are discharged into a bin and are fed to a conveyor which carries the sods to a shredder, adjustable to any required size of shredded M.S. 80.



moss. An air-conveyor lifts the shredded moss to a screen separating it into two sizes. The fine is carried past the screen and is taken off in a dust collector. The coarse, medium and fine peat mosses are conveyed to bins above the presses and are pressed into bales.

A production of about 60,000 bales is estimated for 1940. It should have been twice that, had drying conditions during the past summer been more favourable. The amount of sods cut during 1940, however, is sufficient for 100,000 bales, the greater part of which will need next year's spring drying weather to become dry enough for processing. Leaving the wet sods to freeze on the drying field during the winter improves the product. It becomes lighter, more porous and more absorbent.

Analysis of Peat Moss		Main Bog	
		East Section	Centre
Absorptive Value, dry basis		14.2	15.5
" " 25 per cent moisture basis		10.4	11.3
Ash, dry basis		4.0 per cent	2.5 per cent

#### Isle Verte Bogs

At Isle Verte village are two bogs situated on a high ridge of land one mile east of Isle Verte station, Canadian National Railway. The larger bog lies nearest the station and has an area of 500 acres of which about one third is workable for peat moss. The Canadian National Railway track crosses its northern end. The rest of the bog is fairly heavily wooded and shallow in depth. The large deposit can be reached by country roads from Rivière du M.S.80.

Loup-Rimouski highway and a good road constructed alongside the Canadian National Railway track runs well into the bog.

The upper bed of the bog is sphagnum moss of very good quality, light in colour, and only slightly humified. Below four to five feet it becomes more humified, but not sufficiently so as to be classified as a fuel peat. The bog can be easily drained towards a creek at the west end or to the St. Lawrence river on the north, where the fall of land is steep.

The bog has been worked for peat moss for several years, producing insulating material and, at one time, insulating boards of moss for the building trade and also moss for agricultural purposes. The moss was rated by the users to be of very high grade, light in weight, and of light colour. The production of peat moss for 1940 is reported to be 30,000 standard bales.

The second bog is close to the larger bog in a southeast direction. It is small, 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 has no appreciable cover of moss at height of land. The southwest portion of the bog contains peat moss similar in quality to that of the large bog. The peat from the higher levels of the east portion of the bog might be used for peat fuel, but is not of very high grade, being a mixture of humified and less humified peat. The bog was dry and could be traversed dry shod. A M.S.80.

creek skirting the entire south end drains the bog.

Analysis of Peat Moss  
No. 1 Bog

Absorptive Value, dry basis	23.6
" " " 25 per cent moisture basis	17.4
Ash, dry basis	3.3 per cent

Cacouna Bog

This bog is in Le Parc parish, Temiscouata county, and the Canadian National Railway station is on its western border. The railway track runs through its centre.

The bog has an estimated area of 800 acres, of which two thirds is wooded with smaller trees, spruce and larch. It is a rather shallow deposit. There are fair-sized areas of open bog.

The peat moss is mainly sphagnum, with some intermixture of carex plants. The bog has a moss cover of about three feet, somewhat too humified to yield a high-grade peat moss. It was worked for peat moss to a small extent but, probably due to the humified character of the moss, operation was discontinued. The eastern end has been drained and is dry and passable.

Analysis of Peat Moss

Absorptive Value, dry basis	15.7
" " " 25 per cent moisture basis	11.5
Ash, dry basis	4.2 per cent

Large Tea Field and Small Tea Field Bogs

These bogs are about two miles north of the town of Huntingdon in Huntingdon county. They are large bogs of over 5000 acres. The growth is mainly sphagnum moss M.S.80.

with other peat-bog plants, low bush, Labrador Tea and eriophorum. Since the building of the large drainage canal between Logan River to St. Louis River, which skirts both bogs, they have become very dry and the top moss has almost entirely disappeared. The small tamarack and spruce of 15 years ago have been succeeded by thick growths of birch and poplar.

About 300 acres of bog has been reclaimed by this drainage for agricultural land, and large crops of oats, barley and buckwheat are grown. The bogs may be utilized for the manufacture of peat-fuel.

#### Summary for Quebec Bogs

Of the few deposits of peat moss in Quebec, so far examined, some have proved to be large and of good quality peat moss. Their development for the production of processed peat moss has been greater in the province of Quebec than in any other province in the Dominion. Four plants are in operation, one of them with the most modern equipment producing a non-dusting moss. The production for 1940 is estimated at 92,000 standard bales, which is below the average capacity owing to the unseasonable weather, which so delayed drying that part of the season's cut had to be left to next year for further drying. The total amount of sods cut in Quebec in 1940 is estimated at 7000 tons, calculated on an air-dried basis, which would correspond to about 140,000 standard bales.

## O N T A R I O

The three weeks allotted to investigation of the Ontario deposits of peat moss was inadequate for covering the whole of the province, and only a few deposits were examined, mostly in the southern and in the western parts, and as far north as the district around Gravenhurst, Muskoka.

### Alfred Bog

The Alfred bog is situated in Alfred township, Prescott county. It is a large bog, extending from Alfred station in a southeasterly direction for about five miles. The eastern part of the bog is wooded with spruce and is shallow in depth. The total area is estimated at 7000 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 since 1908 it has been worked experimentally by the Dominion Government and by private companies on a manufacturing scale, and has produced many thousand tons of peat fuel and in later years, peat humus. In the southwest part of the bog, south of the track surrounding a small pond, is about 40 acres that consists of unhumified peat moss to a depth of eight feet. The lower bed of this consists of peat wool intermixed with fine granular humified peat. The peat in the upper bed is light in colour, mostly sphagnum intermixed with sedge and carex, and should furnish a marketable peat moss.

The deposit is worked on a smaller scale and at the time of my visit in June, about 60,000 sods of peat moss had been cut and piled in small chimneys for drying. The owner plans to erect a small finishing plant consisting of shredder, screen, and one baling press.

The bog has been drained by a system of drainage ditches with outlet to the pond and the creek at the northwest end.

#### Analysis of Peat Moss

Absorptive Value, dry basis	25.4
" " 25 per cent moisture basis	18.9
Ash, dry basis	12.1 per cent

#### Newington Bog

This bog is situated in Osnabruck and Roxborough townships a quarter of a mile southeast of Newington station. The New York Central Railway, Ottawa branch, crosses its extreme western lobe. It is a large bog of about 4000 acres, the major part of which is heavily wooded, and consists of three lobes, the western of well humified fuel peat, now being developed for the manufacture of humus, using the hydropeat process. It has an area of 200 acres. The centre lobe has an area of 1500 acres, of which 1000 acres is peat moss to depths ranging from six to ten feet. The moss is a fair quality sphagnum, especially in the upper bed, and should produce a good grade of marketable peat moss. Drainage will be difficult, and moreover, if the manufacture of hydropeat proves successful and be continued, it will take all the water obtainable in the process so that

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to drain the centre bog would create a distinct handicap.

The hydropeat plant now in course of construction consists of an apron with teeth to excavate the peat which will be macerated, pumped to a drying field to drain and to dry in the air and will then be cut into blocks 4 inches by 4 inches by 16 inches and cubed for further drying, after which it will be ground to a powder.

The plant is mounted on a scow, which floats on the bog water in the excavation.

The eastern lobe of the bog is heavily wooded and is rated as unsuitable for manufacturing peat. It contains no appreciable cover of peat moss.

#### Analysis of Peat Moss

Absorptive Value, dry basis	15.6
" " 25 per cent moisture basis	11.5
Ash, dry basis	4.0 per cent

#### Brockville Bog

This bog is situated a short distance north of Brockville and can be reached by a good road. It is a large bog of about 1000 acres workable peat land. The peat is preponderantly fuel peat. The western part has been reported to contain unhumified moss, but owing to unfavourable weather this was flooded and impassable.

#### Welland Bog

The Welland bog is in Wainfleet and Humberston townships between the Welland Canal and the feeder to the canal. It is a large bog; a recent estimate places  
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the area at 3500 acres. The larger part of the deposit is in Wainfleet township and carries an appreciable cover of unhumified moss, 2700 acres being owned and operated on a fairly large scale for production of peat moss by the Erie Peat Company. The peat moss is mainly sphagnum with a small intermixture of eriophorum and other grasses. The colour is fairly light brown.

Of the 2700 acres of peat land acquired by the Erie Peat Company, 800 acres contains peat moss to a depth of three to seven feet, the lesser thickness beginning 300 to 700 feet from the edge of the bog. The deposit is estimated to be capable of yielding three million standard bales of processed moss (100 lbs.).

The developed area is divided into two drying-fields, each surrounded by drains two to four feet deep for No.1 field and four to five feet deep for No.2 field, each field having an area of 80 acres. In No. 1 field 50 acres carry peat moss and 30 acres black peat, and in No.2 field the whole 80 acres is workable for peat moss. Lateral ditches cut 300 feet apart drain into the main ditch. These fields are worked in cutting lanes 40 feet apart.

At the end of August, 20,000 cubic yards of moss had been cut from field No.1, most of which was harvested in small piles and the rest in stacks; of 30,000 cubic yards from No.2 field, two thirds had been piled and none stacked. A production of 50,000 bales of saleable dry peat moss, 25  
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to 35 per cent content of moisture, is estimated from this year's working of the bog; the rest of the peat already cut and to be cut before cold weather set in was to be left on the field until it was thawed out and sufficiently dry for harvest in Spring, 1941.

During the latter part of the season the sods cut are 4 by 6 by 18 inches but earlier while drying conditions are good the size is 6 by 6 by 18 inches.

The number of men employed for cutting sods in the months of June to September ranged from 65 - 75; for piling and stacking, depending on the amount of sufficiently dry mass on hand, 35 - 50, or at times as many as 100 boys from 15 to 20 years of age were employed.

Permanent steel railway track has been laid for 2800 feet at the edge of field No.2 and movable wooden tracks are placed in the cutting lanes for transport of the sods from the small piles to the stacks. The use of baskets holding one third to one cubic yard of sods, with two men to a basket, was found twice as expensive as transportation by wooden rail. Cutting has been done on the contract basis of 4 cents per linear foot, three feet wide and two feet deep, and piling also by piece work at  $4\frac{1}{2}$  cents per cubic yard.

For the comfort of the men shelters have been erected at various points on the bog, all being connected by telephone. At the time of my visit, office, tool shed, and blacksmith shop were completed and functioning. The baling factory

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was under construction, the concrete foundation being completed and the carpentry work in progress. The heavy timber has been cut from the Company's own wood lot adjacent to the bog. The building has a floor space of 48 feet by 49 feet, and will house the elevator, shredder screen and two presses. The yearly capacity of the plant is estimated at 100,000 standard bales of moss.

Drying the sods was slow during the summer of 1940, owing to excessive and continuous rains, which hindered stacking. European methods of stacking have been adopted in this bog, no storage sheds having been planned so far. The stacks are protected from the weather by heavy oiled paper kept in place by wire netting.

The township of Wainfleet has built a stone road a mile long to the company's property.

Access to the Welland deposit is by good roads, railways, and by water during the lake navigation season.

#### Analysis of Peat Moss

Absorptive Value, dry basis	17.5
" " 25 per cent moisture basis	12.9
Ash, dry basis	3.9 per cent

#### Westover Bog

The Westover bog is situated in Beverly township, Wentworth county, 17 miles northwest of Hamilton, occupying Lots 24 to 31 in Con.VII and 20 to 31 in Con.VIII.

The growth on the bog is mainly carex grass, aquatic plants and some hypnum moss. No sphagnum moss was noticed. The peat is well humified and of granular consistency M.S.80.

at the surface under the marsh grass roots; underneath it is more coherent and of colloidal consistency, and the content of ash is high. It would be of no value were it not for its unusual limey ash and for an underlying marl, which makes it possible to produce from these materials a soil conditioner having the desired proportion of alkaline earths and humus. On this account the deposit merits attention.

The Beverly Holdings Corporation has acquired 175 acres of the deposit and has done some development. A narrow-gauge railway of about 3 miles and a power line crossing the bog have been built, the latter to furnish power to the railway and the mill. A large mixing shed, office and residence have been erected. The company has produced 500 tons of a peat humus material which found a ready sale. Judging from reports by officials of high professional standing in Canadian Agricultural Colleges, the claims made for this material as a stimulant of growth appear to have been substantiated. The presence of limey material neutralizes the acidity of the peat, making it what is commonly termed a "sweet soil"; at the same time it accelerates the conversion of nitrogen, making an insoluble nitrogen available for absorption by the plant roots. The bog at the time of my visit was wet, flooded to more than ankle depth at the track. It can be drained fairly well to Spencer's Creek, which flows close to the company's property, the fall of the land being said to

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be eight feet from the track to the surface of the creek.

Plans for resumption of work at this bog include its drainage, excavation by drag line of the wet material to be trucked to the drying field on the hillside for spreading and drying, to be followed by grinding, mixing, and bagging.

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

Analyses

	P e r C e n t		
	Peat	Marl	Mixture of Peat & Marl
<u>As Received</u>			
Moisture	70.9	41.3	36.1
Ash	6.6	41.6	29.8
Nitrogen	0.6	0.2	0.8
<u>Dry Basis</u>			
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.

	Silica SiO <sub>2</sub> %	Lime CaO%	Magnesium MgO %	Sulphate SO <sub>2</sub> %
Westover Peat (1)		33.8	4.3	
Marl (2)	42.0	37.1	3.4	2.9
Peat and Marl (3)	51.3	24.4	3.3	2.4

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Komoka Bog

The Komoka bog is about two miles from Komoka Station, Canadian Pacific Railway, west of the city of London. It is large but only a small part in Concession III in Lobo township has a depth of more than five feet. It is heavily wooded with few open spaces. The peat is mainly sphagnum with carex and other bog plants. No live growth of sphagnum moss was found. The bog is of no importance to the peat moss industry.

Rondeau Bog

The Rondeau or the Ericau bog as it is sometimes named is on the west side of the Rondeau Bay of Lake Erie. Since the first survey made of it, a drainage system with a main canal of eighteen 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 being at times below that of the lake, the water has to be pumped over the dykes into Lake Erie. The undrained part of the bog is of no value for peat, being undrainable except at great expense, and the peat being from marsh grasses is inferior either as fuel or litter. A large field near the canal on the Pere Marquette Railway is owned by Canadian Industries Limited and is worked for the production of peat humus for that company's Chatham plant, where it is used as filler in the manufacture of artificial fertilizers.

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The normal production of peat humus of 60 to 70 per cent content of water is from 5000 to 6000 tons a year. 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. Owing to the very wet weather of the summer of 1940, peat-humus sufficiently dry for harvesting was not obtained and none was harvested.

#### Pelee Bog

This bog is situated at Pelee Point, three miles south of the town of Leamington. It is a very similar bog to the Rondeau 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.

#### The Harrow Marsh

This bog is seven miles west of Harrow on the No.18 highway, Leamington to Amherstburg. It is an undrainable marsh of little or no value as a peat prospect.

#### Brunner Bog

This bog lies a mile northwest of Gads Hill Station on the Canadian National Railway, which crosses the east end of the bog for a distance of somewhat over two miles. It is a large bog of over 2000 acres extending from the M.S.80.

road near Gads Hill Station four miles in a northeasterly direction. A stone road at right angles to the highway, one mile north of Gads Hill Station, crosses the narrow part of the southern end of the bog. Near this road in the middle of the bog a peat plant has been erected that produces air dried peat-fuel. No drainage of the bog has been done. The peat is stripped from the surface of the bog to a depth of one foot, and after being shaped cylindrically about  $2\frac{1}{2}$  inches in diameter in a pug mill is placed on racks and air-dried. It appears to be a good peat-fuel.

The humified peat forms a stratum two to three feet thick, below which unhumified moss four feet thick rests on blue clay, a peculiar formation for usually the moss lies on top of the humified peat. Two other bogs of similar formation were, however, examined in Victoria and Dufferin counties.

The peat growth is mainly hypnum, eriophorum, and carex, yielding a rather inferior grade moss. The bog would moreover 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. The drainage of the bog is difficult and not likely to be below the three-foot level.

#### Analysis of Peat Moss

	Section near Gad's Hill	Section South of road to Gad's Hill
Absorptive Value, dry basis	10.1	7.5
" " 25 per cent moisture basis	7.5	5.4
Ash, dry basis	8.6 per cent	8.3 per cent

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Clinton Bog

This is a small bog of only eight acres on the McKenzie farm near the east end of the town limits of Clinton. It is worked on a small scale for peat moss which is used for insulating material in the building trade and is shipped as loose moss. During 1940 the production was sufficient for insulating 15 houses.

Analysis of Peat Moss

Absorptive Value, dry basis	9.9
" " 25 per cent moisture basis	7.2
Ash, dry basis	7.9 per cent

Luther Bog

The Luther bog lies seven miles west of Grand Valley in East and West Luther townships in Wellington and Dufferin counties. It is a large bog of nearly 5000 acres, four-fifths of which has a fair depth. The growth on the bog is mainly hypnum moss, aquatic plants and, in certain parts, sphagnum moss. A light cover of unhumified moss to a depth of about one foot is not of the best quality.

The bog has been worked experimentally for some years with the object of producing chemicals from humified peat, the raw material for which was obtained by the Nyboe hydro-peat method for the production of peat fuel. A quantity of moss was cut during the past season and was left on racks to dry, but owing to unseasonably wet weather, did not become dry enough for the market.

Analysis of Peat Moss

Absorptive Value, dry basis	13.8
" " 25 per cent moisture basis	10.1
Ash, dry basis	4.5 per cent.
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Aramanthe Bog

This deposit consists of the large and the small Aramanthe bogs in ~~the~~ Aramanthe township, Dufferin County. The smaller bog is much overgrown with trees and bush; it is about 40 acres in area. The larger bog has an area of nearly 200 acres of workable peat land, having a fair depth of peat. It can be easily drained in a westerly direction. 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 bog; well humified peat on top, beneath which lies a stratum of felty fibrous peat intermixed with finely divided granular humified peat. The latter would not be suitable for litter unless first vacuum-cleaned and the fine peat separated, which latter causes dust. It may also find uses in the building trade, in the manufacture of insulating blankets, in which the moss is stitched between sheets of heavy paper. The bog is being worked experimentally by a method similar to the hydro-peat process.

Analysis of Peat Moss

Absorptive Value, dry basis	9.7
" " 25 per cent moisture basis	7.0
Ash, dry basis.	8.2 per cent

McTier Bog

A small bog lies two miles, and a larger, four miles, from McTier Station, Canadian National Railway, northwest of Gravenhurst, Muskoka district. Both were flooded at the time M.S.80.

of my visit and were impassable. The green top moss on these bogs is harvested by being spread on the rocks to dry, and is then baled. It finds extensive use in nurseries and in reforestation as packing material for the shipment of shrubs, trees, roots, etc.

#### Bogs on the Torrence-Southend Road

Following the road from Torrence Station, about ten miles northwest from Gravenhurst, to Southend, a chain of five bogs beginning three miles from Torrence stretches for a distance of about three miles. The five bogs are well connected with the road by wagon roads. The bogs have a heavy top-growth of sphagnum moss. Like the McTier bogs they were flooded and impassable, and test-holes for thickness and sampling were impossible.

The same party working the McTier deposits also harvests the top-moss from these bogs. A normal harvest is 5000 to 6000 bales of moss. A bale of dry moss should weigh twenty pounds. Owing to the heavy and continuous rains of the past season, it was difficult to obtain a bale of even five times that weight.

#### Victoria Road Bog

The bog is situated one mile north of Victoria Road Village in Victoria county. A good road crosses its east side. It is a small bog of 70 acres, most of which is open, only small areas east of the road and at the edges of the bog being wooded. The peat has been classified M.S.80.

as well humified fuel peat. The bog was once worked for peat fuel, the Victoria Road bog being in fact one of the earlier Canadian ventures for peat fuel on a manufacturing basis. Recent development reveals only two feet of fuel-peat, well humified, overlying six feet of only partially humified moss of sphagnum and hypnum origin. The bog cannot be effectively drained, <sup>below to 6 feet</sup> except at considerable expense; wherefore in excavating at that drainage level equal quantities of both kinds of peat would be produced.

The bog is at present worked on a small scale to produce top-moss, humus and peat moss. The working face at a depth of eight feet is kept dry by pumping.

The humus is obtained from the two-foot humified stratum cut in brick form, dried first on the bog, then broken up and dried on a drying platform and finally in a rotary dryer. The humus is finely ground and is sold as a very dry powder.

The moss is cut in sods of the usual size, 5 x 5 x 18 inches, is dried on the bog, stacked, shredded, and bagged. The owner expects to produce 500 tons of peat products in 1941.

#### Analysis of Peat Moss

Absorptive Value, dry basis	8.7
" " 25 per cent moisture basis	6.2
Ash, dry basis	4.0 per cent

### Holland Bog

The Holland bog is close to the town of Bradford in Simcoe and York counties. No. 11 highway crosses it at Holland River. Its area is large, being estimated by the engineers reclaiming the land at 27,000 acres. At one time it was reported undrainable, but an extensive drainage scheme has since been accomplished, reclaiming not less than 7000 acres of farm land on which large crops of market gardening products are grown. As this land was sold at \$100 per acre it is unlikely that any future land to be reclaimed by pumps and dykes could be profitably utilized for the production of peat. Much of the undrained part of the bog beside the reclaimed area across the highway and the Canadian National Railway track was examined. It was very wet and generally almost impassable. Drainage would be expensive and is not at present being considered. The deposit carries only a light cover of unhumified moss.

### Scarborough Junction Bog

This is a very small bog of about 20 acres. It is near Scarborough Junction and is worked for the production of humus by W. A. Krudup, and is used entirely 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 very 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 finds a sale to flower gardens, market gardeners, etc. The yearly production of humus is 400 cubic yards.

#### Brampton Bog

Near Brampton a bog similar in size to the preceding produces peat moss, which is sold in the loose state to adjacent green-houses. The production is only a few tons.

#### Marsh Hill Bog

This is a long narrow bog extending for 17 concessions from the town of Uxbridge through Reach and Brock townships, Ontario County. The Canadian National Railway follows the deposit along its entire length, crossing it at several points. The bog, the area of which has been estimated at 5,000 acres, is almost entirely overgrown with trees and bushes of nearly every kind prevalent on bog land. Open spaces are lacking, and a few patches cleared some years ago in working the bog have again become covered with bush. The growth is mostly marsh grasses, carex, sedge, hypnum and some sphagnum. The bog was generally 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 the bog from Marsh Hill Post Office road, from the road one mile north of Wick Post Office and from the road entering the bog half a mile north of Blackwater Junction.

#### Bogs on Oaklake Road

Bogs containing unhumified moss have been reported on the Oaklake road running north of Havelock on highway No.7, 26 miles east of Peterborough. Several bogs were visited within a comparatively small district, 25 miles north of Havelock. All were small of the beaver meadow type, covered with a rather heavy growth of sphagnum moss. With one exception, a small bog of two or three acres, which contained slightly humified moss of rather dark colour, to a depth of about three feet, all deposits passed into humified peat below the live moss cover.

The growth on these bogs is spotty, some areas being covered with thick sphagnum moss and others with marsh grasses, sedge, etc.

The live sphagnum moss is harvested on a small scale, dried on rocks and baled for the market. The production of dried sphagnum top moss is only a few hundred bales per year, the material being shipped to florists and nurseries.

#### The Richmond Bog

This bog is two miles south of the village of Richmond in Carleton county. It is a bog of over 5000 acres, M.S.80.

most of which is rather shallow and is heavily wooded. The bog at the time of the visit was very wet but passable. Drainage can be done in southeasterly direction but is likely to become expensive as it would mean the lowering of the bed of the Jock River. In the centre of the bog, east of the Canadian National Railway, is a large open area but rather shallow. The growth on the bog is mainly carex grass, eriophorum and some hypnum moss. The bog was entered from the northeast by the road at Concession VIII and from the Canadian National Railway track crossing the northwestern part of the bog.

The deposit passes into humified peat immediately below the live growth cover.

#### Summary for Ontario

Although the deposits of peat moss in the Province of Ontario are few and most of them are small, their development has been more varied and a wider range of production has been marketed than in any other province of Canada. This is undoubtedly due to the better market for these peat products in the highly industrialized areas of the province as well as to proximity to the United States market. The Welland bog, for example, is equipped for a large production of peat moss, and some often smaller bogs, are also producers of this commodity. Besides this, a good demand exists for other peat products: for peat-humus of which there is normally a production of several thousand tons

and for about the same quantity of peat fuel; there is also a limited market for live sphagnum moss. A deposit containing a mixture of humified peat and marl, used as plant stimulant, is under development, and a plant is under construction to produce 5000 tons per annum of this material.

#### The Peat Moss Trade

It is no overstatement to say that within the territory covered by the two reports made in this investigation, Canada possesses resources of high grade peat moss that could supply the American continent with its requirements for a very long time to come. One of the largest deposits, the Eel River bog in Northumberland county in New Brunswick, has been estimated to contain 21 million tons of peat moss, calculated on a basis of 20 per cent content of moisture. With an import into the United States and Canada of 65,000 tons of peat moss, this deposit alone would have a sufficient tonnage to supply the current demand for over 300 years.

At the present time, owing to the war, the European importation of peat moss has ceased, and an appreciable market has opened up for Canadian export of peat moss in the United States as well as for our own consumption. The price of moss has risen from about \$1.40 per bale of 130 pounds to \$2.25 to \$2.40. The price of \$1.40 applies to the last large shipment to the Pacific M.S.80.



coast. For Atlantic coast ports, the figures given vary considerably; they may be accepted as slightly lower, but with the same ratio of increase in price as that for the Pacific coast ports. An excellent opportunity is thus offered for the Canadian peat moss industry to capture a market while prices are high and to become well established before the end of hostilities, so as to meet the competition from the European exporters.

The latest returns for the import of peat moss into the United States are for 1938; they show 62,000 tons valued at \$1,092,942. The amount may not appear large for such plentiful material easily obtainable and manufactured by a simple process, but owing to its bulkiness, the cost of handling adds to the price. The Canadian bale being 100 pounds weight, to supply this market would demand 1,240,000 bales which would require 12 bogs equipped with baling mills of 2 presses each and employ 1500 to 2000 men. It should be noted moreover, that the importation of peat moss into the United States has been increasing steadily from 5000 tons in 1924 to 62,000 tons in 1938, and this increase is likely to continue as the people on this side of the ocean appreciate better the usefulness of this commodity.

Although two modern plants were built in Canada in 1940, it is surprising that a greater development has not taken place in our Canadian deposits of peat moss. The

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reasons are mainly two: (1) Expectation of keen competition from European countries after the war. (2) High freight rates.

The following trade figures for the United States for the import of peat moss in 1938\* are of interest in this respect.

	Tons	Value	Average Value per ton
Germany	32,483	525,564	\$16.23
Sweden	13,506	282,284	20.85
Holland	5,990	65,968	11.00
Canada	3,562	91,167	26.00
Latvia	1,427	34,166	23.92
Other Countries	5,094	103,793	20.37

Our chief competitors would, therefore, appear to be Germany and Sweden, especially the former, which was able to undersell the Canadian product by almost \$10.00 per ton.

The German peat moss industry was then receiving export privileges from its government, free drainage of the bogs, low freight rates by rail and water, etc., in accordance with the policy of creating foreign credits for the purchase of military supplies. Whether Germany after the war will maintain such a trade policy is a matter of conjecture but it would not appear likely.

Import houses of Swedish peat moss state that Swedish producers have been unable to supply the United States demand for Swedish peat moss, because few of her deposits are so situated for profitable trade to trans-

\*Commercial Intelligence Journal, Nov. 9, 1940, p. 641.  
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Atlantic countries. Any appreciable increase in the Swedish peat moss trade to the United States is, therefore, not expected.

The position of Holland is somewhat different, because in that country the peat bogs usually contain both kinds of peat, a top cover of two to three feet of moss and fuel-peat underneath. Owing to the prevailing fuel shortage in all European countries, and especially in Holland, which possesses no coal deposits, a large production of peat fuel may be expected with consequent increased stock on hand of peat moss for export. In the event of the fuel shortage becoming acute, however, probabilities are that in Holland, as well as in other countries producing peat moss, dried peat moss sods will be used as fuel. This was the case in Sweden during the World War, 1914-1918, when a law was enacted by the Diet forbidding the use of peat moss except for fuel.

It would, therefore, seem probable that at the end of the war there will be no appreciable stock of peat moss in Europe for the trans-Atlantic trade.

From the tabulated figures it will be noticed that the Canadian and Swedish peat mosses demand a higher price. This is on account of their much superior quality. There are various reasons for this, but it is chiefly due to climatic conditions. Wet sods of peat moss left on the drying field during the winter and exposed to low temperatures will, when thawed out in the Spring and later air-

dried to the desired content of moisture, become lighter in weight per volume, more porous, and of greater absorptive capacity than sods that have not been frozen. Thus weather plays an important part in the peat industry not only in the drying of the cut sods, but also in improving the quality of the processed moss. Canadian weather records show favourable drying conditions for most areas where the large deposits of peat moss are situated. In Gloucester and Northumberland counties in New Brunswick and in Prince Edward Island fog is rare and the prevailing westerly winds make ideal drying conditions for the wet sods. In the provinces of southern Ontario and central Quebec, the summers are warm with much sunshine, foggy weather seldom occurs, and the drying season is long. The very wet summer of 1940 referred to in this report for Ontario and Quebec was most exceptional. In general, weather conditions in Canada are more favourable for a peat moss industry than those in European countries, where rainy, foggy, and cold summers are not unusual. On the other hand, the freeze-up comes earlier and the frost remains longer in the ground in Canada. In Germany, for example at the large Poggerhagen bog outside Hanover, peat moss can as a rule be excavated throughout the winter months.

Freight rates in Canada are a national problem for many of our natural resources and affect the peat moss industry, many of the deposits being distant from market. Of the total import into the United States, about 80 per cent M.S.80.

cent entered the Atlantic and Gulf ports from Maine to Galveston and 20 per cent entered the Pacific coast ports. Thus, for the western United States, British Columbian peat moss is sold in the States of Washington, Oregon, and as far south as San Francisco. South of that port the competition from Europe could not be met. Recently however, information has been received of several car-loads of peat moss being imported by a Chicago firm from British Columbia producers.

Of the deposits described in the two reports for eastern Canada, most are situated near or on railways and good roads, and a number are at or within short trucking distance of deep sea harbours. It would seem as if more advantage might be taken of shipment by water, which is acknowledged to be the cheapest means of transportation. I know of no deposit in Europe situated by a deep sea harbour. In Holland canal barges carry the peat-bales to Rotterdam for reloading on ocean-going ships, in Germany by canal route and by train to Bremen and Hamburg, etc., and so the Canadian deposits close to harbours, should have an advantage over those in Europe for shipment by the all-water route to markets on the Atlantic coast and the Great Lakes without having to re-load.

The advantage so often stressed of the lower paid labour in European countries, I have found during my two visits on investigatory work on the manufacture of peat products in Holland, Denmark and Sweden, according to M.S.80.

information obtained from the Boards of Trade in the respective countries, to be not quite correct. Wages for peat workers are about the same in the rural districts in these countries as in those of Quebec and the Maritime Provinces, in fact in Sweden the wages are somewhat higher. I have no data as regards wages paid to peat workers in Germany since 1930.

It must also be pointed out that until 1940 the Canadian peat moss industry, as far as eastern Canada is concerned, has been a manufacture on a very small scale using primitive methods and mostly hand labour throughout the process, and the output has been insignificant. It is, therefore, difficult to determine what would be the actual cost of manufacture on a large scale using modern mechanized equipment for working the bog and in the baling plant. The figures of the cost of production at the two plants recently constructed are therefore awaited with interest. A preliminary estimate for one plant indicates an appreciable reduction in the cost of production. Once a large production of peat is attained, shippers by land and water would be attracted, if they could depend on a steady output for a lengthy period of time; in the past with a production of a few thousand bales annually, a regular freight traffic could not be profitably maintained.

### Employment of Labour

The peat moss industry is an important employer of labour, which is not altogether seasonal for the work in the open is of longer duration than most outdoor work. The rigging of the sods of peat moss can be carried on from the time the frost leaves the ground until freeze-up, which varies according to locality and season. The baling plant is kept in operation during the winter and most of the year, depending on 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 baling factory.

### Uses for Peat Moss

Peat moss owes its usefulness to the following characteristics: high absorptive capacity, permanency of composition and low conductivity of heat. Its uses are therefore several. For stable, pen, and poultry litter, it makes a warm, clean and resilient bedding for the animals to lie on. Owing to its high absorptive capacity for liquids and gases, the bedding will keep dry longer than when made of any other litter, and the atmosphere remain free from offensive odours. For the same reason all droppings from the animals are retained in the peat moss to form a valuable manure. The ratio in price between straw manure and peat manure is about one to four. Furthermore vermin, such as rats, mice, or

M.S.80.

lice do not thrive in peat moss and this contributes to the health and comfort of the animals, resulting in decreased losses to the owners as well as improved sanitary condition for the attendants. One ton of peat moss litter lasts as long as two and a half tons of straw, and, a bedding properly attended with removal of the wet parts and replacement by dry litter, should last more than two months, conducive both to a cleaner state of the animals and appreciably less labour in the stables.

As a packing for fruit and vegetables and other perishable articles, peat moss keeps them fresh and crisp, and serves as a protection against frost and heat. Moss-pads are used extensively in California for shipping asparagus and celery. Packing material as a rule is considered a nuisance in unpacking and as regards its disposal; peat moss however, should be a welcome by-product to most recipients of goods packed in it, owing to its many uses.

In the household peat moss has found several uses for keeping down the waste of foodstuffs through decay. Fish and meat packed in peat moss mull remain fresh up to three weeks in the same packing. Hard fruit and vegetables keep throughout the winter without becoming soft, shrivelled, or rotten, if packed in peat-mull, nor do onions, potatoes, etc., sprout prematurely. Eggs packed in peat-mull keep fresh even longer.

Used for packing peat moss lasts almost indefinitely  
M.S.80.



as it does not decompose and if, from long usage, it becomes damp, it can easily be dried by spreading it out in the sun.

It is estimated that about 60 per cent of the peat moss used goes into horticulture and market gardening. It is an efficient soil-conditioner inasmuch as it makes the light soil retain its moisture, and a heavy clayey soil is made lighter. Peat moss provides a good mulch that will remain as such for a long time without decomposing. For greens on golf links and lawns it prevents the soil from packing and produces a surface of thick cushioned turf as well as permitting adequate aeration.

Horticulturists find peat moss litter and mull very useful for packing bulbs, tubers, and roots for winter storage; not only are they protected from the cold weather but they remain firm throughout the winter without shrivelling.

Peat moss has also found uses in the building trade as an insulating material, and for sound-proofing by packing in spaces between the wall boards, and under the floor and roof. In ice-houses it preserves the ice longer whilst retaining a fresh atmosphere and preventing the formation of fungi.

Sphagnum peat moss, especially when mixed with fibrous cotton-grass peat specially treated, makes a very  
M.S.80.

efficient surgical dressing. It was used extensively during the World War 1914-1918, both by the Allies and the Central Powers. On account of their exceptional absorbent, de-odorant and antiseptic qualities the sphagnum surgical pads were found to be an excellent substitute for absorbent cotton.

### Production of Peat Moss

#### The Bog

The raw material being the fundamental basis of any process of manufacture, it is imperative that the greatest care be taken in selecting a suitable deposit of peat moss, hence account must be taken of the following points:

- (1) A bog must be selected that can be 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 must contain a sufficient amount of sphagnum peat moss of good quality and of a minimum depth of four feet.
- (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 paved 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 power of absorption and general suitability for the manufacture of peat moss should be determined.

#### Drainage of the bog

The method of laying out the drainage system of a deposit of peat moss will depend on local conditions, the topography of the bog and the immediately surrounding country, etc.

In general it may be said that the main drain should pass through the deepest part of the bog and, wherever possible, through its centre. The fall of the main drain need not be more than one to two per cent, which is sufficient to carry off the water. The secondary drains may be shallower and empty into the main drain on both sides at right angles. The distance between these varies according to the condition of the bog; it is usually from 250 to 300 feet, but for very wet bogs may be 70 to 150 feet.

In opening up a virgin bog it is not necessary to excavate the main drain to the mineral bottom, but a depth of about four feet will suffice for the first year, in order to prevent the drain from closing up. It is neither necessary nor economical to drain the entire surface of the bog at once, because it ties up capital unnecessarily and furthermore, in a bog that is too well drained the fibre of the moss becomes brittle, breaks down and crumbles, is difficult to excavate

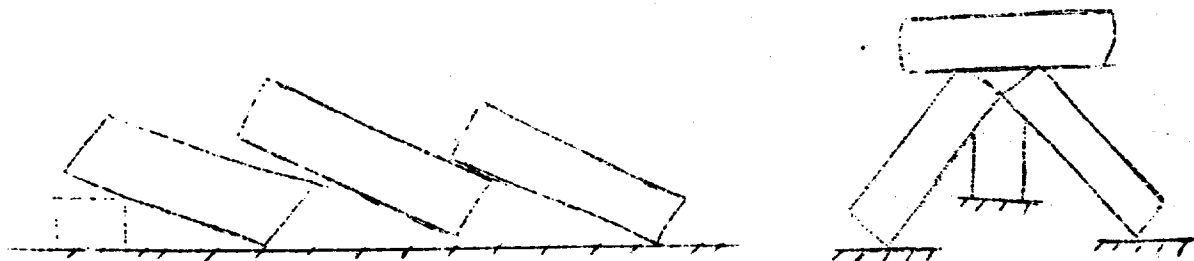
M.S.80.

and assumes a dark colour, resulting in an inferior peat product. It is therefore sufficient at the start to excavate the main drain and the necessary secondary drains, and in the subsequent years prepare the drainage system for the areas as they will be required for cutting sod. The drainage work should be kept at least two years ahead of the cutting.

### Bog Operation

The excavation of peat moss is made by hand labour. Several mechanical excavators have been tried; some have worked satisfactorily from a mechanical point of view, but none has so far proved to be a labour-saving device.

The diggers are placed about on the bog working singly or in pairs. They are paid by the linear foot excavated from the cutting lane or by the 1000 sods cut. The size of the sods varies but 4 x 4 x 18 inches up to 6 x 6 x 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 attained a dry surface can be turned and raised from the ground to allow free access of the air all around the sods. (See sketch below.)



Under normal drying conditions in the summer the sods are ready for cubing after eight to fourteen days, i.e. they may be stacked in hollow piles for the air to circulate freely through them. When sufficiently dry they are piled in the field in stacks nine to twelve feet in height, so as to clear the drying field for the next sod-cutting and spreading.

Good air-dried peat moss should contain 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.

#### Peat Moss Baling Plant

The average sized baling plant for peat moss can be housed in a building of 48 x 49 feet, and consists of the following units: 1 conveyor, 1 shredder, 1 bucket elevator or 1 pneumatic conveyor, 1 hexagon screen, dust collecting system, and 2 baling presses. Such a plant should have a capacity of 100 to 110 bales per hour.

The operation of the mill is as follows: the dried sods are brought from the field by side dumping cars to the mill and emptied into a bin, from which the shredder is fed by means of a conveyor. The shredder can be adjusted to disintegrate the sods into any size desired. A bucket elevator or pneumatic conveyor brings the shredded sods to the screen where three sizes are separated, the coarse for use as stable M.S.80.

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 material is vacuum-cleaned in order to obtain a non-dusting stable and pen litter, necessary for the comfort of the animals and stable employees. 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 100 to 160 lbs. in weight. The bales are covered with burlap or heavy paper and held together with laths and wire.

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, storage room, for at least 2000 manufactured bales, of 48 x 80 feet floor space, covered loading platform for shipping, another covered unloading platform for the cars arriving to the factory with peat sods and there is 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 to the bog. Other buildings required are office building, store and machine shop, camp and garage for tractor. All buildings should be constructed for winter habitation as peat moss mills operate during the winter months.