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Peat and Peatland Resources of Northeastern Ontario

Ontario Geological Survey
Miscellaneous Paper 153

J.L. Riley

1994

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Foreword

The Ontario Peatland Inventory Project was a component of the Hydrocarbon Energy Resources Program (HERP) of the Ontario Geological Survey (OGS). The inventory of the peat and peatland resources of major regions of Ontario is intended to provide information on the possible energy and horticultural potential of the resource, and to assist the Government of Ontario and other agencies in land-use planning and disposition by assembling data on the distribution, frequency and types of peatlands.

During the course of the Peatland Inventory Project, 16 large study areas were the focus of detailed field surveys, reconnaissance and remote-sensing studies, and laboratory analyses of peat materials. The detailed field studies have been released as Open File Reports (5450, 5486, 5492, 5540 and 5541) by the OGS. Manuals on laboratory methods and field-work specifications have also been released as OGS Miscellaneous Papers 145 and 155, respectively.

This report is one of three regional synopses of the Peatland Inventory Project. The inventory covered approximately 78 000 km² in northeastern Ontario; specifically, the Hearst, Cochrane–Kapuskasing, Timmins–Kirkland Lake, Foleyet and New Liskeard areas. For these areas, this report integrates the field studies, laboratory studies and regional resource estimates, and provides a guide for the users of the detailed Open File Reports in terms of the methodology, objectives and results of the major aspects of the inventory. The two other regional reports, covering northwestern Ontario (Miscellaneous Paper 144) and southeastern Ontario (Miscellaneous Paper 154), have been released by the OGS.

V.G. Milne
Director
Ontario Geological Survey

Abstract

Peatland resources of northeastern Ontario were investigated as part of the Peatland Inventory Project of the Ontario Geological Survey (1982–85). Data from 5 adjacent study areas (Hearst, Foleyet, Cochrane–Kapuskasing, Timmins–Kirkland Lake, and New Liskeard) are presented in a comparative manner, and integrated to provide a regional overview of the resource. (Detailed descriptions of each of the 5 study areas have already been published as Open File Reports by the Ontario Geological Survey.)

The methods used for the peatland inventory ranged from on-site detailed mapping and sampling to regional satellite-imagery interpretation. Laboratory analyses on the physical and chemical properties of the peat were also undertaken for 698 samples.

Of the 1500 peatlands greater than 100 ha in size that were identified in the region, 128 were surveyed. This report therefore represents the survey of 61 000 ha of peatland, containing an estimated 1.2 billion cubic metres of peat *in situ*.

The total peatland area in the region is estimated at 1 600 000 ha, 58% of which is classified as conifer swamp. Bogs and fens, which offer a higher potential for peat exploitation, cover an estimated 425 000 ha and contain approximately 8.9 billion cubic metres of peat.

Laboratory analyses indicate that 39% of the peat samples met fuel-grade criteria, and 24% represented peat with good horticultural potential.

Riley, J.L. 1994. Peat and peatland resources of northeastern Ontario; Ontario Geological Survey, Miscellaneous Paper 153, 155p.

Résumé

Dans le cadre du projet d'inventaire des terrains tourbeux de la Commission géologique de l'Ontario (1982–85), on a procédé à une étude des ressources des terrains tourbeux du nord-est de l'Ontario. Les données en provenance de cinq (5) zones d'études limitrophes (Hearst, Foleyet, Cochrane–Kapusking, Timmins–Kirkland Lake, et New Liskeard) sont présentées de façon comparative et intégrée pour fournir un aperçu des ressources à l'échelle régionale. (Des descriptions détaillées de chacune des cinq (5) zones d'études ont déjà été publiées par la Commission géologique de l'Ontario, sous la forme de dossiers ouverts.)

Les méthodes employées pour l'inventaire des terrains tourbeux sont variées : elles vont de la cartographie détaillée et l'échantillonnage sur le site à l'interprétation régionale au moyen d'images captées par satellite. On a également analysé dans le laboratoire six cent quatre-vingt-dix-huit (698) échantillons de tourbe pour en déterminer les propriétés physiques et chimiques.

Parmi les quelque mille cinq cents (1 500) terrains tourbeux d'une superficie supérieure à 100 ha repérés dans la région, cent vingt-huit (128) ont déjà fait l'objet d'une étude. Le présent rapport représente donc une étude de soixante et un mille (61 000) hectares de terrains tourbeux, contenant un total (estimé) de 1 200 000 000 m³ de tourbe *in situ*.

La superficie totale des terrains tourbeux de la région s'élève à environ 1 600 000 hectares, dont 58 % classé comme marécages à conifère. Les marais et les marécages, qui présentent un potentiel plus élevé d'exploitation de tourbe, couvrent une superficie approximative de 425 000 hectares et contiennent environ 8 900 000 000 m³ de tourbe.

Les analyses de laboratoire indiquent que 39 % des échantillons de tourbe répondent aux critères d'un combustible, et que 24 % n'ont qu'un potentiel d'horticulture.

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Peat and Peatland Resources of Northeastern Ontario

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This manuscript was approved for publication by C. Baker, (Acting) Chief, Engineering and Terrain Geology Section, April 15, 1991. This report is published with the permission of V.G. Milne, Director, Ontario Geological Survey.

1.0 Summary

The Peatland Inventory Project of the Ontario Geological Survey (OGS) undertook, between 1982 and 1985, a survey of peatlands across 77 690 km² of northeastern Ontario, centred on the extensive clay plains of the Northern Clay Belt and the Little Clay Belt. Peatlands are a distinctive and extensive portion of the landscape of this region. They are already the focus of considerable economic activity, notably forestry.

The inventory investigated numerous aspects of the peat and peatland resources of northeastern Ontario. Methods ranged from detailed on-site coring, profiling and resource calculations, to broad-scale interpretation of satellite imagery; from detailed laboratory analysis of large numbers of peat cores, to reconnaissance studies of the types of vegetation that have generated the peat deposits of the region.

In particular, the inventory focussed on the potential of the deepest peat deposits as sources of material for conventional horticultural uses and non-conventional energy uses. It measured the scale of the resource, its physical and chemical properties, and the types and distribution of major peatlands in northeastern Ontario.

1.1 FIELD SURVEYS

Field surveys were conducted on 128 individual peatlands in northeastern Ontario (Figure 1). An area of 61 000 ha of peatland was examined; the surveys included 4989 individual peat cores. These field surveys assessed probable and possible resource volumes of 1 181 000 000 m³ of peat. Two-thirds of this volume was well-humified peat worth consideration as a potential energy source.

Of the total surveyed volume, 315 million cubic metres were calculated from detailed isopach mapping, on 100 by 500 m sampling grids, in deposits more than 2 m deep. Of the 49 sites surveyed at this level of detail, 25 had significant volumes of peat, in this case containing areas of more than 150 ha with peat deeper than 2 m. Of all the peat samples analyzed, 67% (see following) met minimum energy standards. The energy potential of these larger sites is substantial.

Of these 25 larger deposits, 5 were considered to have potential in terms of conventional horticultural-peat production, based on material requirements for peat type (more than 70% moss), fibre content (greater than 60%), peat pH (less than 4.9), and surficial peat depth (H1–3 peats deeper than 1 m). However, most conventional peat producers include peat that is slightly more humified (i.e., H4) in their resource calculations. If this is done for the sites surveyed in northeastern Ontario, where the most common peat humification level is H4, the horticultural-peat potential of these deposits is extremely significant, and warrants further, more intensive survey of selected deposits.

The surveyed sites were among the larger and more

accessible peatlands of the region. They can be considered a representative subset of the more than 1500 peatlands larger than 100 ha that were identified in the region during the course of site selection.

For each of the 5 study areas in northeastern Ontario (Figure 1), field project teams produced Open File Reports, already published by the OGS. These reports include extensive site-specific data, mapping, and transect profiles of each surveyed peatland, with detailed text on the peat resource, the peatland vegetation, accessibility, topography and drainage, land use and tenure, and resource potential.

This present summary report is intended to complement these study-area Open File Reports by summarizing the methodology of the overall inventory, integrating results within a regional context, and incorporating broad-scale remote-sensing survey results and detailed laboratory data with the most salient details of the field survey work.

1.2 REGIONAL RESOURCE EVALUATION

The inventory addressed strategic planning for overall peat-volume estimates for the study areas of northeastern Ontario through remote-sensing techniques. In order to estimate regional peat volumes, it was necessary to generate regional estimates of the areas of various peatland types under which predictable depths of peat could be expected, based on the detailed peat-coring undertaken in the field. The remote-sensing technique adopted involved Landsat 2 satellite imagery, thematically interpreted in a supervised manner based on independent field checks of peatland types.

On this basis, peatlands were estimated to occupy 21% of the entire landscape of the study areas of northeastern Ontario: a total of 1 590 000 ha. An estimated 58% of this area was conifer swamp (923 900 ha), and 12% was thicket swamp (193 500 ha). Hardwood swamps were minimal in extent; marshes covered 2.7% of the total peatland area (45 500 ha). The focus of attention was on the bog and fen systems, which predictably occurred on deeper peats (more than 2 m deep). Open and treed bogs covered 333 000 ha (21% of all peatlands), and fens were estimated to cover an additional 92 000 ha (5.8%).

Regional peat-volume estimates were inferred by extrapolating average peat depths measured for each major peatland type, derived from detailed field studies.

Of a total regional volume estimate of 20 760 000 000 m³ of peat *in situ*, over half occurs as relatively shallow deposits (averaging less than 1.5 m in depth) underlying swamps. However, an estimated 425 000 ha of peatlands are bogs and fens, which predictably have depths averaging greater than 2 m of peat.

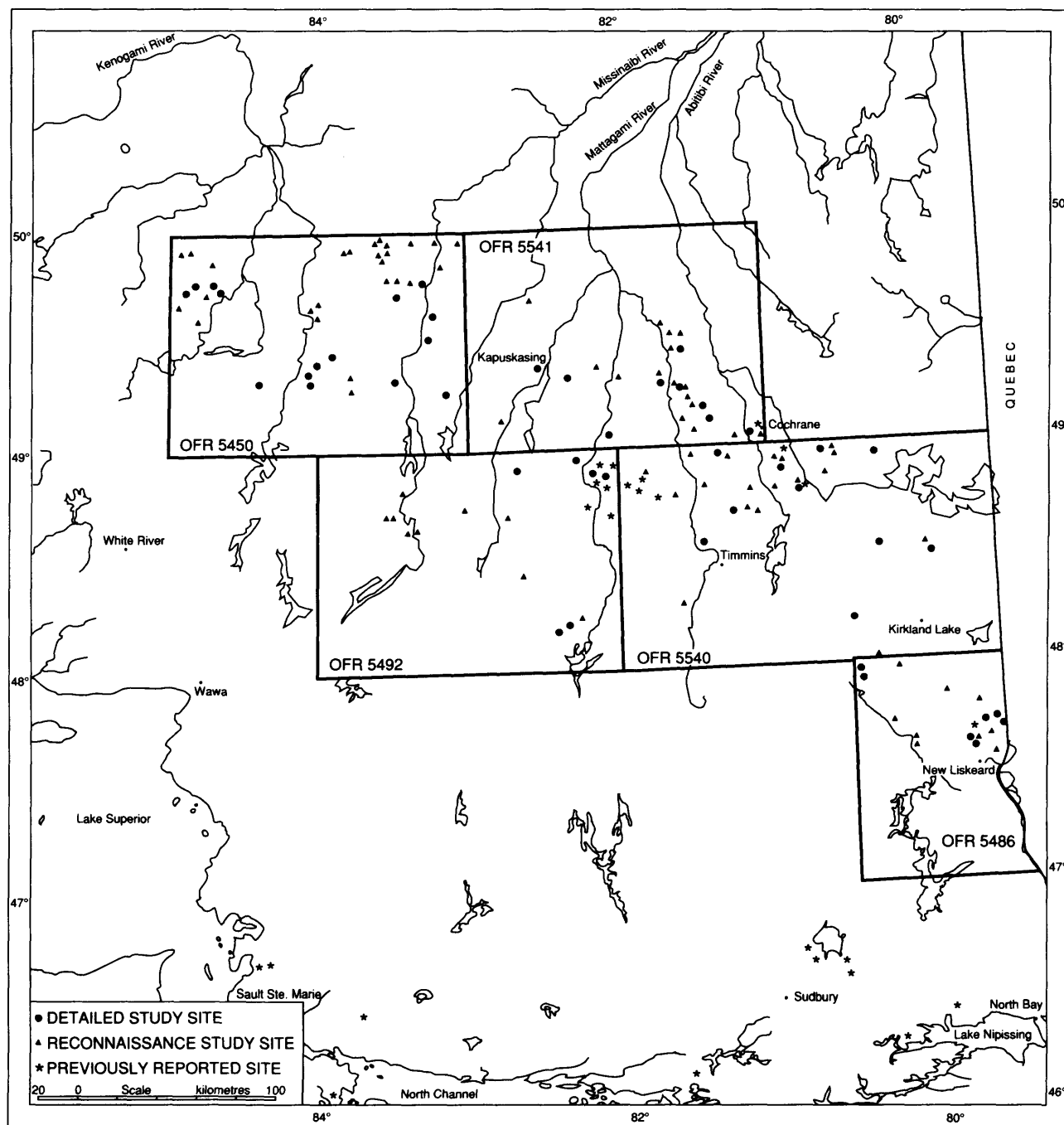


Figure 1. Peatland Inventory Project study sites, northeastern Ontario. OFR numbers refer to Open File Reports published by the Ontario Geological Survey. Sites previously studied (indicated by asterisks) are based on Anrep (1914), Graham (1979), and Pala and Boissonneau (1985).

These bogs and fens contain a peat volume of about 8 870 000 000 m³, equivalent to about 1.6 billion tonnes of peat at 50% moisture content. If 50% of this volume were exploitable fuel peat, the energy equivalent would be 216 million tonnes of oil.

At least 50% of the overall total areal and volume estimates must be discounted as exploitable resources because of various factors such as the noncontinuity of many peatlands, the small size of many peatlands, poor accessibility, land-use conflicts and, especially in the Clay Belt, poor drainage potential.

However, the regional estimates indicate an under-exploited peat resource and considerable potential for improving forest-site conditions on marginal peatlands through drainage. The potential for the development of these peat and peatland resources, especially on a site-specific basis, requires further study of the socio-economic costs and benefits, particularly in terms of markets and transportation.

1.3 PEAT PROPERTIES

From the 49 sites surveyed in detail, 698 peat samples from 109 cores were tested with respect to their physical and chemical properties. The complete data set is included in this report, as are initial analyses of results.

Poorly humified peats (von Post H1–3) with moss contents of more than 70% were considered to have horticultural potential. These made up 24% of all the samples analyzed; their mean values, in terms of peat pH (4.9), cation exchange capacity (average 180 meq/100 g), fibre content (74%), moss peat content (92%), absorptive capacity (average 23 times the dry weight) and other parameters were typical of good-quality horticultural-grade peats.

In the region as a whole, most of the sites surveyed had averaged thicknesses of such peat less than 1.0 m; but several deposits exceeded this average depth. Most sites certainly achieved this minimum depth if H1–4 moss peats were considered; the addition of H4 peats in similar analyses of average characteristics reduced the quality of the peat in terms of peat pH (average: 5.2) and fibre content (average: 65%), but not significantly in terms of cation exchange capacity (average: 184 meq/100 g), absorptive capacity (average: 19 times the dry weight), or other parameters. Fully 44% of all peats analyzed were considered to be H1–4 peats with more than 70% moss content.

By European and American standards, energy peats in the Ontario context must exceed 4165 *net* calories per gram and have a low ash content, certainly lower than 25%. Of all the peat samples analyzed, 39% met these fuel-grade criteria, and had humification levels of H4 and greater. In terms of net heating value (average: 4724 cal/g), volatile matter (average: 68%), ash content (average: 6.2%), total carbon (average: 52%), hydrogen (average: 5.4%), sulphur (average: 0.11%), and other parameters, these are good-quality energy peats. A further 28% of the peats were assessed at lesser levels of humification (H1–3), but also met these standards.

In terms of large-scale peat production, the necessities of conventional harvesting methods dictate extremely large production fields; for example, a minimum of 1250 ha of fields for a 40 MW power plant. The inventory data include sites of this scale; but further investigation of those or other sites, or groups of proximal sites, would be a prerequisite to serious consideration of large-scale energy-peat developments.

1.4 PEATLAND ENVIRONMENT

The environmental and physiognomic characteristics of the major peatland vegetation types, and their species composition, were documented from peatlands across the region. The proportions of peatland types are typical of boreal Ontario.

In the New Liskeard area, minerotrophic swamps with more southern affinities dominate; whereas farther north, minerotrophic swamps are less frequent. Bogs are predominant in the eastern part of the region, but more minerotrophic fens occur with increasing frequency on the carbonate-rich tills and sediments of the Hearst area. Throughout the Clay Belt, there is an unusually high frequency of poor fens—sites transitional between fen and bog.

The long-term successional relationships apparent in the field studies and vegetation data suggest that, driven by the process of net peat accumulation and subject to the dynamics of site hydrology, there are general successional trends towards effectively drier (greater average depth-to-water) and more nutrient-poor sites (lower surface pH). This general succession is from minerotrophic to ombrotrophic ecosystems.

The characterization of peatland vegetation summarized in this report offers a regional synopsis of dominant vegetation types, as base-line data for interpretation of the potential of sites for many of the peatlands in the region in terms of non-extractive uses.

2.0 Introduction and Review of the Project

This report summarizes the 1982–85 Peatland Inventory Project of northeastern Ontario, its objectives, methods and results. Most of the detailed site-specific information has been published in Open File Reports by the OGS, during the course of the inventory. This report complements those detailed reports by focussing on the broader regional results of the inventory, and on the integration of the field studies with remote-sensing and laboratory studies, which paralleled the field studies.

The Peatland Inventory Project was initiated by the OGS in 1981, as part of the Hydrocarbon Energy Resources Program (HERP), which was funded over a five-year period (1981–86) following the 1979 Ontario Government decision to investigate means of increasing the Provincial level of energy self-sufficiency (Telford 1983).

The first step in the fuel peat studies of HERP was educational. The Ontario Ministry of Natural Resources (MNR), the Ministry of Energy, and the Ministry of Northern Affairs jointly commissioned Monenco Ontario Ltd. to carry out a review of the peat industry; to undertake a preliminary estimate of the Province's peat resources; and to recommend Provincial initiatives in this field (Monenco Ontario Ltd. 1981). Release of this publication coincided with the *International Symposium on Peat—An Awakening Natural Resource*, held in Thunder Bay in 1981, co-sponsored by the Ontario Government and the Canadian National Committee of the International Peat Society (Tibbetts and Telford 1981).

Monenco estimated that Ontario's peatlands cover approximately 26 million hectares. The estimated 9.9 million hectares of peatland situated south of the southern limit of discontinuous permafrost correspond to approximately 42 billion tonnes of peat at 50% moisture content. These figures were based on available terrain studies and limited airphoto checks. Monenco's first recommendation was for a resource inventory, as a necessary prerequisite to the planned and orderly development of a Provincial peat industry.

2.1 BACKGROUND

Peat deposits in Ontario and eastern Canada have been studied at various times and by various methods over the past 70 years. The studies by Anrep (1914), Auer (1930) and Leverin (1941) were broad in scope, dealing with horticultural- and fuel-peat resources. More recently, studies of Ontario deposits were undertaken by the OGS and the Canada Department of Energy, Mines and Resources (Graham and Tibbetts 1961, 1964; Graham 1973; Graham and Associates Ltd. 1977), culminating in a review of "some peat moss and peat deposits in selected areas" of northern Ontario (Graham 1979). Other provinces and jurisdictions have also undertaken

peatland inventories: New Brunswick (Keys et al. 1981; Keys 1983); Newfoundland (Pollett 1968; Wells and Pollett 1983); Nova Scotia (A. Anderson, Nova Scotia Department of Mines and Energy, personal communication, 1986); Quebec (P. Buteau, Service de la Géologie du Québec, Ministère de l'Énergie et des Ressources, personal communication, 1986); Manitoba (Mills 1983); New York (Carlson & Sweatt-Monenco Inc. 1982); Minnesota (Minnesota Department of Natural Resources 1981); Maine (Cameron et al. 1984); Massachusetts (Brenninkmeyer and Russo 1984); and others. The Canadian National Research Council (CNRC) and the International Peat Society (IPS) have also published numerous reports and proceedings (e.g., the IPS Proceedings of 5-year Congresses) relating to peat-resource inventories and inventory methodologies.

With this broad background of inventory methodologies available, a decision was made to conduct this inventory within the following general guidelines.

1. The inventory was based on specific geographic study areas, chosen to reflect areas with high densities of peatlands, and in which interest was expressed in an inventory being conducted. The 16 study areas ranged in size from 3500 km² to 24 000 km², with an average area of 13 250 km².
2. Within each study area, a number of the larger, more accessible and less tree-covered sites were designated for detailed surveys. The number of detailed survey sites within the study areas varied from 6 to 17, with an average of 10 detailed study sites in each survey area.
3. A number of other sites were identified as reconnaissance survey sites, to be studied in less detail, with the intention of recommending further study or not. The number of reconnaissance survey sites in the study areas varied from 8 to 33, with an average of 16.
4. The site-specific field studies were augmented by Landsat image interpretation of the entire study areas, with the resultant images (1:50 000) classified thematically with peatland type units similar to those used in the detailed field studies. Field studies intended to confirm the remote-sensing work were conducted in each study area by the author and the Ontario Centre for Remote Sensing (OCRS). The OCRS subsequently produced regional imagery and areal measurements of specific peatland types. These data were then integrated by the author with the detailed field-study results, to produce regional estimates of different types of peatlands, and regional peat volume estimates.
5. The detailed and reconnaissance field studies were undertaken by private-sector consulting firms or groups of firms, one in each study area. The field study teams were encouraged to include experienced

peat surveyors and field botanists, in order to allow an interchange of expertise and, in the case of peat surveyors, the transfer of peat surveying skills to Ontario consulting firms lacking previous experience in the field.

6. Standardization of the field studies was achieved through the use of very detailed specifications for all aspects of field work, data collection and assembly, and report writing, and through field visits by the author of this report.
7. The laboratory analysis of all peat samples was undertaken by a single laboratory that assisted in the development of a standard methodology for all analytical studies (Riley and Michaud 1993).

The standardized field studies of the Peatland Inventory Project began in 1982–83. The inventory methods were modelled on the Finnish and New Brunswick peat resource evaluation systems (Telford 1983; Korpjääkko and Woolnough 1977; Keys 1983; Keys et al. 1981). The results of these studies led to recommendations as to possible changes to the methodology of the inventory (Riley 1983), resulting in the methodology applied during the field seasons of 1983–84 and 1984–85. These studies were considered to be at a level of detail appropriate to a base-line inventory of this scale, thus providing a well-documented framework for more detailed future resource appraisals.

2.2 OBJECTIVES

The objectives of the inventory were as follows:

1. To carry out reconnaissance field investigations of designated peatlands, in order to assess or confirm which sites should be surveyed in detail.
2. To carry out detailed field investigations of designated peatlands, in order to profile the stratigraphy of peat type and peat humification and to evaluate peat volumes, elevations, drainage, surficial vegetation, and other relevant information.
3. To subdivide and map all designated peatlands on the basis of airphoto interpretation and field work into major types (bog, fen, swamp, marsh, open water), and to further subdivide these units into physiognomic groups.

The objectives must be viewed in the context of the level of detail implied by the methods. Previous authors have concurred on a general ranking of assessment methods (Monenco Ontario Ltd. 1981; Tibbetts 1983), modified below.

- Level 1: Peat and peatland resources estimated on the basis of remote-sensing or airphoto techniques, topographical maps and relevant literature sources (e.g., Monenco Ontario Ltd. 1981).
- Level 2: Resources estimated on basis of remote-sensing or airphoto techniques, topographical maps, relevant literature sources, aerial reconnaissance, and reconnaissance field-

work at a restricted number of representative points on a site, in this case in the order of 1 sample point per 50 to 80 ha of peatland (reconnaissance survey sites).

- Level 3: Peatland and peat resources measured and evaluated over the entire peatland by generally recognized sampling and analytical techniques, in this case in the order of 1 sample point per 6 to 10 ha, with 1 to 3 physical cores removed for laboratory testing. Sampling and data collection are defined by grid placements at about 500 m intervals, with sampling at 100 m intervals on grid transects. This spacing of the grid network also defines the resolution of elevation, isopach or profile mapping undertaken (detailed survey sites).
- Level 4: Site-specific measurements of peatland and peat resources prior to and designated for potential economic exploitation, undertaken at a scale suitable to the necessary resource, drainage, harvesting and reclamation needs of a particular production plan.

The Ontario Peatland Inventory Project incorporated regional remote-sensing surveys at Level 1 detail, reconnaissance surveys of some sites at Level 2 detail, and detailed surveys of selected peatlands at Level 3 detail.

The level of detail selected for this resource survey combined detailed measurement of the peat resources in selected peatlands with the capability of inferring or indicating the resource potential of other nearby peatlands. This combination of Levels 1 to 3 resource assessments required the integration of ground surveys, remote-sensing and laboratory analyses in order to provide both site-specific detail and regional overview to planners and prospective developers.

Methods of mineral resource estimation in Ontario (Robertson 1975; APEO 1976) suggest that the peat resources which can be estimated by these levels of investigation are as indicated below. Because of the peculiarities of peat and peatland resources, the following potentialities are the case only where an additional number of specific material and deposit characteristics are available.

- Level 1: Speculative resources
 - Level 2: Possible (or inferred) reserves; sub-marginal conditional resources
 - Level 3: Probable (or indicated) reserves; possible reserves or sub-marginal conditional resources
 - Level 4: Proven reserves
- None of the studies undertaken by the inventory has approached Level 4 detail. It is worth noting that several peat specialists (for example, Tibbetts 1983) recommend that the term “reserve” not be applied to any peat resource figures until economic assessments are completed, because the economics of the Canadian peat industry, especially in terms of energy potential, are relatively poorly defined.

2.3 POTENTIAL USES OF PEAT AND PEATLANDS

The actual and potential uses of peatlands and peat deposits are diverse. A brief introduction to these uses may assist in the interpretation of the inventory results.

Peat may be considered simply as the accumulating mass of dead vegetation in a situation in which decomposition is prevented or slowed by the presence of a high water table. However, peat as a material is not at all simple. There exists in Ontario a remarkable array of different peatland vegetation types, each of which has different gross physical and chemical characteristics that contribute continuously to a similarly variable organic substrate. The peatland vegetation and the accumulating peat also reflect the variability of the terrain in which the peatland occurs, the specific hydrology of the site, and the manner in which inorganic nutrients are introduced into the peatland ecosystem.

The physical and chemical processes that take place during accumulation are complex. The process of decomposition includes diminution of organic particle size, stratification, compaction and, perhaps, restricted percolation or dispersion of particles within the peat profile. Processes of chemical humification include degradation of plant cellulose, hemicellulose, lignins, tannins, etc., into partially degraded artifacts of those precursors, as well as into carbohydrates, enzymes, humic and fulvic acids, other acids and carbon dioxide, all interactive to some degree with inorganic materials present. These processes also vary in relation to the type of precursor materials, the site's hydrology, the site-specific aerobic/anaerobic regime, the acidity of the peat and peat waters, the seasonal patterns of oxidation and reduction, and the climate prevalent in a particular area. In addition to these complex abiotic chemical processes, the uptake and the products of algae, fungi, bacteria, and other microfauna and microflora are important biochemical elements of these systems. In this regard, our laboratory studies are an attempt at baseline characterization of the gross physical and chemical characteristics of Ontario's peat materials, in relation to the types of peatlands in which they have formed.

2.3.1 Energy

The energy uses of peat are of strategic long-term importance in terms of energy self-sufficiency, whether for domestic, industrial or community uses. In Finland, Ireland, the USSR and elsewhere, the fuel-peat industries have become highly mechanized, and strategically important to those countries' energy budgets and social policies.

Dry harvesting of peat (milled and sod) for direct combustion for heat or electrical generation is the norm for the industry. However, considerable research has been undertaken through the former Peat Program of the National Research Council of Canada on wet-harvesting techniques more adaptable to northern climates, and on wet oxidation and biogasification processes.

On the basis of US Department of Energy criteria and Finnish industry standards, fuel-grade peats are considered in the Ontario context to be peats with more than 4165 cal/g net calorific value, and with less than 15% ash content, both on a dry basis. Other fuel-peat characteristics, such as shipped-peat bulk densities and moisture contents, vary with the harvesting and combustion methods.

Some of the harvesting factors and peat deposit characteristics critical to large-scale energy production are considered in Section 3.4, Categorization of Deposits for Potential Use as Energy or Horticultural Peat.

For further references, *see* Harme 1982; Suoninen 1982; Institute of Gas Technology 1980; Berggren et al. 1980; Monenco Ontario Ltd. 1981; Monenco Ontario Ltd. 1983; ADI Ltd. 1982; CNC-IPS 1983; Monenco Consultants Ltd. 1985; Mundale 1981; Ontario Bureau of Mines 1892, 1893; Kalmari 1982; Lang 1984.

2.3.2 Horticulture

At present, the Canadian peat industry is almost exclusively a horticultural-peat industry. Canadian production is worth over \$75 million, with over 75% of the product exported to the US. Exports to the US account for 99% of US peat imports, and are valued at \$68 million (1983). Canadian exports are equivalent to more than 50% of reported total US domestic production (Davis 1983).

In the US, the principal uses for sphagnum peat moss are for general soil improvement, ingredients for potting mixes, nursery use and mushroom beds. The US imports Canadian peat at premium values because of the high sphagnum content of the Canadian export product. Its large domestic market for sedge peat is currently serviced by domestic production.

Ontario production of horticultural peat is declining, and was reported as about 1% of Canadian production in 1984. More than 80% of Ontario's consumption comes from New Brunswick, Quebec and Manitoba; yet, an estimated 70 to 80% of Canadian peat exported to the US from eastern Canada is shipped through southern Ontario. In Ontario, production figures are poorly documented because very few of the small bulk-material producers report production figures to Statistics Canada, especially figures for the domestic market.

There are no labelling regulations for baled peat in the US or Canada, but there are general expectations with respect to the quality of export-grade sphagnum peat moss. These expectations are not dissimilar from the standards required by the soil-less potting-mix business in southern Ontario. Because many characteristics of the peat material are modified significantly from their field condition through the breaking of fibres during harrowing, windrowing and harvesting, only some of the characteristics of high-quality horticultural peats can be interpreted from the laboratory tests undertaken by the inventory: e.g., pH (H₂O) less than 4.9; peat type more than 70% sphagnum moss; humification

H1 to H3 on the von Post scale; cation exchange capacity, 85 to 160 meq/100 g; and ash content less than 5%. These standards do not apply where suitable markets for other peat-types are found, whether for bulk or baled materials.

For further references, *see* Weatherson 1985; Sheppard et al. 1982; Boodley 1982; Graham 1979; Carlson 1983; Grandmaison 1982; Brown 1982; Puustjarvi and Robertson 1975; Puustjarvi 1979; Farnham 1968; ASTM 1981 (ASTM D2607 and D2944); Riley 1989a; Gunther 1983; Carncross 1981.

2.3.3 Agriculture

Agricultural production on organic soils, under controlled water-table conditions, is extensive in southern Ontario. Most notable at the Bradford–Holland Marsh and among shoreline peatlands of southwestern Ontario, agricultural drainage has been viewed as the most significant process in the conversion of natural wetlands and peatlands in southern Ontario as a whole (Champagne 1981).

Agricultural production on organic soils is very significant, with hay and pasturage the principal uses in northern Ontario, and with vegetable crops such as onions, carrots, lettuce, celery, potatoes, and other “muck” crops dominant in southern Ontario. Production of sod on organic soils is increasingly prevalent; and the cultivation of cranberries has considerable potential (Smith 1980). Canadian production of agricultural commodities on organic soils is estimated to have a market value of over \$70 million (Levesque 1982).

Current research by various agencies is focussed on marketing, water-table control and subsidence reduction, and fertilization regimes (Lucas et al. 1975; Adamson 1975; Valmari 1982; Newland 1980; Lucas 1982; Valk 1980, 1982; M. Valk, Horticultural Research Institute of Ontario, personal communication, 1986; Levesque et al. 1980).

2.3.4 Forestry

In southern Ontario the logging of hardwood and conifer swamp peatlands is commonplace, but of limited overall economic significance. However, in the central latitudes of the province, where forestry is most active, peatland forestry is of critical economic importance. In this region, it is estimated that “production black spruce forest” on peatland accounts for 38% of all peatlands. In the Clay Belt of Ontario, the majority of wood harvested is from peatlands, mainly black spruce swamps (Jeglum et al. 1982). Site classification, harvesting systems and their effects on the site, site preparation and regeneration, and the integration of harvesting and regeneration activities are the focus of intensive ongoing research.

Unforested peatlands were the focus of the Peatland Inventory Project in the north and, where possible, in the south. These poorly treed areas are not the traditional domain of peatland forestry in Ontario. In

Fennoscandia, however, peatlands that are less productive from the point of view of forestry (e.g., less heavily treed bogs and fens) are commonly drained where the economic benefits of improved tree growth are greater than the costs of drain construction, fertilization, intermediate or regeneration cuttings, and/or afforestation. In Finland, it was estimated that 23% of the entire forested land base in 1982 was drained peatland forest (Heikurainen 1982a).

Peatland drainage trials have occurred at different times in Ontario's Clay Belt; and in 1984–85, a feasibility trial using 110 km of drains was initiated on an area of 410 ha just east of Cochrane, with the objective of demonstrating how a drainage system is established on an operational level. Concurrent fertilization and regeneration trials are also under way (Rosen 1984; Koivisto 1985).

For further reference, *see* Stanek 1976; Stanek and Jeglum 1977; Jeglum 1985; Jones et al. 1983; Laine and Starr 1979; Heikurainen 1982a, 1982b; Pavainen 1985; Pavainen and Wells 1977; Payandeh 1982; Ketcheson and Jeglum 1972.

2.3.5 Other Uses of Peat

In addition to horticultural and energy applications, a great diversity of other uses are made of peat. For example, the cation-exchange capacities of some peat materials make them particularly suitable for sewage treatment and runoff filtration (Toth 1980; Guntenspergen et al. 1980; Sloey et al. 1978; Nichols 1980; Thun et al. 1983; Loxham and Burghardt 1983; van der Valk et al. 1978), for mine tailing leachate treatment (Eger et al. 1980), and for mine waste site amelioration (Campbell 1984).

The production of low-sulphur, highly conductive metallurgical coke is important in Germany and Finland for electric-arc ovens used in the manufacture of iron alloys (Ekman 1982; Grumpelt 1983; Fuchsman 1980; André Marsan et Associés Inc. 1980). Associated with this is the production of barbecue charcoal and activated carbon (Sipila et al. 1983; Fuchsman 1980; André Marsan et Associés Inc. 1980; Ekman 1982).

Biochemical applications of peat include the production of waxes (Fuchsman 1980); synthetic fuels (Punwani et al. 1983; André Marsan et Associés Inc. 1980; Punwani and Lau 1981; Ekman 1982); culturing of high-protein yeasts (Fuchsman 1980); and other chemical processes (Luttig 1983; Fuchsman 1980; Forsberg et al. 1984).

Other more traditional uses include floral peat for wreaths, etc.; peat pots, pellets and blocks, for commercial nursery use (Chistyakov et al. 1983); mushroom-growing substrates; and culturing media for earthworm production. Applications that are highly developed in Europe but almost unknown in North America include balneological therapies (for rheumatic and gynaecological disorders especially), and the use of peat in cosmetics, peat packs, baths, ointments and soaps (Solovyeva and Lotosh 1984; Strecker and Gyarmati 1980).

2.3.6 Environmental Effects of Peatland Developments

The conversion of natural peatlands to resource extraction purposes has obvious effects on wildlife habitats in developed peatlands (IEC Beak Consultants 1983). Particular attention has been given to the effects of peatland drainage developments on the quantity and quality of discharged waters, and on modified drainage patterns (Ertugrul and Sober 1980; Siegel 1979; Martin 1980; Schwintzer 1979; Jeglum 1975; Clausen et al. 1980; Predmore and Brooks 1980; Washburn and Gillis Assoc. Ltd. 1983b). The dry-harvesting of peat affects air quality and worker comfort by creating dust (Ertugrul and Sober 1979, 1980; Conklin 1978; Riihimaki et al. 1980).

Combustion of peat results in various emissions (Hasanen 1982; Ketola et al. 1983; Ertugrul and Sober 1979; Monenco Ltd. 1983). Liquefaction, gasification or wet oxidation entails significant aqueous discharges (Predmore and Brooks 1980; Ontario Research Foundation 1984; Monenco Ltd. 1983; Washburn and Gillis Assoc. Ltd. 1983a).

Other environmental effects vary considerably from area to area, and vary with the use of the peat or the type of peatland (Lofton 1980; Walters et al. 1980; Osbourne 1982; Clarke-Whistler et al. 1984; Washburn and Gillis Assoc. Ltd. 1982; Monenco Ontario Ltd. 1981; Carpenter and Farmer 1981; Clarke-Whistler and Rowsell 1982; Williams Bros. Engineering Co. 1979; Clausen 1979). The effects of forest drainage have been studied, notably in Finland (Heikurainen 1982a). General water-quality monitoring has been undertaken in Minnesota on peatland systems comparable to those of northern Ontario (Minnesota Department of Natural Resources 1985). Impact assessments as part of highway construction procedures have been developed in the United States (Smith 1984).

2.3.7 Mitigation of Effects and Site Reclamation

In peat-harvesting situations, the use of settling ponds for buffering the effects of peat-water discharge is widespread, and even regulated in some jurisdictions (Selin et al. 1984). Most combustion plants recycle flue gases to aid in dewatering peat, and studies have been made of further recycling of these potential emissions (Ketola et al. 1983).

Reclamation of mined sites entails a close appraisal of the costs and benefits, in terms of the particular hydrological balance that must be struck for particular land uses. Elevated water levels may be conducive to reclamation for marsh creation, cranberry or wild-rice production, waterfowl or fish habitat, or lake construction. Reduced or maintained water levels may be more suitable to end uses such as semi-natural peatland (common practice in Germany and the Netherlands), pasturage, tree or coppice-growth crops, or other uses (Farnham 1979; Ellington and Knighton 1984; Farnham

et al. 1980; Osbourne 1982; Carpenter and Farmer 1981; Ferda and Novak 1976; Martin 1980; Washburn and Gillis Assoc. Ltd. 1983a).

2.3.8 Conservation of Peatlands

The conservation of peatlands and wetlands, especially in areas where these habitats historically have been impacted by development pressures, has become the focus of considerable research and management attention: for example, in Ontario (Riley 1989b; Bardecki and Patterson 1989; Shay 1981; Champagne 1981; OMNR 1984; OMNR and Environment Canada 1984; Van Patter and Hilts 1985; Houser 1974; Federation of Ontario Naturalists 1979); in Canada (Clarke-Whistler and Rowsell 1982; IEC Beak Consultants 1983); in the United States (Tiner 1984; Worley 1984; Minnesota Department of Natural Resources 1981); and in Finland (Havu 1982; Ruuhijarvi 1982; Kuitunen and Kuitunen 1985). Germany has a strong peatland preservation program (Kuntze and Eggelsmann 1981; Schmatzler 1981; Falkenberg 1982), which includes research on such matters as reclamation or regeneration (Dietze 1981; Nick 1984) and hydrological buffer zones (van der Molen 1981).

Considerable discussion has been made of the rationale and the economics of peatland and wetland preservation (Bardecki 1984; Thibodeau and Ostro 1981; Odum 1978). Peatlands often support diverse and unusual wildlife assemblages (Hummel 1981; Shaw and Fredine 1956; Golet 1978), and can be considered to have particular educational, aesthetic, heritage and recreational values independent of their development potential (Kreutzswier 1981). The hydrological value of peatlands, and their necessary integration into watershed and land-use planning, is often cited as a critical merit in site conservation (Bertulli 1981; Carter et al. 1978; Gosselink and Turner 1978; Ontario Chapter of the Soil Conservation Society of America 1981a, 1981b).

Many peatland-wetland values are the subject of detailed scientific studies, and this scientific interest is often cited as a reason for selective peatland preservation. As well as providing habitat for numerous rare plants and animals, peatlands are hydrologically partitioned into a great diversity of vegetation types (Jeglum et al. 1974), which entail a parallel partitioning of wildlife niches (for example, see Niemi et al. 1983). Peatlands have been the object of numerous biomass productivity studies (Reader 1978; Richardson 1978), which have implications in terms of organic carbon storage and atmospheric carbon uptake (Boville et al. 1982). Some peatland systems may play a specific scientific role through their recognition as useful monitoring stations for accumulative records of atmospheric deposition of heavy metal and organochemical fallout (Glooschenko et al. 1981; Glooschenko 1986; Glooschenko and de Benedetti 1983), pollen deposition, and macrofossil assemblages.

2.3.9 Geotechnical Aspects of Peat and Peatlands

The geotechnical aspects of peat and peatlands include all aspects of organic terrains and substrates of concern to the engineer, such as the suitability for all-terrain vehicles, or the loading performance and hydraulic conductivity (and permeability) of particular peat types intended as the foundation or surroundings of roadways, buildings, drains and pipelines (MacFarlane 1969; Burwash and Wiesner 1984; Hobbs 1986).

In resolving design and construction problems, the engineer draws on diverse information sources. Some material parameters, such as peat depths, bulk densities, etc., can be derived from the inventory data base for particular sites, but more exacting engineering data are required for almost any type of actual peatland development.

These additional data may include airphoto interpretation of peatland patterning, hydrology and permafrost characteristics (Mollard and Janes 1984); the seasonal characteristics of potential winter or off-road access routes; *in situ* peat density studies (Lefebvre et al. 1984; Grigal 1983); hydrological discharge and carrying characteristics (e.g., Bertulli 1981); permeability studies on roadbed materials and culvert placements for mitigating drainage or damming effects (Rycroft et al. 1975); ditching plans and surface-water interception by perimeter ditches; load-settlement and consolidation studies (Raymond et al. 1972; Hollingshead and Raymond 1972); and road construction directly on peat substrates (Rowe et al. 1984; Hanrahan and Rogers 1981; Gruen and Lovell 1984; Keyser and Laforte 1984a, 1984b).

2.3.10 Geochemistry of Peat and Peatlands

The occurrence and distribution of major and minor elements within a peatland is subject to both stratigraphic and areal variability. In terms of the latter, both peat and water chemistry offer critical monitoring and interpretive capabilities in terms of substrate fertility, current site productivity (Stanek and Jeglum 1977), and ecological classification (Jeglum et al. 1974; Pakarinen 1978; Schwintzer 1978, 1981; Schwintzer and Tomberlin 1982; Vitt and Slack 1975; Vitt and Bayley 1984).

The distribution and movement of elements within peat profiles and the biochemical partitioning of elements within a profile have been studied in detail as a means of understanding the successional, accumulative and decompositional processes operating within a peatland (Largin et al. 1972; Damman 1978; Levesque et al. 1982; Levesque and Millette 1977; Urquhart and Gore 1973; Szilagyi 1973; Pakarinen et al. 1980; Hemond 1980; Kilham 1982; Pakarinen and Gorham 1983). An aspect of these studies that has become important is the use of ombrotrophic peat bogs as monitoring sites for the study of surface peat uptake of atmospherically deposited materials, many of which are anthropogenic

(Gorham 1961; Gorham and Tilton 1978; Oldfield et al. 1981; Pakarinen et al. 1980; Glooschenko and Capobianco 1982).

Direct application of geochemical studies has been made to geochemical prospecting in organic terrains (Salmi 1967; Boyle 1977; DiLabio and Coker 1982).

2.3.11 Crown Land Disposition and Regulatory Controls

Regulations for the disposition of Crown lands for peat development and for the control of environmental impacts are in place in Ontario (Stocking 1981), as they are in New Brunswick (Keys et al. 1981) and other jurisdictions in Canada (J. Phillip Nicholson Inc. 1984); in Minnesota (Asmussen 1983; Johnson 1983; Minnesota Department of Natural Resources 1984); and in Finland (Havu 1982).

In Ontario, peat-related Crown land disposition is controlled by the Mining Act, as administered by the Mining Lands Section of the Ministry of Northern Development and Mines; and the Public Lands Act, as administered by the Lands Management Branch of the MNR.¹

2.4 STUDY AREAS IN NORTHEASTERN ONTARIO

Five areas in northeastern Ontario were studied during the Peatland Inventory Project (Table 1; *see also* Figure 1). They are located between lat. 47°N and 50°N, and between the Ontario-Quebec border and long. 85°W.

During the Peatland Inventory Project, 128 individual peatlands were studied, with a total peatland area (Table 2) of 60 890 ha (0.8% of the total area of the study areas). Based on available topographic maps, aerial photographs and satellite imagery, these peatlands were judged to be the most accessible large sites

Table 1. Northeastern Ontario study areas.

Year	Study Area	1:250 000 NTS Map Sheet	Total Study Area
1982-83	Hearst	42 F (E ₁), 42 G (W ₁)	16 000 km ²
1983-84	New Liskeard	31 M, 41 P (E ₁)	8 290 km ²
	Foleyet	42 B	16 400 km ²
1984-85	Cochrane-Kapuskasing	42 G (E ₁), 41 H (W ₁)	16 000 km ²
	Timmins-Kirkland Lake	42 A, 32 D	21 000 km ²
Totals 1982-85			77 690 km ²

¹The administration of wetlands on Crown land and the regulation of land uses by municipalities must now have regard for the conservation of wetlands, as specified in the 1992 Ontario Policy Statement, *Wetlands*, issued under the authority of Section 3 of the 1983 Planning Act.

Table 2. Inventory coverage in northeastern Ontario.

Study Area	No. of Peatlands Surveyed	Total Peatland Area of Sites Studied	Percentage of Total Study Area
Hearst	41	12 153 ha	0.76%
New Liskeard	51	6 917 ha	0.83%
Foleyet	16	7 613 ha	0.46%
Cochrane–Kapuskasing	27	13 141 ha	0.82%
Timmins–Kirkland Lake	29	21 068 ha	1.00%
Totals	128	60 892 ha	0.78%

for study. They were considered generally representative of the type of large, relatively unforested peatlands characteristic of the Northern Clay Belt of northeastern Ontario and the adjacent upland areas to the south and west.

2.5 PROJECT PARTICIPANTS IN THE PEATLAND INVENTORY, NORTHEASTERN ONTARIO

2.5.1 Detailed Field Studies

Full citations for Table 3 are included in the References.

2.5.2 Remote-Sensing Studies

In 1982, the Ontario Centre for Remote Sensing (OCRS) was commissioned to study the application of computer-assisted Landsat image interpretation to peatlands in the vicinity of the Groundhog River, north-east of Timmins (Pala and Boissonneau 1985). This test project refined remote-sensing techniques that were subsequently applied to the other study areas, in order to provide the regional context of the overall distribution of different peatland types in northeastern Ontario.

Table 3. Field study participants, northeastern Ontario.

Study Area	Consultant	Ontario Geological Survey Open File Report	Year of Report Release
Hearst	Dendron Resource Surveys Ltd., Ottawa	OFR 5450	1983
New Liskeard	Hunter and Associates Ltd., Mississauga	OFR 5486	1984
Foleyet	Dendron Resource Surveys Ltd., Ottawa	OFR 5492	1984
Cochrane–Kapuskasing	Geo-Analysis (1981) Ltd., Ottawa	OFR 5541	1986
Timmins–Kirkland Lake	Northland Associates Ltd., St. John's	OFR 5540	1985

2.5.3 Laboratory Studies

Technical Service Laboratories Ltd. of Mississauga conducted the laboratory analysis of peat samples collected at detailed survey sites in northeastern Ontario. In addition, a comparative geochemical study of some peatlands in northeastern Ontario was undertaken (Shotyk and Telford 1983).

2.6 ACKNOWLEDGMENTS

Numerous individuals were involved in these studies, and their efforts are gratefully acknowledged. In particular, we would like to thank some of those involved with the field studies and data reporting: L. Sayn-Wittgenstein, P. Tomascik, R. Dewe, E. Dawe, L. Michaud, N. Patterson, P. van Wyck, J. Sauriol, D. White, R. Doiron, D. Keys, D. Smith, R. Bobbette, J. P. Bacle, M. Moore, J. Bouzane and R. Holland. These individuals were the principal investigators of the project teams in each study area, working for the consulting firms indicated in Section 2.5 of this report, Project Participants in the Peatland Inventory Project, Northeastern Ontario.

Supervised classification of Landsat imagery was done by S. Pala, A. Boissonneau, A. Jano, N. Goba, W. Woitowich, D. White, J. Narraway, and others at the Ontario Centre for Remote Sensing.

Laboratory analyses were carried out by Technical Service Laboratories Ltd., Mississauga. J. A. Burgener, P. Burgener and W. Grondin are especially thanked. The OGS Geosciences Laboratories offered valuable guidance with the analytical program.

At the OGS, this project was guided by Dr. P. G. Telford and Dr. O. L. White of the Engineering and Terrain Geology Section. Also in this Section, and deserving special thanks for their work on the inventory, were J. Stevenson, W. Woitowich, G. Fernandez, A. Bleiwas, S. Dunlop, L. Michaud, and numerous others.

3.0 General Inventory Methodology

3.1 FIELD SURVEYS

The Peatland Inventory study areas (see Figure 1) were selected to include areas of considerable peat resources, where there was expressed interest in the inventory being conducted or that displayed significant development potential. The individual peatland sites to be surveyed were selected on the basis of available peat information, relevant topographic and terrain mapping, preliminary airphoto interpretation, Landsat 2 feature imagery (1:50 000), and discussions with MNR staff having program responsibilities for the study areas. Selection was also based on considerations of accessibility, and the scale and type of peatland. In terms of the latter, larger and less forested sites were preferred, in order to satisfy the objective of evaluating as much as possible of the peat and peatland resources of each study area. Selected sites were delineated by straight-line perimeter boundaries along UTM (Universal Transverse Mercator) 1000 m grid lines.

All peatlands more than about 100 ha in size, and all survey sites, were plotted on 1:250 000 NTS (National Topographic System) base maps of the study areas. On these index maps (Appendix 4), each peatland was assigned a number. The complete peatland index number consists of the map number of the 1:250 000 NTS map sheet on which the site occurs, followed by a site number of up to three digits; e.g., 43J-823 or 42P-8. This numerical index was used throughout the inventory for referring to particular peatlands, in order to avoid any confusion from using geographic or colloquial names.

The project teams commissioned to undertake the field studies were provided with a detailed manual describing the field studies and report writing required (Riley and Michaud 1993). In addition, the project teams were requested to review a number of reports and papers discussing peat inventory methods and peatland uses (e.g., Morgan and Pollet 1983; Radforth and Brawner 1977; Graham 1979; Institute of Gas Technology 1980; Jeglum and Boissonneau 1977; Rees 1982; Sheppard et al. 1982; Tibbetts and Telford 1981; Riley 1983, 1984), and available publications of the International Peat Society and the Canadian National Committee of the IPS.

The project teams undertook a preliminary interpretation of airphotos (1:15 840, or 1:10 000 where available) before field studies, in order to assist in planning and the allocation of sampling efforts. Field studies were intended to clarify and modify this airphoto interpretation, and the final peatland classification maps integrated both field data and airphoto interpretation. This integration was done most successfully where various project team members, especially the airphoto interpreter and the field botanist, co-operated in completing the mapping *in the field*, following detailed field studies. For each designated survey site,

airphotos were interpreted and a final peatland classification map (1:10 000) was completed, with all peatlands delineated and subdivided into peatland types and physiognomic groups, using the terminology and classification units adopted by the Peatland Inventory Project (Appendix 3; Jeglum et al. 1974; Jeglum and Boissonneau 1977).

The collection of data on site was standardized through the use of standard "site data record" forms (Appendix 3), completed at each sampling point on the peatland. These were used on both detailed and reconnaissance survey sites; the difference between the detailed and reconnaissance surveys lay principally in the density of sampling.

The detailed surveys of sites concentrated on the collection of data at sampling points distributed on a grid system of transects across the site. A base-line transect was usually surveyed on the long axis of the peatland, and side-line transects were surveyed at right angles, customized for each site in order to best distribute coverage across the peatland. In many instances, secondary base-line-side-line series were required in order to conform with the configuration of a site. At 100 m intervals along these transects, points were surveyed and sampled. In areas not sufficiently covered by the grid, extra traverse points were sampled between transects.

Each sample point was identified in the following manner. Base lines were designated as **B** (or **F**), and points along it were identified by their distance (in metres) and direction; e.g., B000W, B100W, etc. Side lines were designated as **L** (or **G**). Points along it were identified by the point at which the side line intersects the base line, and by distance and direction along the side line; e.g., L700N + 1250E was the point on the side line that intersects the base line at B700N, and which was 1250 m east of the base line. Traverse points were numbered consecutively; e.g., T1, T2, etc.

On detailed survey sites, sampling density was 1 sampling point per 8 to 10 ha on sites greater than 1000 ha, and 1 per 6 to 8 ha on smaller sites. Where extensive areas of shallow peat (less than 1 m deep) were encountered, especially in combination with dense tree-cover, sampling lines were often discontinued.

On reconnaissance survey sites, the sampling density was in the order of 1 point per 50 to 80 ha of peatland. On these sites, representative sampling points were cored at a minimum of 2 points for each peatland vegetation type covering more than 20% of the site, with the addition of other points of interest. Points were aligned, where possible, as a rough transect, so that stratigraphic data could be presented in profile form. These reconnaissance sampling points were identified by consecutive numbers; e.g., R1, R2, etc.

The standard site data record forms (see Appendix 3) were completed for all sampling points on de-

tailed and reconnaissance survey sites. For each point, these records include: peatland index number; point location on the sampling grid; date; investigator; latitude and longitude of the site; UTM grid reference of the site; surface wetness at the sampling point; hummock-hollow microtopography; average depth-to-water; number of snags or stumps hit in 10 probes to 2 m depth around each sampling point; the type of basal sediment underlying the peat; elevation of the sampling point to the nearest 0.3 m (by various methods, including transit work, electronic topochains, airborne laser profiling and photogrammetry); total peat depth; total depth of humified peat (von Post scale H4+); and total depth of unhumified peat (von Post scale H1-3). (For the purposes of these studies, peat with a von Post humification of H1-3 was considered unhumified, and primarily of horticultural interest; H4+ peat was considered humified, and of more interest in terms of energy potential.) At each sampling point, the type of peatland vegetation was recorded (formation, subformation, physiognomic group, disturbance modifiers, and dominance type; see Appendix 3), as was the Radforth cover type (Keys 1983); the average tree canopy height; the percentage cover (light interception method) by tree canopy height; the percentage cover (light interception method) by tree species taller than 150 cm, shrub species taller than 150 cm, shrub and tree species shorter than 150 cm, graminoid and herbaceous species, and moss and lichen species; and the plot sizes used for cover calculations.

At each sampling point, the peat stratigraphy was recorded by recovering a full core with a Mini-Macaulay sampler (5 cm diameter, 50 cm long; CNRC 1979) or a Hiller sampler (3 cm diameter; MacFarlane 1969). Core was pulled from alternate holes, to minimize contamination or mixing of the sample by the auger tip.

The recovered core was divided into intervals based on changes in peat type and von Post-based humification (Henderson and Doiron 1982). The major peat types encountered were sphagnum moss (Ss), other mosses (Sb), sedge-herb peat (C), woody peat from shrubs (Ln) and from trees (Ll), with minor amounts of *Eriophorum* (ER), *Equisetum* (EQ), and others (MS). For each interval, the estimated composition was recorded on a percentage basis; e.g., Ln1C2Ss7 indicated a type of peat composed of 70% sphagnum, 20% sedge-herb, and 10% shrub. Any seeds, charcoal layers or constituents at less than 10% (coded as <1) were also recorded. This rough characterization of the plant remains was relatively easy in poorly decomposed, especially surficial, peats, but becomes more difficult with increased decomposition, especially above H5 on the von Post scale. Where moss or wood peats of questionable provenance were encountered, S and L were recorded instead of Ss/Sb or Ln/Ll.

Ooze and marl intervals were also recorded. The term "ooze" (OZ) was used to describe subaquatic humus deposits, such as gyttja, dy, muck, sapropel, copropel, etc., as defined by Stanek (1977). Such sediments vary in composition and sedimentation regime,

but tend to have a relatively high ash content. They tend to be amorphous or gel-like. The "gyttja" type was often white-green-grey-brown in colour, and gel-like or with a loose coprogenic or granular structure. The "dy" type was usually a brown-black gel and, more often than gyttja, appeared to be transitional to a very well humified peat. Seeds of aquatic plants were often present.

"Marl" (MA) was used to describe the greyish or white, loose deposits of impure calcium carbonate, largely precipitated through evaporative effects or the action of aquatic organisms. Both ooze and marl were usually encountered in a basal position, but also occurred higher in the sequence. Marl in southern Ontario was occasionally found as periodic laminations throughout a profile.

The von Post humification rating is based on a scale of 1 to 10, and is the most widely used rapid field technique for the characterization of this aspect of peat. The determination entails examination of three features: colour and amount of water released in a gentle preliminary squeeze of a small hand sample; the amount of recognizable plant-fibre remains; and the final squeeze test. Preliminary laboratory analyses on Ontario peats indicated that H4 peats had suitably high calorific values to qualify them as fuel-grade peats, while still retaining many of the fibre characteristics of horticultural peats. For the purposes of many of the summary tables and conclusions, H4 peats were considered in this inventory to be potential fuel peats, and volume calculations are based on this assumption. In New Brunswick, H4 peats are considered by many field workers to have potential as horticultural peat. Ontario inventory results should be interpreted with this in mind.

All core intervals showing any change in peat type or humification level were measured in terms of top and bottom depths, and logged for peat type and humification. In addition, a categorization was made of sample wetness, as well as the estimated amount of fibre in the sample. The latter categorizations included:

- 0 Amorphous/sapric—without discernible fibre or recognisable plant remains
- 1 Sapric—little discernible fibre; large plant remains may occur; fibre tends to disintegrate under pressure; 10 to 40% fibre
- 2 Hemic—fibre and plant remains distinct, with distinctive structure present; 40 to 70% fibre
- 3 Fibric—breaking of hand sample entails tearing of fibres; structure is elastic, resilient; plant remains clearly recognizable; more than 70% fibre

Data from the site record forms constituted the baseline information on which subsequent mapping, discussion, profiling and evaluation was based. However, additional data on site vegetation was collected in order to complement these data, to assist in accurate airphoto interpretation, and to provide more detailed habitat descriptions for land-use planning. This entailed semi-quantitative collection of phytosociological data at rep-

representative peat sampling points; i.e., at 3 points per physiognomic group covering more than 20% of the peatland, and with single sample points for smaller physiognomic groups.

In addition, full vegetation sampling was undertaken at all points from which peat cores were recovered for laboratory analysis (see Section 3.5, Laboratory Tests and Analysis of Results). The more complete vegetation data were also useful in accurately characterizing the mapping units used on the peatland classification map for the site, and in contributing to text on site drainage, hydrology, succession, and potential overburden removal or trafficability problems.

The full vegetation sampling entailed a record of all plant species occurring within a prescribed distance of the sampling point (in most cases, a 5 m radius), and the percentage cover (light interception) by each species within defined physiognomic strata; i.e., tree species taller than 150 cm, shrub species taller than 150 cm, shrub and tree species shorter than 150 cm, graminoid and herbaceous species, and moss and lichen species (see Appendix 3 for more detail). Moss and lichen species were recorded, at a minimum, wherever their percentage cover values exceeded about 5% (although some project teams exceeded or failed this minimum, depending on their particular capabilities). All vascular plant species were recorded within a 5 m radius; cover values were assigned on the basis of visual estimates of light interception by each species in standard-sized quadrats, usually 2 by 1 m², qualified by a visual estimate of the species' cover in the 5 m radius as well. The presence of water and debris was also recorded.

Plant species were identified in the field or collected for later determination by the field botanist or by experts in particular groups; e.g., mosses were sent to specialists of the National Museum of Natural Sciences (Ottawa) and elsewhere. Nomenclature followed standard treatments for Ontario; references for these are cited in the Open File Report on each study area.

Full vegetation sampling included measurement of the actual depth-to-water in the hummock and in the hollow phase of the microtopography near a particular sampling point. These data allow a more accurate estimate of average depth-to-water; e.g., if the depth-to-water in the hummock phase was 55 cm and in the hollow phase was -10 cm, and if the hummock phase occupies 40% of the microtopography, then the average depth-to-water was calculated as $[(40 \times 55) + (60 \times -10)] + 100 = 16$ cm.

Surface-water pH (to the nearest 0.1 unit) was measured in the field in water samples retrieved from about 10 to 15 cm below the water table, or water squeezed from peat in a hand-dug pit. The pH was measured with a portable pH-meter or with composite pH papers with overlapping accuracy ranges (E. Merck ColorpHast™ papers in the pH 4–7 and 6.5–10 ranges, for example).

At representative points on peatlands investigated in detail, complete cores were recovered from the surface of the peat down to the underlying mineral sub-

strate. These sampling points were selected to represent the variation in peat stratigraphy and/or vegetation occurring on the peatland. Mini-Macaulay samplers were recommended for this work (5 cm diameter, 50 cm long); a modified piston sampler (4 cm diameter; Korpi-jaakko 1981) was also used.

The cores were divided into sample intervals on the basis of changes in botanical composition and degree of humification on the von Post scale (Henderson and Doiron 1982).

The minimum sample weight of each core interval collected was 1 kg. Detailed core logs were recorded at each sampling point. Sedimentary peats (ooze) and marl intervals were also sampled by the same procedure.

Samples of each core interval were sealed into plastic bags, with excess air expelled. These samples were double-bagged, sealed to prevent water loss, and clearly labelled on the outside by study area (e.g., Ignace), peatland number (e.g., 52G-191), sample point number (e.g., L3200N + 200E), and stratum level (e.g., C2). The samples from all intervals of a particular core were then bagged together with another outside label including study area, peatland number and sampling-point number. They were stored in darkness.

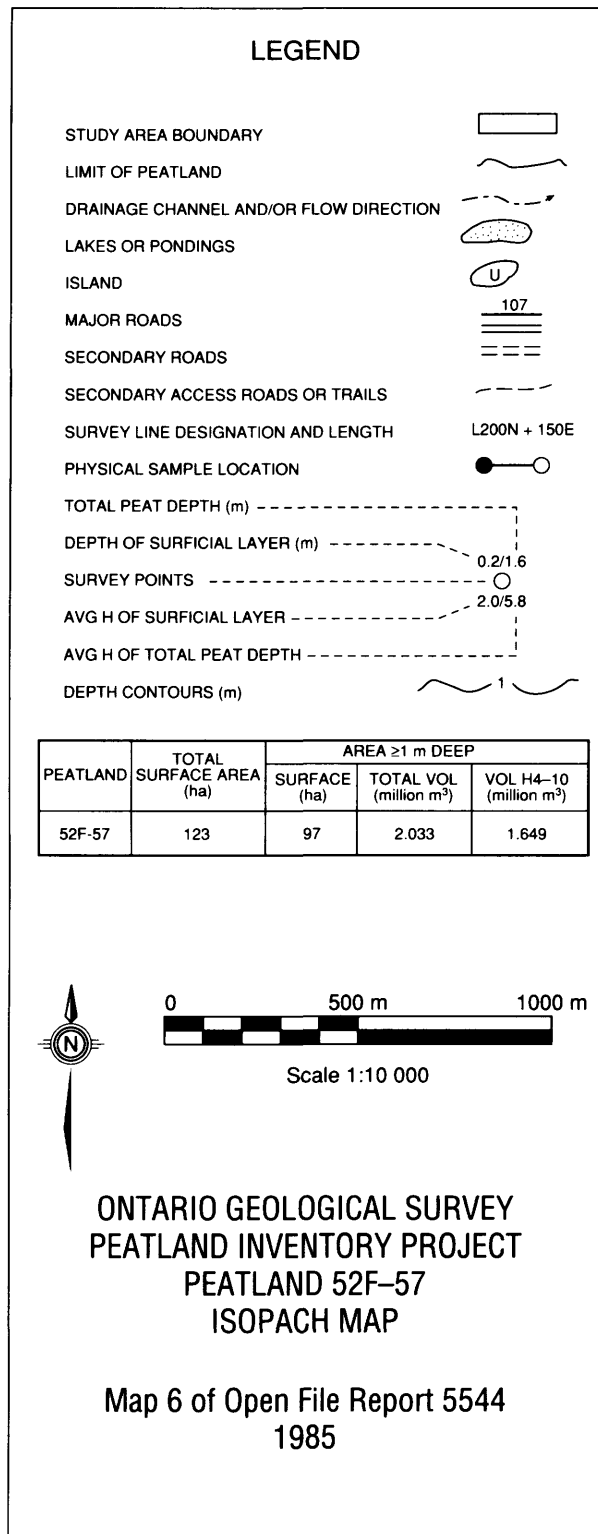
Physical samples were frozen as soon as possible in the field or kept at temperatures less than 3°C (Jasieniuk and Johnson 1982; Levesque et al. 1980). All samples were frozen upon delivery from the field.

Field studies were usually conducted in July, August and September, with some extending later in the season.

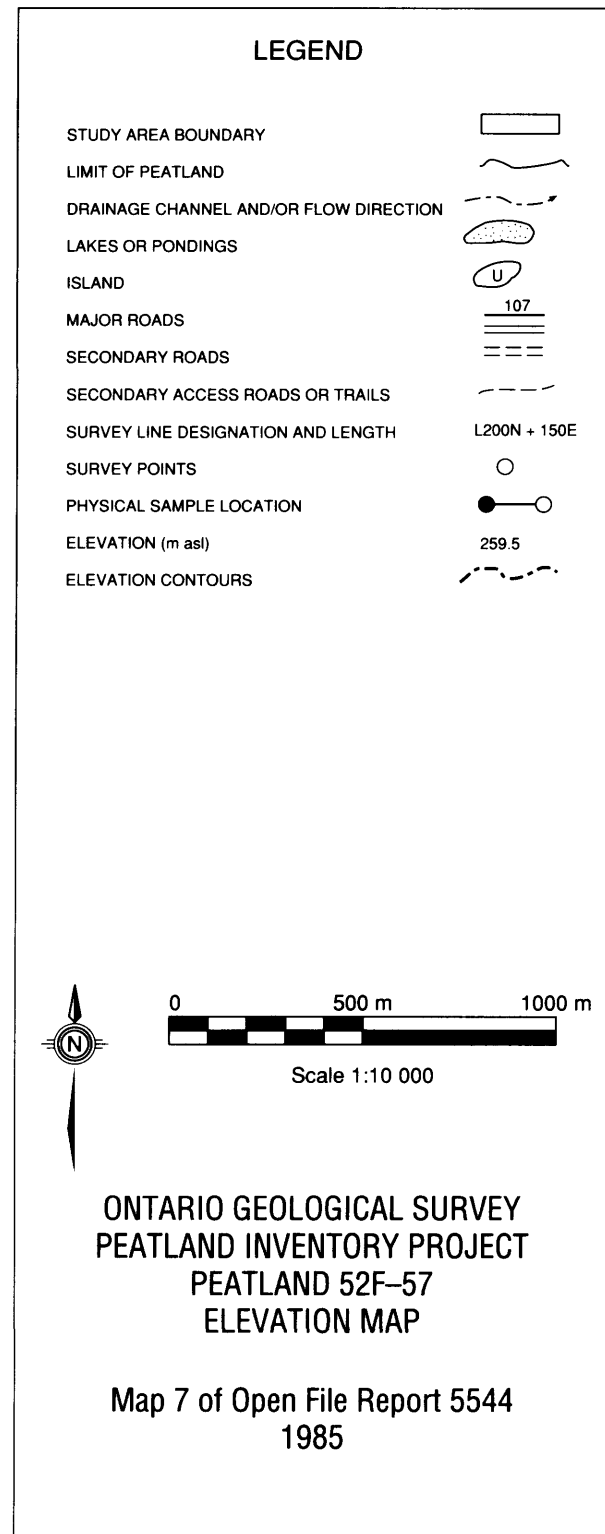
3.2 OPEN FILE REPORTS ON FIELD SURVEYS

Open File Reports written by the project teams for each study area have a standard format, with the exception of the first year of the inventory (the Hearst, Pembroke, Peterborough and Armstrong study areas). This format (Riley and Michaud 1994) included the following: a summary volume (abstract, introduction, methodology, results and conclusions), followed by volumes on each detailed survey site (location, access, topography drainage, peatland vegetation, peat depth, peat type, peat humification, peat volumes, site potential, isopach map, elevation map, peatland classification map, and peat type/peat humification profiles) and each reconnaissance survey site (abbreviated text on the same topics, with a peatland classification map and peat profiles).

All peatland mapping was done on a scale of 1:10 000, produced on base maps derived from Forest Resource Inventory (FRI) maps or Ontario Basic Maps (OBM) at available scales. The base maps included the survey site boundaries (usually along UTM 1000 m grid lines), latitude/longitude and UTM grid co-ordinates, roads, trails, drainage directions on streams, grid layout and sampling points. The isopach maps, elevation maps and peatland classification maps were plotted on this base, using standardized legends (Figure 2) and pro-

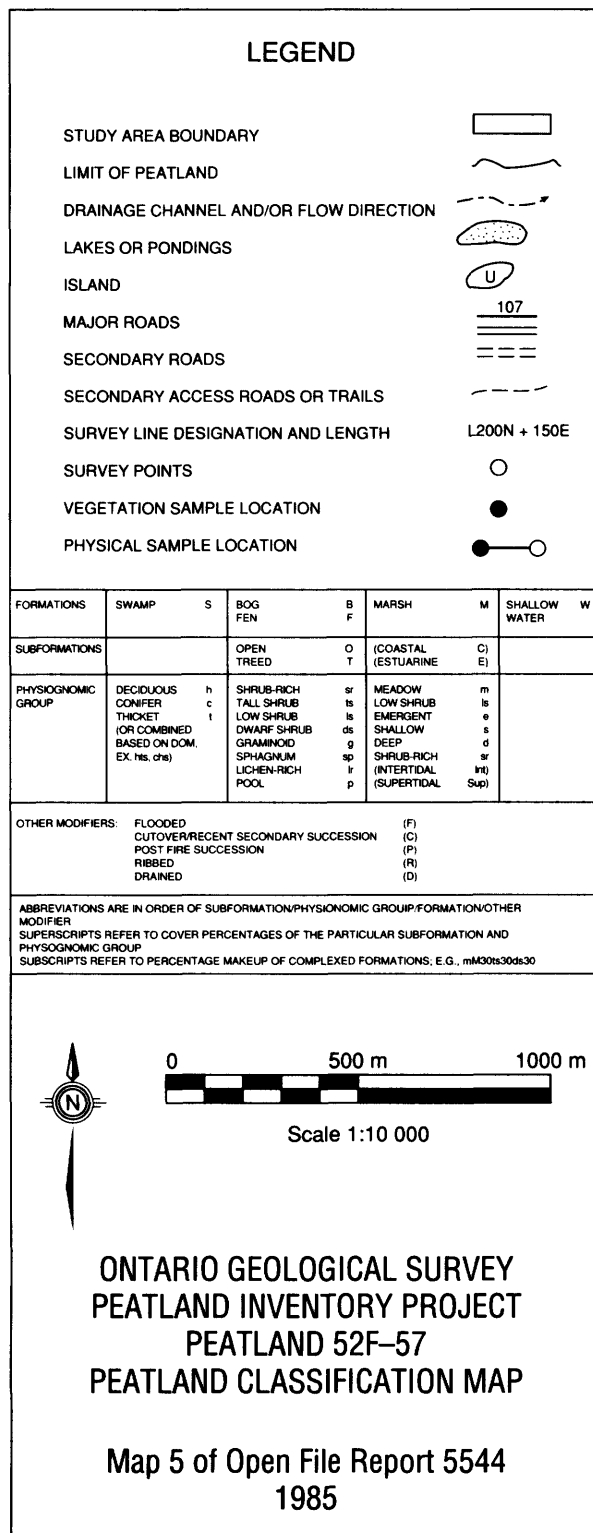


a) ISOPACH MAP

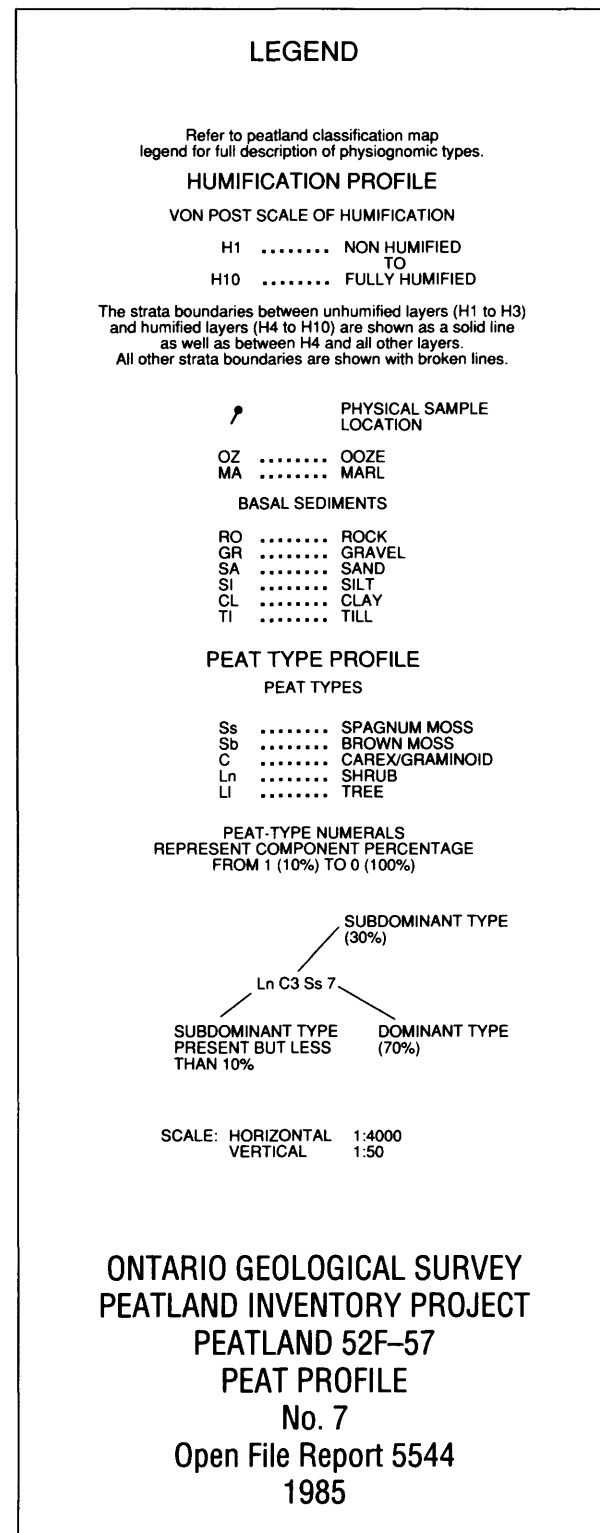


b) ELEVATION MAP

Figure 2. Legends for Peatland Inventory Project maps and profiles: a) isopach map; b) elevation map.



c) PEATLAND CLASSIFICATION



d) PEAT PROFILE

Figure 2 (continued). Legends for Peatland Inventory Project maps and profiles: c) peatland classification; d) peat profile.

files: a) isopach map; b) elevation map; c) peatland classification map; d) peat profile.

The isopach map (Figure 2a) indicates the depth contours of the peat deposit (the contour interval is 1 m), with peat depth and humification data indicated for each sampling point. At each point, the total peat depth (in metres) and the depth of unhumified peat (von Post scale H1–3) were indicated, as were the weighted-average von Post humifications of each of these depth intervals. This type of map formed the basis for calculations of peat deposit volumes and the assessment of particular concentrations of suitable peat. Humification inversions involving 50 cm of peat or more (e.g., 60 cm of H3 peat occurring as a stratum below a significant depth of H4 peat) were considered in calculations as part of the overall depth of that humification category (e.g., 60 cm of H3 peat was added to the surficial depth of H1–3 peat).

Peat volumes in areas deeper than 1 m were calculated by the “doughnut” method, as follows.

1. The surface area (in hectares) between each isopach contour line was measured.
2. The average total peat depth within each contour “doughnut” was calculated from all sampling points within the “doughnut”.
3. The area was multiplied by the average depth to produce a volume of peat (in cubic metres) for each contour area.
4. The volumes of each contour “doughnut” were summed to obtain a volume estimate for the peat deposit with a total depth of greater than 1 m. For the area covered by peat less than 1 m deep, an estimated average depth of 0.5 m (or another value estimated by the project team based on available data) was assumed in order to allow an estimate of the peat volume in these shallower areas.

The volume of well-humified peat (von Post H4+) was calculated by the same procedure, but using the depth figures and averages for H4–10 peats only. Volume calculations excluded marl and ooze intervals.

The elevation map (Figure 2b) indicates surface elevations on the peatland and the upland areas immediately adjacent to the peatland. The area that was contoured beyond the peatland itself varied, with a view to providing detail sufficient to assess the overall topography of the basin and sectors at which water drained into and out of the peatland.

On-site contouring was done to 0.5 m or 1.0 m contours (depending on the site), with 3.0 m contour intervals for adjacent upland areas. On-site contouring data were derived from transit work, electronic topochains, airborne laser profiling or photogrammetry, whereas elevations for adjacent uplands areas were based on photogrammetry or airborne laser profiling. Bench mark or reference height locations and elevations (and their sources) were indicated on the maps or in the text of the Open File Reports.

The peatland classification map (Figure 2c) indi-

cates the distribution of vegetation on the peatland, with the legend units based on a hierarchical classification including vegetation formations (e.g., bog, fen, swamp, marsh, poor fen), subformations (open, treed), and physiognomic (or structural) groups, such as graminoid, dwarf shrub, low shrub, tall shrub, deciduous, conifer, thicket, etc. (see Appendix 3). The airphoto interpretation on which this mapping was based was, for the most part, done in conjunction with field studies by the photointerpreter, in co-operation with the project field botanist, and after study of the site data records compiled by sampling crews at each point. (Despite a standardized classification system, the style and expertise demonstrated in this portion of the inventory varied considerably between study areas, and the data included in this summary report do not always coincide with data presented in the Open File Reports for each study area.)

This mapping also indicates the sampling points at which full vegetation sampling was undertaken by the project team. Where data were available, numerical superscripts were applied to the physiognomic mapping units; e.g., T²²ls⁴²B indicated a bog with tree cover of 22% and a dominant understorey of low shrubs at 42% cover.

The sampling density on detailed survey sites enabled the production of these three types of maps; for reconnaissance survey sites, only peatland classification maps were produced.

Peat profiles indicate the stratigraphy of peat types and humification levels along the sampling transects (Figure 2d). The top of the profile relates to surface elevation; the bottom, to substrate depth and type. Peat profiles are useful interpretative illustrations and can be used in conjunction with the laboratory data presented in this report to extrapolate peat characteristics laterally within a deposit. They can provide a rough measure of the succession of peatlands through time on the site. In addition, they are an excellent guide for focussing subsequent detailed surveys for site preparation, ditching, palynological studies, and ecological surveys.

The detailed peat-core data is interpreted along a transect by joining strata of relative similarity of peat type or humification. Considerable interpretation is involved in deciding on “significant” breaks in a profile, which warrant breaking out as separate strata. In this inventory, a significant break in the peat type of individual cores was viewed as a change of 20% or more in dominant peat type (e.g., C3 to C5), a change in dominant peat type (e.g., L1C4S5 to L1S5C4), or the appearance of different minor components (e.g., L). Where similar breaks between similar types occur on adjacent peat cores, this was interpreted as a discrete profile stratum.

Within this stratum, independent of its length, the peat types or humification values of all intervals recorded on the site data record forms were averaged to produce a stratum-specific description; e.g., C4S6, to indicate a peat composed of about 40% sedge–herb and

60% moss. Peat lenses of 30 cm or less in thickness were profiled only if they extended more than 100 m.

For reconnaissance study sites, sampling density was much less. Where sampling points were arranged in a more-or-less straight line, a modified peat profile was drafted. For unaligned points, the core data were plotted at the same scale as the profiles, but with no strata interpreted between points.

Detailed site evaluations included the above maps and profiles, interpretation of them, and other site-specific detail. The evaluations included the peatland index number and informal geographic or local names; the location of the site; airphoto flight lines and frames; and access, in terms of roads, railways, rivers, cut township lines, rights-of-way, distances to nearby towns, industries and transportation routes. The discussion of topography and drainage integrated relevant topographic data with the elevation and isopach data on the specific site, including present and potential drainage of the site, substrate types, seasonal flooding regimes, water-bodies present, and any existing modifications to the natural drainage patterns. This and subsequent text focussed on the areas of the peatland which, because of peat depth, drainability and peat type, were considered to have the greatest resource potential.

The peatland's vegetation was characterized in terms of dominant formations and physiognomic groups, their distribution across the site in relation to site hydrology, and the areal coverage and average peat depth of each physiognomic group. Each peatland classification unit was discussed in relation to average depth-to-water, groundwater pH, hummock-hollow microtopography, average tree-cover values, and dominant or diagnostic plant species. Detailed floristic data were summarized in tables of dominance types, and tables of the cover values of all plant species recorded at full vegetation sampling points. (As indicated previously, some aspects of this part of the inventory were not undertaken in its first year; i.e., Hearst, Pembroke, Peterborough, Armstrong.) Any patterning of the peatland vegetation (e.g., ribbing, tear-shaped islands, raised bogs, circular features) was discussed.

Discussion of peat resource characteristics focussed on the physical aspects of the peat, as observed in the field. Laboratory analyses of the peat were not available to the project teams during the field studies. As a result, peat depths, peat types and humifications, and peat volumes were the focus of the evaluation of the sites for peat-resource development. Overall peat depths, the proportions of humified versus unhumified peat, and the average peat depths beneath certain peatland types (e.g., open bog, rather than treed bog) are critically important, especially in relation to the distribution of peat types considered most suitable for energy or horticultural applications.

The assessment of development potential in a strict socioeconomic sense is not feasible at the inventory stage, but appraisals were made based on the characteristics of the peatlands in a study area, and the relative suitability and accessibility of particular sites. In this

inventory, this evaluation entailed appraisal of several attributes:

1. Deposit volumes
2. Generalized peat types
3. Accessibility with respect to existing roads and centres of population or industry
4. The degree of tree cover presently on the site
5. The evident drainability and trafficability of the site
6. Apparent possibilities for dry or wet mining of the site (or portions of it) for energy or horticultural peat
7. The stump content of the deposit (after Keskitalo 1982; Keys 1983), to measure the volume of wood in a deposit
8. The present land tenure and land use
9. Any present or past peat extraction or drainage of the site

If the site had been previously studied or if contacts with district or regional staff of the MNR indicated that important biological values were associated with the site, information and its source were also presented.

The reconnaissance site evaluations used a similar approach, but focussed on assessing the suitability of sites for more detailed site investigations. This assessment was based on the potential for peat extraction on the basis of:

1. Anticipated peat depths, volumes and quality
2. The absence of constraints to development such as dense tree cover, drainage problems, or conflict with existing land uses
3. Proximity to population and transportation centres
4. The similarity of sites to nearby detailed study sites that had apparent resource potential

The summary volume included a detailed summary table, indicating total peatland area; peatland area deeper than 1 m; number of sampling points and transects; total volume of peat *in situ*; percentage stump content; peatland types, their area, average peat depth, number of peat cores, and number of full vegetation sampling points; and the numbers of physical sample cores recovered for subsequent laboratory analysis.

The summary table of development factors summarized certain factors in terms of whether they were limiting, good, poor or excellent for development. These factors included such items as deposit area deeper than 1 m; volumes of humified and unhumified peat; average peat-depth and humification; dominant peat-type; stump content; tree cover; drainage; and land tenure. This comparative table showed an overall rating of the sites as well as the regional patterns of particular development factors.

The resource potential was also related to other factors such as accessibility; slope gradients across deposits to potential discharge points; the occurrence of string fens (with inherent trafficability problems); and other special considerations such as Environmentally

Sensitive Areas, Areas of Natural and Scientific Interest, deer yards, fish spawning areas, timber licences, and extant peat harvesting operations. Finally, the resource's potential was addressed in terms of suitability for use as energy or horticultural peat; potential drainage for agriculture or forestry; and for conservation or wildlife uses, where these values were pre-eminent or most suitable by default.

3.3 REGIONAL SUMMARY TABLES INTEGRATING DETAILED FIELD- SURVEY AND LABORATORY RESULTS

The general methods of data analysis, mapping and reporting have been outlined in order to provide an overview of the inventory as it operated in the field, to complement the Open File Reports on particular study areas. Those Open File Reports contain the intensive studies of numerous peatlands; but there were certain aspects of the inventory that were undertaken as studies parallel to the field studies. Among these is the compilation of summary tables integrating the field studies and certain aspects of the laboratory results (Appendix 1).

The volume of a peat deposit is of significance only by virtue of the areal extent of a suitable depth of an appropriate peat material. Approximately 90% of peat harvesting is done by a dry-milled method, so large-scale extraction for both energy and horticultural peat requires large surface areas from which very shallow, solar-dried harvests are made over sufficient lengths of time to warrant the initial capital investment. Although other harvesting techniques are technically feasible, the following comments are based on dry harvesting and are intended to provide focus for a summary treatment of the peat data base.

The volumes and peat-depth figures calculated through the field inventory are *in situ* values. During the drainage phase of a production development, a significant degree of compaction of the peat occurs, estimated to be about 15% (Turverukki Oy Ltd. 1982). In addition, most large-scale peat operations assume that peat extraction should be discontinued within 50 cm of the basal sediment underlying the deposit, to avoid peat with generally higher ash contents, to avoid potential damage to harvesting equipment, and to assist in site reclamation.

In some situations, this 50 cm buffer zone may be considered too little or too much, depending on the uses of the particular peat extracted and the type of underlying substrate. However, the combination of these two factors (compaction and non-extractable basal peat) means that an *in situ* peat depth of 2 m may be assumed to have an extractable depth of 1.3 m. (This figure excludes any peat removed from the surface during site preparation.)

Milled peat harvesting is by far the most prevalent production method. A thin layer of peat is milled or

shredded from the top of the prepared production field, then harrowed and solar-dried over the course of several days. The thickness of this harvested layer varies with circumstances, but can be assumed to be in the order of 10 to 15 mm per harvest: Suoninen (1982) reports Finnish averages of 10 to 20 mm, and Monenco Ontario Ltd. (1981) reports an average of 12 mm.

During the potential harvesting period (May to September), the number of suitable two- to three-day drying periods in Ontario is 10 to 16, depending on the thickness of harvested peat to be solar-dried (10 to 11 in Timmins and Armstrong, and 11 to 12 in Ottawa and Fort Frances; Ecologistics Ltd. 1985). Suoninen (1982) reports a Finnish average of 16 harvests per year, based on two-day drying periods; Midwest Research Institute (1976) reports an Irish average of 12 harvests per year; Monenco Ontario Ltd. (1981) reports an average of 15 harvests per year.

Therefore, at a rate of 12 mm per harvest and 15 harvests per year (a maximum value), a total of 0.18 m of peat is removed each year, so that a 1.3 m depth of peat could bear harvesting for at least 7 to 8 years. This period would appear to be a minimum length of time, in terms of the capitalization of investment in a large-scale operation.

In summary, the analysis of peat deposits should focus on those portions of peatlands with a minimum of 2 m of peat. This conforms with the US Department of Energy definition of fuel-grade peats as those having a minimum depth of 5 feet, and with the Finnish and Irish estimates of usable peat resources as those being deeper than 2 m (Lappalainen 1982; Midwest Research Institute 1976).

Thus, the focus of the peat resource evaluation in this report is on the areas of peatland with depths greater than 2 m. This entailed recalculation of all depth averages, areas and volumes, based on a reappraisal of all isopach maps and site data records produced by the project teams for each study area. This reappraisal of the data in the Open File Reports and the integration of subsequent laboratory data resulted in the regional summary tables (Appendix 1) in this report. For detailed survey sites, these tables include:

1. Study site number and UTM grid reference
2. Total area of the peatland (in hectares); total volume of peat *in situ* (in millions of cubic metres); volume of well-humified peat *in situ* (von Post scale H4+, $\times 10^6 \text{ m}^3$)
3. Area of peatland deeper than 2 m (in hectares, based on planimetry of the isopach maps in the Open File Reports); number of sub-basins composing that area; total volume of peat *in situ* ($\times 10^6 \text{ m}^3$) in the area deeper than 2 m; volume of well-humified peat *in situ* (von Post scale H4+, $\times 10^6 \text{ m}^3$, in the area deeper than 2 m); average depth of peat in the area deeper than 2 m (in centimetres, based on the average of all core depths in the area deeper than 2 m); and number of cores for which depths were recorded

4. Average thickness of unhumified peat (in centimetres, von Post scale H1–3, based on isopach maps) in the area deeper than 2 m
5. Weighted-average peat type of unhumified peat in the areas deeper than 2 m, based on averages of the logged cores, with the core values weighted by thickness of the intervals recorded, $S-C-L-Other = (\% \text{ moss}/10) - (\% \text{ sedge-herb}/10) - (\% \text{ wood}/10) - (\% \text{ other}/10)$
6. Weighted-average humification of unhumified peat in the area deeper than 2 m (von Post scale, based on average of the logged cores, with the core values weighted by thickness of the intervals recorded)
7. Weighted-average heat value of unhumified peat in the area deeper than 2 m (net calories per gram, based on laboratory data on cores from areas deeper than 2 m, with the average weighted by the thickness of the intervals analyzed in the laboratory)
8. Weighted-average ash content of unhumified peat in the area deeper than 2 m (percentage ash, based on laboratory data on cores from areas deeper than 2 m, with the average weighted by the thickness of the intervals analyzed in the laboratory)
9. Weighted-average fibre content of unhumified peat in the area deeper than 2 m (percentage fibre, based on laboratory data on cores from areas deeper than 2 m, with the average weighted by the thickness of the intervals analyzed in the laboratory)
10. Weighted-average peat pH of unhumified peat in the area deeper than 2 m (pH, based on laboratory data on cores from areas deeper than 2 m, with the average weighted by the thickness of the intervals analyzed in the laboratory)
- 11–17. For the well-humified peat in the area deeper than 2 m, the average thickness and weighted average peat type, humification, heat value, ash content, fibre content and peat pH, calculated as indicated in 4 to 10 above
18. Percentage of the peatland area deeper than 2 m with tree cover of less than 10%
19. Presence of a basal ooze in the area of peat deeper than 2 m, expressed as the average thickness (cm), the number of cores showing basal ooze, and the total number of peat cores in the area deeper than 2 m
20. Peatland vegetation types occurring on the whole peatland area, abbreviated as OB (open bog), TB (treed bog), OF (open fen), TF (treed fen), OPF (open poor fen), TPF (treed poor fen), cS (conifer swamp), hS (hardwood or deciduous swamp), tS (thicket swamp), mS (mixed swamp), and M (marsh) (definitions as in Appendix 3)
21. Area of each peatland vegetation type (ha)
22. Average peat depth (m) beneath each peatland type; number of cores on which this average is based
23. Stump content calculated for whole peatland area (%)
24. MNR Administrative District and Site Region/ Site District (Hills 1959; Hills and Pierpoint 1960)
25. Comments; in this case, the categorization of the peat deposits in terms of energy and horticultural peat, as discussed in the following Section (3.4)

The regional summary tables for reconnaissance survey sites reflect the reduced field-work done and the absence of laboratory data on those sites. They cover the following aspects of the peat and peatland resource:

1. Study site number and UTM grid reference
2. Total area of the peatland (ha)
3. Estimated average peat depth (cm), and number of peat cores on which average is based
4. Estimated total peat volume *in situ* ($\times 10^6 \text{ m}^3$), based on multiplication of the total area by the average peat depth (2 and 3, above)
5. Estimated volume of well-humified peat *in situ* (von Post scale H4+, $\times 10^6 \text{ m}^3$), multiplying the estimated total volume by proportion of the average peat depth occupied by well-humified peat
6. Average thickness of unhumified peat (in centimetres, von Post scale H1–3), based on all logged cores
7. Average humification of unhumified peat (von Post scale), based on all logged cores with H1–3 intervals; average of the logged cores, with the core values weighted by thickness of intervals logged
8. Average peat-type of unhumified peat (classification as already indicated), based on all cores logged with H1–3 intervals; average of the logged cores, with the core values weighted by thickness of intervals logged
- 9–11. Average thickness, humification and peat type of well-humified peat (von Post H4+; same method as indicated above for unhumified peat)
12. Percentage of total peatland area with tree cover of less than 10%
13. Presence or absence of basal ooze, based on cores logged
14. Peatland vegetation types occurring on the whole peatland area, the area of each peatland type (ha), and the average peat depth beneath

each peatland type, based on the cores logged (same method as indicated for detailed study sites)

15. MNR Administrative District and Site Region/ Site District

These summary tables include data not included in the earlier Open File Reports, and focus on peatland areas deeper than 2 m. However, the Open File Reports contain the results of intensive field studies not summarized in this report. Refer to them for additional peatland information on the sites studied.

3.4 CATEGORIZATION OF DEPOSITS FOR POTENTIAL USE AS ENERGY OR HORTICULTURAL PEAT

Most of the peatlands surveyed by the inventory have potential in terms of small-scale bulk peat production for local or specialty uses, where economics warrant and where land-use policies permit. However, only a restricted number of peatlands have potential for large-scale, mechanized peat-harvesting operations. Large-scale developments can be categorized on the basis of horticultural and fuel utilization characteristics.

In horticultural-peat production, a large-scale operation is defined here as involving milled peat harvesting for a peat-baling operation with an annual product of 100 000 bales (80 lb or 36 kg each, at 50% moisture content). Estimated milled-peat production would be in the order of 180 t/ha/yr, assuming about 12 mm of peat per harvest and almost 15 harvests per year (see Section 3.3, Regional Summary Tables Integrating Detailed Field-Survey and Laboratory Results).

In comparison, Finnish production rates are estimated at 210 t/ha/yr, based on 600 m³/ha at bulk densities of 350 kg/m³ (Suoninen 1982). Monenco Ontario Ltd. (1981) estimates potential northern Ontario production of 140 t/ha/yr, and southern Ontario production of 200 t/ha/yr. Midwest Research Institute (1976) estimates Irish annual production at 165 t/ha/yr. Turverukki Oy Ltd. (1982) estimated central Ontario production potential at 180 t/ha/yr.

To produce 100 000 bales per year (3636 t/yr) at production rates of 180 t/ha/yr, 20 ha are required. However, if only 1 m of harvestable horticultural peat is present, and if capital requirements demand a production duration of at least 15 years, then the area required is 50 ha. If harvestable peat depths are greater, the area required is less. If capitalization requirements demand a longer production duration, or if the number of harvests per year is reduced by weather problems, the required area of production fields may be greater.

A horticultural-peat operation has been used as an example because it involves a smaller area of peatland than required for a large-scale fuel-peat operation. Fuel-grade peat can be harvested at any scale, depending on the end use of the product. However, large-scale power generation requires large areas of suitable peat deposits. For example, peat power plants in Ireland vary

in output from 40 to 90 MW (Lang 1984). A 40 MW plant consumes peat at a rate of about 250 kt/yr (6.3 kt/MW). Assuming a very high peat-production rate of 200 t/ha/yr, this production would require 1250 ha of developed production fields. A 100 MW power plant, with a consumption of 700 kt/yr (at an estimated 7 kt/MW) would require a minimum of 3500 ha. In Ireland, the smallest deposit developed for milled peat harvesting for energy production is 1135 ha, with production fields of 850 ha (Midwest Research Institute 1976).

These area estimates can be considered minimum values because development of such an operation would require production of peat over an extended period of time, and the duration of production would again relate to the available thickness of suitable peat. These area requirements would rarely be met in a single deposit; a group of peatlands within an economical transport distance of a power plant is a more probable scenario. Monenco Ontario Ltd. (1981) estimates 100 km as the economic limit for transporting milled peat by rail or road.

Figure 3 shows the general relationship between usable peat depths and the area of production fields, assuming a 40 MW power plant based on milled peat harvesting involving 16 harvests per year of 15 mm per harvest. The production rates, area requirements and harvestable depths are estimates, but consideration of the relationship between these factors (and others) is critical in assessing the development potential of a site.

A categorization of the peatlands examined in detail has been derived from these considerations of deposit area and usable depths. Because of the absence of specific data on operating Canadian energy-peat developments, the area requirements are biased towards the inclusion of relatively small fuel-peat deposits. These categories are included on the regional summary tables (Appendix 1). Other relevant comments on the potential of sites in terms of agriculture, forestry, land tenure, biological conservation, drainage, etc., have been made in the detailed text of the Open File Report on each study area.

Category A Fuel-Peat Deposit

- 1 Peatland area deeper than 2 m >150 ha
- 2 Average net heating value >4165 cal/g
- 3 Average ash content <15%

Category B Fuel-Peat Deposit

- 1 Peatland area deeper than 2 m 50 to 150 ha
- 2 Average net heating value >4165 cal/g
- 3 Average ash content <15%

Category A Horticultural-Peat Deposit

- 1 Peatland area deeper than 2 m >150 ha
- 2 Average unhumified peat thickness
(von Post scale H1-3) >1 m
- 3 Average peat type of unhumified
peat >70% moss peat
- 4 Average pH of unhumified peat <4.9
- 5 Average fibre content of unhumified peat .. >60%

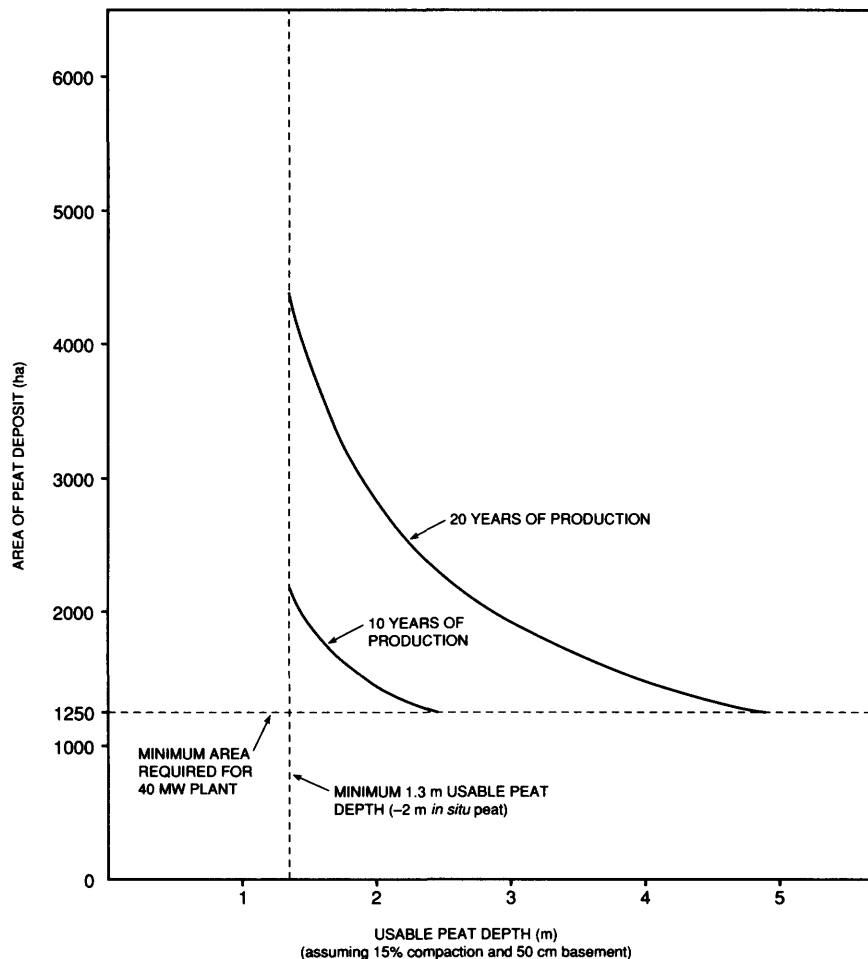


Figure 3. General relationship between usable peat depth and area of production deposits for a 40 MW power plant operating for 10 and 20 years.

Category B Horticultural-Peat Deposit

- 1 Peatland area deeper than 2 m 50 to 150 ha
- 2 Average unhumified peat thickness
(von Post scale H1-3) > 1 m
- 3 Average peat type of unhumified
peat > 70% moss peat
- 4 Average pH of unhumified peat < 4.9
- 5 Average fibre content of unhumified
peat > 60%

These categories are based on the regional summary tables, and on specific laboratory data on the peat cores sampled (Appendix 2). Modifications to these categories can be readily made with reference to these sources; i.e., if the requirement for average peat pH happens to be less than 5.0 rather than under 4.9. Even for detailed survey sites, this categorization is tentative because of the limited nature of the data collected, especially laboratory data.

The percentage of the peatland area deeper than 2 m with more than 10% tree cover was not considered to be of critical importance, because the significance of tree cover in terms of clearing costs will vary in relation to the value associated with the peat resource. In addition, the calculated stump content was not considered in

this categorization, as it was not based on a sufficient density of sampling points on the peatland area deeper than 2 m to provide more than an approximate guide to stump content.

Within portions of peatlands deeper than 2 m, there may be sufficient lateral variation in peat materials to allow horticultural-peat production, regardless of the overall "average" values of the deposit. More detailed information is in the relevant Open File Reports.

3.5 LABORATORY TESTS AND ANALYSIS OF RESULTS

From each peatland studied in detail, the project team recovered top-to-bottom sample cores. Up to 4 sample cores were recovered from each peatland, from points chosen to reflect the general patterns of peat stratigraphy, peat depths and peatland vegetation (see Section 3.1, Field Surveys).

The laboratory tests reflect the broad objectives of the inventory, and include parameters of relevance to the energy, horticultural, agricultural, forestry and ecological resources of the peatland. The testing comple-

ments the detailed peat profiles published in Open File Reports, so that laboratory results could be stratigraphically integrated with transect profiles of the peat deposits, and with other peatland data, such as peatland vegetation types.

The laboratory methods used in the inventory project have been described in detail elsewhere (Riley 1989a); descriptions of methods are therefore abbreviated in this report. That report also describes the collection and handling of the samples, tests of various methods, results of blind duplicate and replicate tests, results from tests of standards and blanks, and the precision and accuracy achieved by the test methods. The outline below refers to published analytical methods, from which the general inventory methodology was derived (Riley 1989a). Capitalized abbreviations (e.g., CAT EX CAP) are those used as column headings in Appendix 2, Physical and Chemical Properties of Peat Samples from Northeastern Ontario.

1. Cation Exchange Capacity, As-Received Peat (CAT EX CAP)—Total amount of exchangeable cations that can be held by a peat (McKeague 1976). Horticultural peats should have a cation exchange capacity of 90 meq/100 g or greater (Farnham 1968; Carlson 1983). The method used was “CEC (of Fresh Sample) by NH₄OAC at pH 7.0” (CNRC 1979), with results corrected to dry-peat weight on the basis of the moisture content of sample. Sample: as-received, 25 g. Result: cation exchange capacity, in milliequivalents per 100 grams (meq/100 g), corrected to oven-dry weight.
2. Peat pH in H₂O (H₂O PH)—The measurement of hydrogen ion concentration (CNRC 1979; Minnesota Department of Natural Resources 1982; Levesque et al. 1980; ASTM 1981, D2976-71). Sample: as-received, 20 g. Result: pH to nearest 0.1 pH unit.
3. Peat pH in CaCl₂ (CACL₂ PH)—The measurement of hydrogen ion concentration independent of initial amounts of salts present (CNRC 1979). Sample: as-received, 20 g. Result: pH to nearest 0.1 pH unit.
4. Conductivity (COND)—An indication of the total concentration of various dissolved ions, excluding hydrogen ions (CNRC 1979). Sample: as-received, 20 g. Result: conductivity in micromhos per centimetre ($\mu\text{mho/cm}$) at 25°C.
5. Fibre content (FIB %)—A laboratory measure relating to the degree of fibre decomposition and water-retaining capacity of the peat. Fresh peat and deionized water are stirred at 240 rpm for 10 minutes, then sieved through 100 mesh (0.15 mm) under wash at a flow rate of 5 L/min; the carbonates are dissolved; the sieve residue is dried and weighed (after Levesque and Diné 1977; equations to correlate results with fibre-content data by the syringe method are presented by Riley 1989a). Sample: as-received, 20 g. Result: fibre, percentage of oven-dry peat made up of fibres longer than 0.15 mm.
6. Moisture Content (MC % WET)—Oven-drying to determine moisture content (ASTM 1981, D2974-71; CNRC 1979). Moisture content is used in converting test results on as-received peat to a dry-weight basis. Sample: as-received, 50 g. Result: moisture content, percentage wet basis, by weight.
7. Absorptive Value (VAL ABSO)—Ratio of the weight of water originally retained in the peat *in situ* to the dry weight of the peat.
8. Absorptive Capacity (CAP ABSO)—Ratio of the weight of water potentially retained in the peat (following saturation in the lab) to the dry weight of the peat; decreasing with increasing humification of the peat (after Graham 1979, as “absorptive value, dry basis”). Reported values relate to more-or-less undisturbed peat; harvesting methods change a peat’s absorptive capacity. Sample: as-received, 50 g. Result: absorptive capacity, ratio.
9. Bulk Density (DRY BULK DENS, WET BULK DENS)—Measure of the weight of a given volume of peat; generally increasing with increased humification, and mineral content, and decreasing with increased sphagnum content (after Minnesota Department of Natural Resources 1982; Graham 1979). Bulk density can be used to convert water content, nutrient and energy characteristics measured on a unit weight basis to a unit volume basis (e.g., Lucas and Rieke 1968). Sample: as-received, 50 g. Result: bulk density, on a dry-weight basis, in grams per cubic centimetre (g/cm^3); and on a wet-weight basis (g/cm^3).
10. Sample Homogenization—The preparation of peat samples at 0% moisture content for subsequent tests was done by drying bulk samples at 50°C until most moisture was evaporated (1 to 4 weeks); grinding samples with Wiley Mill (80 mesh, 0.18 mm); finish drying at 60°C to 80°C for 16 hours. To avoid potential problems of rehydration of samples before tests, all samples were redried at 90°C to 0% moisture immediately before any tests on oven-dry peat were conducted.
11. Ash Content (ASH %)—Indicates accumulation of mineral matter as a result of decomposition and sediment load in peatland waters (after CNRC 1979; Minnesota Department of Natural Resources 1982; ASTM 1981, D2974-7; Walmsley 1977). Organic soils or sediments are considered to be peat if they contain 25% or less inorganic material (i.e., ash) on a dry-weight basis (Andrejko et al. 1983). Sample: 1 g at 0% moisture content. Result: ash content, percent, dry weight.
12. Volatile Matter (VOL %)—Percentage of gaseous fraction obtained by combusting a peat sample; relates to the reactivity of peat to some processing methods. A high content of volatile matter results in reduced combustion temperatures (ASTM 1981, D3175-77; Sheppard 1984). Sample: 1 g at 0% moisture content. Result: volatile matter, in percentage of dry weight.

13. **Calorific Value (NET CAL/G)**—The US Department of Energy considers peats with gross calorific values of 4400 cal/g or more as fuel-grade peat (LeMasters et al. 1983). At average levels of N (1.5%), S (0.18%), and H (5.0%), this value corresponds to a net calorific value of about 4165 cal/g for fuel grade peats (ASTM 1981, D2015-77). Sample: 1 g, 0% moisture content. Result: net calorific value, in calories per gram (cal/g) of dry weight.
14. **Total Carbon (C TTL %)**—Total inorganic and organic carbon (Riley 1989a). Sample: 0.05 g, 0% moisture content. Result: total carbon, percentage, dry weight.
15. **Organic Carbon (C ORG %)**—Organic carbon content (Riley 1989a). Sample: 0.05 g, 0% moisture content. Result: organic carbon, percentage, dry weight.
16. **Nitrogen (N %)**—Nitrogen content by Kjel-Foss Automatic 16200 nitrogen determinator; method comparable to Semi Micro-Kjeldahl Method (CNRC 1979). Sample: 0.1 g, 0% moisture content. Result: nitrogen, percentage, dry weight.
17. **Hydrogen (H %)**—Hydrogen content (Riley 1989a). Sample: 0.1 g, 0% moisture content. Result: hydrogen, percentage, weight.
18. **Sulphur (S %)**—Sulphur content (Riley 1989a). Sample: 0.1 g, 0% moisture content. Result: sulphur, percentage, dry weight.
19. **Oxygen (O %)**—By difference; equal to $100 - (\text{ASH \%} + \text{N \%} + \text{H \%} + \text{S \%} + \text{Total C \%})$.
20. **Arsenic (AS PPM)**—Arsenic content by acid dissolution, hydride generation and atomic absorption (Riley 1989a). Sample: 1.0 g, percentage moisture content. Result: arsenic, parts per million (ppm) of dry weight.
21. **Mercury (HG PPM)**—Mercury content by acid dissolution, cold vapour generation and flameless atomic absorption (Riley 1989a). Sample: 1.0 g, 0% moisture content. Result: mercury, parts per million (ppm) of dry weight.
22. **Multi-Element Inductively Coupled Argon Plasma (ICAP) Emission Spectrometry**
 - 1984—Calcium (CA PPM), Phosphorus (P PPM), Potassium (K PPM), Aluminum (AL PPM), Iron (FE PPM), Lead (PB PPM), Manganese (MN PPM), Magnesium (MG PPM), Copper (CU PPM), Zinc (ZN PPM)—Wet-ashing dissolution (modified from Arafat and Glooschenko 1981; Riley 1989a), followed by simultaneous determination of elements by ICAP, on a Jarrell Ash Model 975 Atom Comp. (Riley 1989a). Sample: 0.25 g, 0% moisture content. Result: the above elements, parts per million of dry weight.
 - 1985—Calcium (CA PPM), Phosphorus (P PPM), Potassium (K PPM), Aluminum (AL PPM),

Iron (FE PPM), Zinc (ZN PPM), Manganese (MN PPM), Magnesium (MG PPM), Zinc (ZN PPM)—Dry-ashing dissolution, followed by simultaneous determination of elements by ICAP (Jarrell Ash Model 975 Atom Comp.; Riley 1989a). Sample: 10 g, 0% moisture content. Result: the above elements, parts per million of dry weight.

—Lead (PB PPM) and Copper (CU PPM)—Dry-ashing dissolution followed by atomic absorption (Riley 1989a).

The results of these analyses are presented in Appendix 2, along with other descriptive parameters associated with individual peat-sample intervals and with the sampling-point location itself.

1. **Depth of the Top of the Sample Interval (TOP INT CM)**—In centimetres (cm)
2. **Depth of the Bottom of the Sample Interval (BOT INT CM)**—In centimetres
3. **Humification (HUM 1–9)**—Recorded humification of the sample interval (von Post scale)
4. **Moss Peat (S)**—Percentage (+ 10) of moss peat recorded in the sample interval; 1 = 10%, 2 = 20%... 0 = 100%
5. **Sedge Peat (C)**—Percentage (+ 10) of graminoid-herbaceous peat recorded in the sample interval; 1 = 10%, 2 = 20%... 0 = 100%
6. **Wood Peat (L)**—Percentage (+ 10) of woody peat recorded in the sample interval; 1 = 10%, 2 = 20%... 0 = 100%
7. **Other Peat or Material (X)**—Percentage (+ 10) of other material recorded in the sample interval; 1 = 10%, 2 = 20%... 0 = 100%
8. **Relative Position (REL POS)**—Relative position of the interval in the overall peat core:
 - 0 strictly surface, living peat
 - 1–4 midpoint between the top and bottom of the sample interval occurs in the first, second, third, or fourth quarter of the overall core length—with the overall core length determined as the distance from the surface (or the bottom of 0, as described above) down to the bottom of the lowest interval with an ash content of less than 25%, or to the bottom of the sample core
 - 5 samples with 25 to 60% ash content, usually ooze or marl intervals
 - 6 samples with more than 60% ash content, usually substrate samples
9. **Tree Cover at Sampling Point (T %)**—Vegetation cover at the sampling point by tree species taller than 150 cm, as an estimated percentage of intercepted light

10. Tall Shrub or Thicket Cover at Sampling Point (TS %)—Vegetation cover at the sampling point by shrub species taller than 150 cm tall, as an estimated percentage of intercepted light
11. Low Shrub Cover at Sampling Point (LS %)—Vegetation cover at the sampling point by shrub or tree species less than 150 cm tall, as an estimated percentage of intercepted light
12. Graminoid/Herbaceous Cover at Sampling Point (G %)—Vegetation cover at the sampling point by graminoid/herbaceous/subshrub species, as an estimated percentage of intercepted light
13. Moss Cover at Sampling Point (SP %)—Vegetation cover at the sampling point by moss or lichen species, as an estimated percentage of intercepted light
14. Vegetation Formation (FOR)—Major vegetation classification type:
 - 1 Bog
 - 2 Poor fen
 - 3 Fen
 - 4 Conifer swamp
 - 5 Mixed swamp
 - 6 Thicket swamp
 - 7 Hardwood swamp
 - 8 Meadow marsh
 - 9 Emergent marsh
15. Substrate Type (SUB)—Recorded dominant substrate type underlying the peatland:
 - 1 Rock
 - 2 Gravel
 - 3 Sand
 - 4 Silt
 - 5 Clay
 - 6 Till
16. Surficial Groundwater pH (SUR WAT PH)—The pH of groundwater at the sample point, sampled 10 to 15 cm below the water table (*see* Section 3.1, Field Surveys)
17. Average Depth-to-Water at Sampling Point (AV D-W CM)—Average depth to water table, in centimetres, calculated as $[(\% \text{ of hummocks} \times \text{depth-to-water in hummock}) + (\% \text{ of hollows} \times \text{depth-to-water in hollows})] \div 100$

This data set (Appendix 2), comprising laboratory and site data, was input for computerized manipulation of the data, using SPSS PC+® and PC Tables™ (IBM-compatible programs). Options used in the analysis of results were Means, Tables, Options, Statistics, Plot, Regression, and Correlation (Pearson Corr). This package was used to print out:

1. Appendix 2
2. Summary peat profiles (Figure 7)
3. Means, standard deviations, and ranges of values for subsets of the data base (including subsets based on

geographic locations, dominant peatland types, humification levels, relative positions of intervals within the cores, and combinations of these subsets)

4. Pearson product-moment correlation coefficients between 352 pairs of variables (again with peatland type and geographic subsets)
5. Graphs and regression equations of all variable pairs for which correlation coefficients were calculated as greater than +0.5 and less than -0.5

Some of this statistical analysis is incorporated into the discussion of results of the inventory.

3.6 REMOTE-SENSING AND REGIONAL ESTIMATES OF PEATLAND AREAS AND PEAT VOLUMES

Following several initial surveys, airphoto interpretation of entire study area was not considered to be a practical or rapid method of estimating the extent of peatland in each study area. Few individuals could be identified as sufficiently expert at the airphoto interpretation of peatland types on a large-scale production basis. In addition, the area that the Peatland Inventory Project was undertaking to study exceeded 21 700 000 ha over three years. Finally, a high level of standardization of site-typing between study areas was required to permit the results to be integrated on a regional basis.

Given a longer period of time, airphoto interpretation would have been an effective and accurate method. For this inventory, however, other remote-sensing techniques were investigated and used.

During the late 1970s, the Ontario Centre for Remote Sensing (OCRS) of the Ministry of Natural Resources developed special expertise in the field of peatland and wetland mapping in the Hudson Bay Lowland of northern Ontario (Pala and Boissonneau 1982; Pala and Weisheit 1982; Pala 1982; Riley 1982). The methods used by the OCRS were based on three factors: 1) the availability of excellent quality Landsat satellite data; 2) the availability of suitable equipment for the classification of wetland types by means of a supervised classification technique and a computer-based plotting system; and 3) the use of helicopters to carry small, multidisciplinary field teams to inaccessible field-investigation sites.

To estimate regional volumes of peat resources from a restricted field-data base, regional estimates of the distribution of peatland vegetation types were required. It is assumed that the vegetation that occurs on a peatland is a relatively conservative expression, integrating all features of the peatland ecosystems (including peat depths), and that it segregates predictably in terms of community assemblages. The use of Landsat, of course, is based on the further assumption that reflectance values recorded by the satellite relate directly to the variation in vegetation in the peatland ecosystem and to the exposure of surface water.

In 1982, the OCRS was commissioned by the OGS to use remote-sensing techniques in an evaluation of peatlands over a 1700 km² study area northwest of Timmins, and to finalize a method for mapping peatlands in Ontario south of the James Bay Lowland (Pala and Boissonneau 1985). This investigation was undertaken in much greater detail than was possible for all study areas of the Peatland Inventory Project, but it was instrumental in defining the role of remote sensing in the overall methodology of the inventory. The Landsat-based techniques became central to the project in terms of 1) selecting peatlands for detailed and reconnaissance field surveys; 2) collecting regional reconnaissance data on peatlands for image classification and for familiarization with all detailed and reconnaissance survey sites; and 3) providing a data base on the distribution and frequency of peatland types across each study area as a whole, from which to derive final estimates of peatland areas in the region. This last objective was critical to obtaining final estimates of total peat volumes by study area and by region.

The primary sources of data in this remote-sensing work were the Landsat imagery, available airphoto coverage, 35 mm oblique low-level and ground photography, botanical records, and measurements of environment parameters in the field (i.e., site data record forms).

For most of the study areas, Landsat imagery recorded in July or August, at the same season that field studies were conducted, permitted recognition of the greatest number of peatland types. However, this was not always the case. For example, in areas with (spring-flooded) hardwood swamp, the reflectance values recorded in late summer did not allow accurate segregation of these swamps from other hardwood forests. The integration of a spring image with this late-summer image allowed swamps with above-ground spring water-levels and delayed leaf appearance to be accurately delineated.

Landsat computer-compatible tapes were geometrically corrected to 1:250 000 scale NTS map sheets, with final registration to the UTM grid. The images were resampled to give a pixel coverage of 50 m by 50 m, with a maximum tolerable error of one pixel in any one direction. For study areas for which coverage was provided by two adjacent satellite passes, a computer program "merged" the frames digitally to create an accurate fit between them, after each frame had been geometrically corrected. In the event that images from two seasons were required for a single area, the digital information was merged using a computer program designed for this purpose (multitemporal imagery using image-to-image registration).

Landsat MSS bands 4, 5 and 7 were combined to create false-colour images of the data in its original state. These composites were then printed as "feature images" at scales of 1:100 000 and 1:50 000, using a computerized Applicon™ ink-jet plotter.

The feature images were used in conjunction with topographic maps, airphotos and comments from re-

gional MNR staff, to select the sites for field study; to delineate study sites in terms of the UTM 1000 m grid; and to prepare preliminary plans of the position and orientation of field-sampling grids to be used by project teams.

Helicopter-supported field studies were made of most of the study areas, with a field crew consisting of a remote-sensing specialist (S. Pala or A. Jano), a wetland/geomorphology specialist (A. Boissonneau), a botanist/peatlands specialist (J. L. Riley), and two additional crew for drilling and characterizing peat cores. The primary objectives were:

1. To evaluate the presence and variability of wetland/peatland types (*see* Appendix 3, and Jeglum et al. 1974)
2. To assess in the field the apparent differences in spectral reflectance between peatland types
3. To decide, on the basis of the frequency of types and the spectral reflectance characteristics, which peatland legend units were possible and most appropriate for the specific study area
4. To select, delineate and document potential "training areas" (relatively large areas of homogeneous peatland vegetation) for all the peatland types to be classified in the study area. Although this aspect of the inventory focussed on peatlands designated for detailed field survey, training areas were often selected and field visits made at additional sites that usually, for reasons of inaccessibility, were not designated for detailed survey by the project teams.

Field records of this reconnaissance consisted of complete (full vegetation) site data records; additional physiognomic data records; a selective delineation of types and areas on airphotos and 1:50 000 scale Landsat imagery and topographic maps; taped oral records; peat stratigraphy record sheets; and, in some cases, videotaped records.

The peatland type/legend units determined to be classifiable and that were used most frequently were the following:

1. Open Bog—tree cover less than 10%, subdivided where possible into open graminoid bog or open shrub-rich bog
2. Treed Bog—tree cover 10 to 30% (occasionally 40%); usually subdivided into low-density treed bog (10 to 15%), medium-density treed bog (15 to 25%), low and medium-density treed bog (10 to 25%), or high-density treed bog (more than 25%), with the latter often not segregating well from poorly stocked conifer swamp
3. Open Fen
4. Open Fen with Pools—patterned fen with very high water-tables; occasionally combined in a complex with shoreline marsh with similar spectral reflectance values
5. Treed Fen—tree cover more than 10%; segregated where practical into the same density classes as treed bog

6. Poor Fen—segregated as treed poor fen on occasion; tree-density classes not relevant in most cases, because the majority of poor fen areas had tree cover 8 to 12%
7. Conifer Swamp—a class that was not always segregated because of difficulties in separating spectral reflectance values from dense, upland conifer stands
8. Mixed Swamp
9. Hardwood Swamp—usually segregated into wet (spring-flooded) hardwood swamps and drier sites; occasionally combined in a complex with thicket swamp
10. Thicket Swamp—seldom used except in a complex with hardwood swamp due to the small size of many natural thicket swamp areas, and the prevalence of thicket swamp as colonizing vegetation on logged or flooded areas
11. Marsh—occasionally combined as a complex with open fen with pools because of similar spectral reflectance values

In most study areas, not all of these peatland types occurred over sufficiently large areas for practical segregation at the resolution of Landsat imagery.

The supervised classification of peatland types was done independently for each study area, based on training areas within those study areas, 2 to 8 such areas being established for each peatland type. For each training area for each peatland type, all the pixels were identified. For each of the pixels, the values of spectral reflectance intensity recorded on all four bands of the Landsat MSS data were aggregated to produce a “signature” bell curve for each group of training areas corresponding to a particular peatland type. The various peatland-type signatures were statistically pared to occupy the range of possible reflectance values while avoiding detrimental overlap that might later result in the misclassification or multiple classification of pixels.

Programmed searches of the digital data files were then made to assign a peatland-type class to each pixel in the study area; the computerized Applicon plotter was used to print the colours assigned to represent individual peatland-types on a hard-copy map. Manual supervision and filtering programs designed to scan for individual or small assemblages of pixels (less than 5, by “clustering”) were then used to remove erroneous features irrelevant to the inventory from the image, such as those resulting from anomalous spectral reflectance values associated with clear-cuts, fire burns, agriculture, urban development, etc.

Most of this manipulation was done on cathode-ray tube (CRT) terminals. The final hard-copy images merged the theme and feature data so that the peatland themes appeared superimposed on the original, unclassified feature imagery. The final images were produced at scales of 1:100 000 and 1:50 000, and were annotated, using mapping software, with the UTM and latitude/longitude co-ordinates, the names of geo-

graphic features, and a full legend. In addition, computer printouts were made of the extent and pixel coverage of each legend unit, for the complete study area as well as for each peatland surveyed by project teams. These images, printouts and backup reports on field studies are maintained as folios in the Engineering and Terrain Geology Section of the OGS.

During the generation of these classifications, checks were made of the accuracy of the classifications of training areas, and of the accuracy of the images in relation to the points sampled during helicopter reconnaissance. An accuracy of 80% was considered the minimum acceptable for the points actually visited in the field.

Following this image classification by the OGRS and the submission of detailed peatland classification maps by field teams, a method was developed to compare the thematic Landsat results with the more detailed airphoto interpretation and vegetation analysis by the project teams.

On a site-by-site basis, for the same detailed and reconnaissance survey sites, a comparison was first made of the Landsat coverage and the peatland classification maps to calculate the proportion of peatland that was overclassified or underclassified by the Landsat image interpretation. In the case of most units, a slight underclassification had occurred, probably due to the resolution of the Landsat data and to programs that had been used to eliminate erroneously classified pixels. This underclassification was probably only slight because, within the designated UTM block, there often occurred smaller peripheral peatland areas that were not always interpreted by the project teams. Some other peatland-type units, such as conifer swamp, thicket swamp and marsh, were generally very much underclassified due to the reasons already indicated in the listing of legend units. The pattern of underclassification and overclassification was quantified as an accumulative variance over all the sites, and expressed as a percentage variance for over- and underclassification.

A second comparison was made, again on a site-by-site basis, of any possible misclassifications made in the supervised Landsat classification. The standard against which it was compared was the peatland classification map from the relevant Open File Report, where that map was determined to be accurate on the basis of an independent airphoto check, the site data record forms and vegetation data from the project teams, and from records made during the course of helicopter reconnaissance of the site. In the case of a few study areas, the project-team maps were judged to lack sufficient accuracy, and a separate airphoto interpretation was done to provide the necessary standard for comparison.

In most cases, misclassification involved differences in the interpretation of tree-cover densities (e.g., open bog versus treed low-density bog; conifer swamp versus treed high-density bog; treed high-density fen versus conifer swamp), and also difficulties in determining the extent of poor fen in some areas. Some misclassification

was, of course, also due to the differences in resolution between 1:50 000 Landsat imagery and 1:10 000 peatland classification maps. The degree of misclassification was quantified as an accumulative variance over all the sites, and expressed as a percentage variance for misclassification.

The variance quantified in this way for designated survey sites was assumed to apply to the classification of all peatlands of the study area, in the same manner as specific training-area data are extrapolated to the whole study area. On this basis, the percentage variances for over- and underclassification and misclassification were used to adjust the area calculations of peatland types (based on Landsat theme imagery) for the study areas as a whole, as a means of improving the accuracy of the overall regional peatland cover estimates.

These data (Table 6b) are considered the best available by the methods used. The only modifications made to these figures were in the cases of conifer swamp, thicket swamp and marsh. The inventory focussed on larger, more-or-less untreed peatlands; the three peatland types mentioned above were seldom the focus of site-specific work, but usually occurred marginally around or within the perimeter of sites. They were proportionally much more frequent elsewhere in the study areas. Furthermore, conifer swamp, thicket swamp and marsh were deliberately underclassified by OCSR because of spectral reflectance conflicts with other non-peatland terrain units. As a result, a separate estimate was made of the probable extent of these units in the study areas, based on feature and theme imagery, topographic maps and some airphoto checks. On Table 6b, where relevant, these figures are indicated as estimates.

Regional peat volume estimates were calculated by multiplying the area of a particular peatland type in each study area by its average measured depth, and then adding all the volumes for each peatland type in each study area (Table 7).

The area covered by each peatland type was calculated in the manner outlined above. The best available data on average peat depth derives from the detailed and reconnaissance surveys done by the project teams. Average depths were calculated by two methods. First, average peat depths for each peatland type were calculated by averaging the depths of all the peat cores sampled by inventory project teams (Table 6c). Second, average peat depths for each peatland type were calculated by averaging the average peat depth per site for each peatland type, where there were 3 or more peat core depths per peatland type (Table 6d). This latter figure was determined to be a more conservative expression of peat depth, and more appropriate for extrapolating to other unsurveyed sites in the study area. This figure is less liable to be skewed by a large number of data derived from the survey of a few anomalously deep sites, in which project teams were expected to conduct more dense sampling. Table 7 presents these overall volume estimates for the study area, calculated on this basis.

3.7 REGIONAL OVERVIEW OF PEATLAND VEGETATION

For the sites surveyed by the project teams, Open File Reports characterized the vegetation as it was surveyed by the team field-botanist, usually on a site-by-site basis. In most cases, descriptive summary text was included; and in some cases, quantitative data were organized into dominance types for each peatland type, and into tables listing the species present and the percentage cover values of each. Several Open File Reports also included overall study-area floristic checklists. The completed site data record forms with these data are maintained on file at the Engineering and Terrain Geology Section of the OGS.

During helicopter reconnaissance of the peatlands of the study area, the author collected phytosociological data on the vegetation occurring in peatland ecosystems. These were completed on standard site data record forms (see Section 3.1, Field Surveys). All vascular-plant determinations were made by the author; *Sphagnum* specimens, by H. Crum (University of Michigan, Ann Arbor); other moss specimens, by R.R. Ireland (National Museum of Natural Sciences, Ottawa); liverworts, by L. Ley (National Museum of Natural Sciences, Ottawa); and lichens, by P.W. Wong (National Museum of Natural Sciences, Ottawa). Bryophyte nomenclature follows that of Ireland et al. (1980).

The sites studied were complexes of numerous peatland types. The quantitative data collected on a series of 5 m radius plots can be viewed as a series of "snapshots" taken along the gradient of variation expressed in the vegetation of peatlands in northeastern Ontario. These data include the following 87 peatland sampling sites: Open Bog sites (6 dwarf shrub, 10 low shrub, 15 graminoid, 1 pool); Treed Bog sites (10 low-density, 4 medium-density, 1 high-density); Open Fen sites (5 low shrub, 7 graminoid, 2 pool); Treed Fen sites (5 low-density, 4 medium-density); Open Poor Fen sites (2 graminoid); Treed Poor Fen sites (2 low-density); Conifer Swamp sites (6); Thicket Swamp sites (3); and Marsh sites (3 meadow, 1 emergent). Excluded from this data set were sites that were successional types following clear-cut, burns, or anthropogenic site modifications.

The above listing represents an undersampling of heavily treed sites, conifer swamps, thicket swamps and marshes. From the site data of the project teams, a number of additional site-data sets were added: Conifer Swamp sites (8); Thicket Swamp sites (9); Treed Bog sites (2 medium-density); Open Fen sites (6 low-shrub, 4 graminoid, 1 pool); Treed Fen sites (6 low-density); Open Poor Fen sites (5 low shrub); Treed Poor Fen sites (1 low-density); Meadow Marsh sites (1). These additional data were collected by D. White (30 sites, Geo-Analysis (1981) Ltd. 1986), and N. Patterson (13 sites, Northland Associates Ltd. 1985).

Evaluation of this data base consisted largely of a tabulation of the data as mean values for each major peatland type (Tables 8 and 9; Appendix 5).

Table 8 presents data on minor-element composition of surface waters, based on sampling sites as indicated above, and collected by the author. They are reported as mean values, ± 1 standard deviation (± 1 SD), along with the range of values for calcium, iron, magnesium, manganese, copper, zinc, aluminum, phosphorous, lead, sodium, and potassium. All values are in parts per million, by ICAP spectrometry and flame-emission photometry (sodium, potassium) by OGS Geoscience Laboratories, on samples from 10 to 15 cm below water tables, filtered through Whatman 40 Ashless filter paper.

Table 9 quantifies the physiognomic and environmental characteristics of peatland classification units, based on sampling sites as indicated above. They are reported as mean values, ± 1 SD, along with the range of

values for surface-water pH; average depth-to-water; peat depth; percentage of tree species cover taller than 150 cm; percentage of shrub species cover taller than 150 cm; percentage of shrub and tree species cover less than 150 cm in height; percentage of graminoid and herb cover; percentage of bryophyte and lichen cover; and average number of vascular plant species.

Appendix 5 is the species composition of peatland vegetation types, northeastern Ontario, based on sampling sites as indicated above. Mean cover percentage values (and percentage-frequency values) are reported.

Phytosociological synopses of this type are presented as base-line data on the vegetation of peatlands in the region. The peatland types are presented in a more descriptive, comparative manner in Appendix 3.

4.0 Regional Setting of Northeastern Ontario Study Areas

The physical environment plays a critical role in the evolution of peatlands and the accumulation of various types of peat materials and deposits. Peatlands can be viewed as ecosystems of biological species directly reflecting the diversity of the environmental processes and the geology, geomorphology, hydrology and climate of local areas. In addition, peatland vegetation creates its own environment through organic deposition and landscape paludification.

The following discussion summarizes the regional setting of the peatlands in northeastern Ontario, the bedrock geology and the glacial and postglacial history, which contribute the overall physiographic setting in which peatlands have developed. These factors combine with the climate and ambient modern vegetation of the region, to define the regional environmental setting in northeastern Ontario.

4.1 BEDROCK GEOLOGY

The northeastern Ontario study areas are for the most part underlain by Precambrian (Archean) rocks of the Superior Province (Bennett et al. 1968, 1969; Pyke et al. 1973; Thurston et al. 1976; Pyke 1982; Card and Lumbers 1977).

A Paleozoic outlier consisting of Middle Ordovician to Middle Silurian carbonates, shales and sandstones has been preserved within the Lake Timiskaming Rift Valley located at the extreme southeast corner of the Timmins–Kirkland Lake study area. It continues southwestward into the New Liskeard study area (Russell 1984).

In general, the thin sandy tills overlying the Shield areas south of the Clay Belt are derived from the Precambrian bedrock of the region, whereas the carbonate-rich clayey tills and glaciolacustrine clays of the Clay Belt are derived largely from the glacial transport of Moose River Basin materials. The presence of Paleozoic bedrock in the New Liskeard lowland may also contribute to more carbonate-rich substrates in that area.

4.2 GLACIAL AND POSTGLACIAL HISTORY

Glacial and postglacial features and deposits occur throughout the area. The extensive clay plains known as the Northern Clay Belt and the Little Clay Belt are the dominant physiographic features of northeastern Ontario. These clayey sediments were deposited during the inundation of the area by proglacial Lake Barlow–Ojibway and, in the north, by the subsequent Cochrane Readvance. In the northern half of the area, the gently undulating clay plain is broken occasionally by south-trending esker systems.

A more rugged Shield terrain occurs in the south and southeast, usually covered by a thin mantle of stony to sandy till. Bedrock exposures are common. Large areas of glaciofluvial deposits (outwash plains and eskers) commonly occur in this area as well. The surficial geology of the region has been mapped by Boissonneau (1965a, 1965b). More detailed mapping has been undertaken by the Geological Survey of Canada and the OGS (Morton et al. 1979; Baker et al. 1980; and Appendix 6). Terrain studies at a scale of 1:100 000 have been undertaken for much of the area, details of which can be found in Gartner et al. (1981).

During the last glacial and postglacial period, at least three major events occurred (Boissonneau 1965a, 1965b, 1966, 1968). First, the Wisconsinan advance of the Laurentide ice-sheet deposited a sandy-till ground moraine over most of the area. This advance generally took the form of a fan-shaped southerly movement. In the New Liskeard study area, glacial features indicate a major southwesterly ice-flow. Veillette (1983b) presents evidence of other ice-flow directions as well, and suggests a more complex scheme of ice movements in the Lake Timiskaming area during the late glacial time.

The late glacial recessional period resulted in the formation of glaciofluvial deposits within the ice mass (eskers, esker complexes), and proglacial deposits near the ice margin (outwash, deltas). Large sand plains are most predominant in the southwestern portion of the Timmins–Kirkland Lake study area. Numerous eolian dune fields have subsequently formed upon these deposits, such as those in the northwest corner of the New Liskeard study area, and those on the Munro Esker in the Timmins–Kirkland Lake study area.

The second major event started with the deglaciation of the area and the formation of proglacial Lake Barlow–Ojibway. The ice front receded northward from the area, between 11 000 and 9000 years ago, releasing large volumes of water into the proglacial lake. During the lacustrine episode, a thick layer of varved clay and silt settled in the low-energy areas of the lake, and coarser sediments were deposited in high-energy (near ice) and shallow lake environments (Baker 1985). The evolution of the proglacial lake, as well as the different drainage stages of the lake, are not entirely clear. Different hypotheses have been discussed by Boissonneau (1966, 1968), Prest (1970), Hardy (1977), Vincent and Hardy (1979) and Veillette (1983a, 1983b). According to Veillette (1983a), the damming and the different water-level stages may be explained by a combination of different factors. These include: 1) the presence of an ice lobe extending southwest from the New Quebec glacier across the Ottawa River; 2) differential rates of isostatic uplift; and 3) morainal damming of the southern outlets.

Approximately 8900 years ago, isostatic uplift re-

sulted in the separation of Lake Ojibway from Lake Barlow (Vincent and Hardy 1979). At this stage, proglacial Lake Ojibway occupied the area between the receding ice front and the height of the land (the drainage divide). This lacustrine episode ended abruptly approximately 7900 years ago with the northward drainage into Hudson Bay, resulting from the separation of the Hudson and New Quebec glaciers (Hardy 1977; Vincent and Hardy 1979).

The last glacial event of importance in the region was the Cochrane Readvance (Karlstrom 1956). At its maximum, the ice lobe extended southward into the Lake Ojibway basin (as far as just north of Timmins) and deposited clay-till ground moraine, mostly by the reworking of the underlying glacio-lacustrine sediments. The ice front rapidly withdrew, shortly after the drainage of Lake Ojibway into Hudson Bay (Hardy 1977). In terms of the impermeability of this clay till and the resultant formation of extensive peatlands on this till, the Cochrane Till is very similar to the glaciolacustrine clays of Lake Barlow–Ojibway.

After the disappearance of the ice mass and the drainage of proglacial lake waters, the newly emerged land was soon colonized by vegetation. Extensive wind erosion and deposition occurred as well, resulting in the formation of many dune fields, mainly in the southeast part of the area.

Little information is available on the postglacial climate and vegetation evolution within the study area. Some palynological studies have been conducted by Vincent (1973) near Lake Timiskaming, and by Terasmae and Anderson (1970) and Richard (1980) near Lake Abitibi.

Vincent (1973) and Richard (1980) provide evidence that an open black spruce (*Picea mariana*) forest with abundant aspen (*Populus tremuloides*), jack pine (*Pinus banksiana*), oak (*Quercus*) and birch (*Betula*) was prevalent approximately 9000 years ago on the emerged surface of the proglacial lake, south of Lake Abitibi.

As the proglacial lake withdrew, the forest migrated into the lowlands, with black spruce dominant. On drier sites, balsam fir (*Abies balsamea*), white birch (*Betula papyrifera*) and jack pine became more dominant. The beginning of the warmer and drier Hypsithermal Period was marked by the arrival of the white pine (*Pinus strobus*) and the red pine (*Pinus resinosa*) in the area, with black spruce and jack pine becoming less important (Vincent 1973). The warmer period peaked between 7200 years ago (Richard 1980) and 5000 years ago (Terasmae and Anderson 1970). This drier and warmer climate persisted until approximately 3000 years ago.

Peat deposition and landscape paludification probably occurred most rapidly in the post–Hypsithermal Period, when the climate became colder and more humid. The expanse of peatlands was furthermore favoured in the Clay Belt area by the differential isostatic uplift, which caused a decrease of slope toward Hudson Bay and the deterioration of drainage

(Terasmae 1968). (During the field studies of the inventory, a relatively thin lens of forest peat less than 10 cm thick was occasionally encountered in the basal third of peat profiles, suggestive of an early period of forest growth on peatlands; but this was not confirmed by any detailed palynological or dating studies.)

In the last 3000 years, the forest cover has closed, with an increase in black spruce and jack pine. The white pine has receded southward to its present northern limits.

4.3 PHYSIOGRAPHY

The Abitibi Upland and Cobalt Plain of the Precambrian Shield provide the physiographic setting for the region (Bostock 1970). A flat-to-undulating clay plain, commonly known as the Northern Clay Belt, is situated on the Abitibi Upland. A southern equivalent of this plain, commonly known as the Little Clay Belt, is situated on the Cobalt Plain, in the New Liskeard study area.

To the south and southwest, the region is characterized by a moderately rolling Shield topography, with elevations of 305 m to 365 m asl (above sea level). This rolling Shield topography also flanks the south and west edges of the Little Clay Belt at similar elevations. It is occasionally masked by large expanses of glaciofluvial deposits (eskers, outwash). Eskers and outwash plains, as well as parabolic sand dunes, are the main surficial features related to these deposits (Boissonneau 1966).

The Pinard Moraine and Arnott Lake Moraine are located in the north and northwest areas of the region. The moraines rise 55 m and 30 m, respectively, above the surrounding ground moraine.

Isolated bedrock outcrops are scattered throughout the clay plain. A major area of exposed bedrock is located in the Larder Lake area. This terrain is part of a height of land (365 to 430 m asl) that separates the Hudson Bay–James Bay and St. Lawrence–Great Lakes drainage basins.

Overall, the region gently decreases in elevation, from an average of 400 m asl in the south to 260 m asl in the north. The clay plain in New Liskeard has an average elevation of 200 m asl, and is surrounded by elevations of 305 m asl.

Several major river systems, such as the Abitibi, Mattagami, Missinaibi and Nagagami, drain northward towards James Bay. However, in the New Liskeard area and southern parts of the Foleyet and Timmins–Kirkland Lake study areas, rivers flow south into the St. Lawrence–Great Lakes system.

4.4 VEGETATION

Most of the study area is located in the Boreal Forest Region, as described by Rowe (1972). The Northern Clay, the Missinaibi–Cabonga and the Central Plateau Sections are the forest subdivisions of the region. They occur in the north, south and west portions of the area, respectively. The New Liskeard study area is partly within the northern Great Lakes–St. Lawrence Forest

Region, specifically the Haileybury Clay and Timagami Sections.

Black spruce (*Picea mariana*) dominates a wide range of habitats in the Northern Clay Section. In wetland areas, tamarack (*Larix laricina*) accompanies the black spruce. Jack pine (*Pinus banksiana*) and white birch (*Betula papyrifera*) are common on drier sites such as eskers and outwash deposits; mixed-wood stands of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), balsam fir (*Abies balsamea*) and white spruce (*Picea glauca*) are scattered throughout the area.

The Missinaibi–Cabonga Section occupies the height of land in northeastern Ontario. This coincides with the southern boundary of the Foleyet and Timmins–Kirkland Lake study areas and the north boundary of the New Liskeard area (lat. 48°N; see Figure 1). Boreal forest species (black spruce, tamarack, trembling aspen and white birch) dominate this zone, with some Great Lakes–St. Lawrence forest species present at their northern limit in this region.

The Central Plateau Section is found along the western portion of the study region. The dominant species are black spruce and jack pine; trembling aspen and white birch are also frequent.

The Haileybury Clay Section is considered to be a transitional area, with an affinity to the Northern Clay Section, but also with some southern hardwoods of the Great Lakes–St. Lawrence Forest Region. Black spruce and tamarack are prevalent in the lowlands, as in the Northern Clay Section. Around the head of Lake Timiskaming, the vegetation has a strong Laurentian character, with several species of southern hardwoods present.

The Timagami Section occupies the southwestern parts of the New Liskeard study area. Eastern white pine (*Pinus strobus*) is dominant, along with scattered white birch and white spruce. Balsam fir and trembling aspen are also present. Red pine (*Pinus resinosa*) and jack pine are restricted to dry, sandy or rocky uplands. Black spruce, tamarack and eastern white cedar (*Thuja occidentalis*) occupy the wooded wetland areas.

In northeastern Ontario in general, black spruce, jack pine, white birch and trembling aspen are the most common species, with tamarack accompanying the dominant black spruce in forested lowland environments. In the southeastern parts of the region, some Great Lakes–St. Lawrence forest species can be found. The forest landscape of the whole region has been perceptibly modified by lumbering activities, fires, land-clearing and forest pathogens.

4.5 REGIONAL CLIMATE

The regional climate is characterized by long, cold winters and short, cool summers. The region lies primarily in the Northern Clay Belt Climatic Region, as well as the Timiskaming Climatic Region and Height of

Land Climatic Region, as described by Chapman and Thomas (1968). Other references of interest pertaining to climate and peat production are cited by Monenco Ontario Ltd. (1981) and Ecologistics Ltd. (1985).

Data from several stations for the 1951–80 period show a range of mean annual temperatures of 1° to 2°C; average January temperatures of –24° to –10°C; average July temperatures of 10° to 24°C; and mean annual precipitation of 760 to 810 mm.

The region undergoes 140 to 175 days with measurable precipitation throughout the year. May to September precipitation varies from 381 to 406 mm across the region, with approximately 72 days with measurable precipitation (Environment Canada 1982). The range of mean annual potential and actual evapotranspiration is 480 to 530 mm, with a water deficiency near 0 mm and a surplus ranging from 279 mm in the west to 330 mm in the east.

The frost-free period varies throughout the region, with an average of 88 days. The Height of Land area generally gets 80 frost-free days, whereas Timiskaming averages 96 days. The first frost occurs around the beginning of October; the last, the beginning of May.

In a provincial context, the climate of the region can be considered to have long, cold winters and short, cool summers, with a short growing season. Prevailing winds are from the south to the southwest in the summer (averaging 13 to 14 km/h), and from the north to the northwest in the winter. The influence of James Bay to the north and the Great Lakes to the southwest is expressed by a cooler, more humid climate than in northwestern Ontario, which is more under the influence of continental air masses. Compared to southern Ontario, the region has longer winters, cooler summers, and a much shorter growing season. The region's climate is similar to Minnesota, northern New Brunswick and Rivière du Loup, Quebec—other peat-producing areas. In comparison to Finland, there is less rainfall, but cooler temperatures may offset the advantages of this to standard peat production.

Based on the frequency of dry periods of various lengths in Kapuskasing over a forty-year period (Chapman and Thomas 1968, figure 37), there appears to be a likelihood of 15 to 16 periods of 3–4 consecutive dry days per summer (May 15 to September 15), equivalent to about the same number of peat harvests by conventional milled peat harvesting methods. This frequency can vary considerably from year to year; for example, between the summers of 1984 and 1985 in northeastern Ontario.

Ecologistics Ltd. (1985) employed a meteorological computer-simulation model developed for agriculture, adapted to the problems of peat production, to calculate a mean estimated production rate for the Timmins area of 10 to 11 harvests per year. However, the present lack of actual peat-production data for northeastern Ontario prevents a validation of this modelling approach.

5.0 Peat and Peatlands of the Study Areas

In the 5 study areas, 49 peatlands were surveyed in detail (Table 4). These peatlands covered a total area of almost 29 000 ha, 40% of which was found to have peat over 2 m deep. Of these sites, 25 included areas greater than 150 ha with peat deeper than 2 m. An additional 79 sites were surveyed at a reconnaissance level, covering a further 32 000 ha of peatland (Table 5).

The following discussion is intended to complement the more intensive treatments of the Open File Reports. It provides additional information on different aspects of the peat and peatland resources of each study area, and integrates the inventory data (Appendix 1) with remote-sensing results. It also represents estimates of the total peatland area and peat volume of each study area (Tables 6 and 7).

Table 4. Summary of detailed surveys in northeastern Ontario.

Study area	Hearst	Foley	Cochrane-Kapuskasing	Timmins-Kirkland Lake	New Liskeard	Totals
Number of sites	15	6	10	11	7	49
Total peatland area (ha)	3983	5417	6022	8315	5137	28 874
Total peat volume ($\times 10^6 \text{ m}^3$)	72.2	101.8	98.2	150.7	94.5	517.4
Volume of well-humified (H4+) peat ($\times 10^6 \text{ m}^3$)	68.9	55.9	73.2	84.6	37.0	319.6
Total area > 2 m deep (ha)	1470	2747	1970	3588	1793	11 568
Total peat volume in area > 2 m deep ($\times 10^6 \text{ m}^3$)	44.4	67.3	55.8	103.0	44.1	314.6
Volume of well-humified peat (H4+) in area > 2 m deep ($\times 10^6 \text{ m}^3$)	33.3	37.9	44.7	65.9	24.0	205.8
(% of total volume in same area)	(75%)	(56%)	(80%)	(64%)	(54%)	(65%)
No. of sites with > 150 ha of peat > 2 m deep	4	5	2	9	5	25

Table 5. Summary of reconnaissance surveys in northeastern Ontario.

Study area	Hearst	Foley	Cochrane-Kapuskasing	Timmins-Kirkland Lake	New Liskeard	Totals
Number of sites	26	10	17	18	8	79
Total peatland area (ha)	8143	2256	7119	12 822	1781	32 121
Total estimated peat volume ($\times 10^6 \text{ m}^3$)	171	57	156	254	26	664
Estimated volume of well-humified (H4+) peat ($\times 10^6 \text{ m}^3$)	131	31	118	161	13	454
(% of total volume in same sites)	(77%)	(54%)	(76%)	(63%)	(50%)	(68%)

Table 6a. Peatland types surveyed by Peatland Inventory Project field studies, in hectares (and as percentages of the totals).

Study Area	Size of Study Area (ha)	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp	Hardwood Swamp	Thicket Swamp	Marsh	Total (ha)
Hearst	1 600 000	915 (7.5)	954 (7.9)	3 070* (25.3)	5 501* (45.3)	—	—	754 (6.2)	—	704 (5.8)	255 (2.1)	12 153 (100)
Foleyet	1 640 000	689 (9.1)	1 522 (20.0)	1 357* (17.8)	1 625* (21.4)	—	—	2 277 (29.9)	—	19 (<0.1)	124 (1.6)	7 613 (100)
Cochrane-Kapuskasing	1 600 000	7 885 (60.0)	3 255 (24.8)	786* (6.0)	575* (4.4)	—	—	507 (3.9)	—	103 (0.8)	30 (0.2)	13 141 (100)
Timmins-Kirkland Lake	2 100 000	8 252 (39.2)	4 561 (21.6)	321 (1.5)	511 (2.4)	3 421 (16.2)	567 (2.7)	1 780 (8.5)	—	1 286 (6.1)	369 (1.8)	21 068 (100)
New Liskeard	829 000	443 (6.4)	347 (5.0)	265 (3.8)	276 (4.0)	33 (0.5)	111 (1.6)	3 290 (47.6)	43 (0.6)	2 042 (29.5)	16 (0.2)	6 917** (100)
Totals	7 769 000	18 184 (29.9)	10 639 (17.5)	9 253* (15.2)	9 166 (15.1)	—	—	8 608 (14.1)	43 (—)	4 154 (6.8)	794 (1.3)	60 892
Totals excluding New Liskeard	6 940 000	17 741 (32.9)	10 292 (19.1)	8 955* (16.6)	8 779* (16.3)	—	—	5 318 (9.9)	—	2 112 (3.9)	778 (1.4)	53 975

* Includes Poor Fen

** Includes 51 ha in agriculture

Table 6b. Total areas of peatlands occurring in northeastern Ontario study areas, based on integration of field studies and Landsat 2 imagery interpretation, in hectares (and as percentages of totals).

Study Area	Size of Study Area (ha)	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp*	Hardwood Swamp	Thicket Swamp*	Marsh*	Total (ha)	% of Total Study Area
Hearst	1 600 000	4 502 (1.3)	est. 27 330 (8.1)	14 969* (4.4)	21 244* (6.3)	—	—	est. 196 473 (58.0)	564 (0.2)	57 098 (16.9)	16 709 (4.9)	338 889	21.2
Foleyet	1 640 000	3 339 (1.1)	34 095 (11.7)	4 588* (1.6)	15 822* (5.4)	—	—	est. 218 411 (74.7)	est. 1 200 (0.4)	est. 9 240 (3.2)	est. 5 695 (2.0)	292 420	17.8
Cochrane-Kapuskasing	1 600 000	46 438 (8.8)	122 637 (23.2)	11 305* (2.1)	6 102* (1.2)	—	—	est. 281 194 (53.2)	trace (—)	est. 48 728 (9.2)	est. 12 391 (2.3)	528 795	33.1
Timmins-Kirkland Lake	2 100 000	26 428 (8.2)	63 042 (19.6)	1 141 (0.4)	4 723* (1.5)	—	8 476 (2.6)	est. 162 493 (50.6)	trace (—)	est. 48 000 (14.9)	est. 6 987 (2.2)	321 290	15.3
New Liskeard	829 000	2 337 (2.2)	3 427 (3.2)	3 131* (2.9)	612* (0.6)	—	—	65 275 (60.7)	615 (0.6)	30 408 (28.3)	est. 1 750 (1.6)	107 555	13.0
Totals	7 769 000	83 044 (5.2)	250 531 (15.8)	36 783* (2.3)	55 330* (3.5)	—	—	923 876 (58.1)	2 379 (0.2)	193 474 (12.2)	43 532 (2.7)	1 588 949	20.5
Totals excluding New Liskeard	6 940 000	80 707 (5.5)	247 104 (16.7)	33 652* (2.3)	54 718* (3.7)	—	—	856 601 (57.9)	1 764 (0.1)	163 066 (11.0)	41 782 (2.8)	1 479 394	21.3

*Includes Poor Fen

* Areas of conifer swamp, thicket and marsh may be underestimated.

Table 6c. Average peat-depths in metres, based on total number of peat cores (number of cores).

Study Area	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp	Hardwood Swamp	Thicket Swamp	Marsh	Average depth (m)
Hearst	2.2 (59)	2.4 (80)	2.0* (140)	2.3* (446)	—	—	1.3 (6)	—	1.1 (15)	1.8 (1)	2.2 (747)
Foleyet	2.9 (134)	2.3 (152)	2.3* (282)	2.2* (239)	—	—	2.0 (145)	—	—	1.6 (2)	2.3 (954)
Cochrane–Kapuskasing	2.3 (653)	1.6 (203)	3.8* (87)	2.3* (24)	—	—	1.0 (89)	—	0.8 (17)	—	2.2 (1073)
Timmins–Kirkland Lake	2.4 (825)	1.9 (152)	2.4 (39)	2.1 (14)	2.2 (200)	2.6 (53)	1.6 (10)	—	1.3 (29)	—	2.3 (1322)
New Liskeard (Only areas > 1 m deep were surveyed)	4.3 (86)	3.4 (30)	1.9 (27)	1.5 (8)	1.8 (10)	2.8 (16)	1.9 (451)	1.3 (5)	1.9 (260)	—	2.2 (893)
Average depth (m)	2.5 (1757)	2.0 (617)	2.4* (785)	2.3* (800)	—	—	1.8 (701)	1.3 (5)	1.8 (321)	1.6 (3)	2.2 (4989)
Average depth, excluding New Liskeard	2.4 (1671)	2.0 (587)	2.4* (748)	2.3* (776)	—	—	1.6 (250)	—	1.1 (61)	1.6 (3)	2.3 (4096)

*Includes Poor Fen

Table 6d. Average peat-depths in metres, based on total average peat-depth per site, where there were 3 or more cores per peatland type (number of sites).

Study Area	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp	Hardwood Swamp	Thicket Swamp	Marsh
Hearst	2.2 (5)	2.3 (7)	2.2* (9)	2.1* (14)	—	—	—	—	1.5 (2)	—
Foleyet	3.0 (5)	2.2 (4)	2.1* (5)	2.4* (6)	—	—	1.7 (7)	—	—	—
Cochrane–Kapuskasing	2.2 (22)	1.7 (10)	3.4* (3)	2.5* (4)	—	—	0.8 (8)	—	0.4 (2)	—
Timmins–Kirkland Lake	2.3 (29)	2.0 (14)	2.2 (4)	1.9 (3)	2.2 (14)	1.9 (6)	2.4 (1)	—	1.2 (5)	—
New Liskeard (Only areas > 1 m deep were surveyed)	3.3 (3)	2.8 (3)	2.1 (2)	1.6 (2)	1.8 (1)	3.1 (1)	2.0 (9)	1.3 (1)	1.9 (6)	—
Average depth: mean $\pm$ 1 SD Range Number of sites	2.3 $\pm$ 0.8 0.7–4.9 n=64	2.1 $\pm$ 0.7 0.9–3.9 n=38	2.3 $\pm$ 0.7 1.3–4.0 n=38	2.1 $\pm$ 0.7* 0.8–3.7 n=36	—	—	1.5 $\pm$ 0.7 0.2–2.8 n=26	1.3 n=1	1.4 $\pm$ 0.7 0.2–2.5 n=15	—
Average depth, excluding New Liskeard	2.3 $\pm$ 0.7 0.7–4.4 n=61	2.0 $\pm$ 0.6 0.9–3.9 n=35	2.3 $\pm$ 0.7* 1.3–4.0 n=35	2.1 $\pm$ 0.7* 0.8–3.7 n=33	—	—	1.3 $\pm$ 0.7 0.2–2.8 n=17	—	1.1 $\pm$ 0.7 0.2–2.3 n=9	—

*Includes Poor Fen

Table 7.
Regional peat-volume estimates, northeastern Ontario.

Peatland Type	Hearst		Foleyet		Cochrane-Kapuskasing		Timmins-Kirkland Lake		New Liskeard	
	Area (ha)	Depth (m)	Area (ha)	Depth (m)	Area (ha)	Depth (m)	Area (ha)	Depth (m)	Area (ha)	Depth (m)
Open Bog	4 502	2.2	3 339	3.0	46 438	2.2	26 428	2.3	2 337	3.3
Treed Bog	27 330	2.3	34 095	2.2	122 637	1.7	63 042	2.0	3 427	2.8
Open Fen*	14 969	2.2	4 588	2.1	11 305	3.4	2 790	2.2	3 131	2.1
Treed Fen*	21 244	2.1	15 822	2.4	6 102	2.5	11 550	1.9	612	1.6
Conifer Swamp	196 473	est. 1.3	218 441	est. 1.4	281 194	0.8	162 493	est. 1.3	65 275	est. 1.8
Hardwood Swamp	564	est. 1.0	1 200	est. 1.0	trace	est. 1.0	trace	est. 1.0	615	1.3
Thicket Swamp	57 098	est. 1.1	9 240	est. 1.2	48 728	est. 0.8	48 000	1.2	30 408	est. 1.4
Marsh	16 709	est. 1.0	5 695	est. 1.0	12 391	est. 1.0	6 987	est. 1.0	1 750	est. 1.0
Total Volume ($\times 10^6 \text{ m}^3$)	4858.0		4564.5		6406.7		4907.8		1874.9	
Total for Bog and Fen ($\times 10^6 \text{ m}^3$) (% of total)	1503.0 (30.9%)		1326.4 (29.1%)		3643.4 (54.6%)		2149.5 (43.8%)		248.7 (13.3%)	

*Includes Poor Fen.

5.1 HEARST

The Hearst study area (Figure 4; lat. 49°N to 50°N, long. 83°W to 85°W) contains numerous extensive peatlands, defined by and reflecting the surficial clay-silt deposits of proglacial Lake Barlow-Ojibway and clay tills of the Cochrane Readvance.

Almost 4000 ha of peatland at 15 sites were surveyed in detail (Table 4 and Appendix 1), with a meas-

ured total volume of peat *in situ* of 72.2 million cubic metres. More than a third of the total area surveyed was more than 2 m deep, and this area contained about 45 million cubic metres of peat, 75% of which was well-humified peat (von Post H4+) suitable for consideration as potential fuel peat. The proportion of these deeper deposits with tree cover less than 10% varied from 0 to 100%; but on the 4 largest deposits (greater than 150 ha, with peat deeper than 2 m), areas with tree cover less than 10% ranged from 5 to 44%.

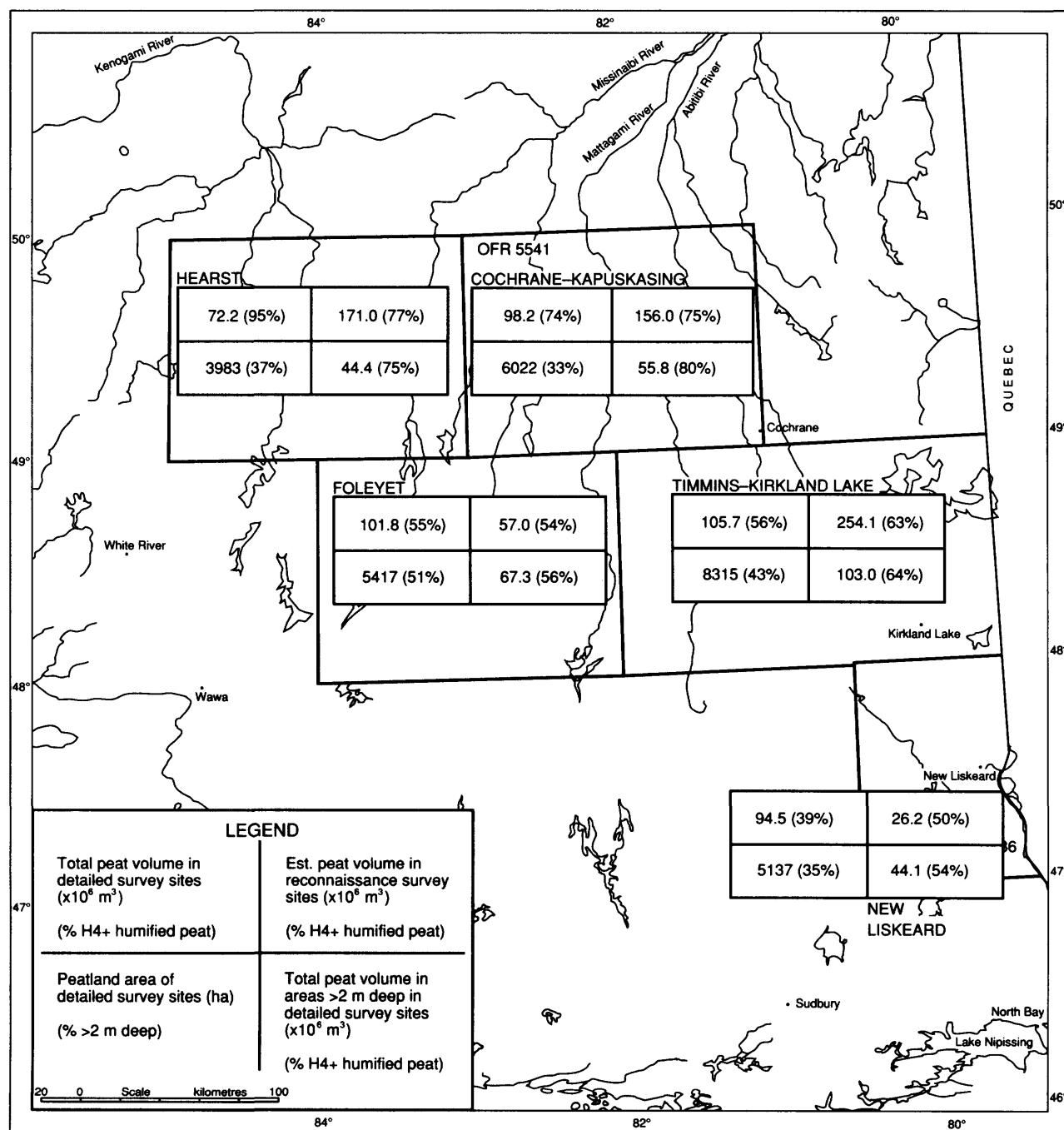


Figure 4. Surveyed peatland areas and peat volumes in northeastern Ontario.

Numerous other peatlands occur in the Hearst area; 26 of these (covering a total area of 8413 ha) were surveyed at a reconnaissance level (Table 5). These sites have an estimated total volume of 171 million cubic metres of peat, 77% of which was found to be well-humified (von Post H4+). Although only limited coring was undertaken on these sites, 10 of them appeared to contain significant peat deposits in excess of 2 m deep, and had average areas of more than 200 ha of total peatland.

Overall, the quantities of peat were significant, and suggest that well-humified peats predominated on the sites surveyed. Three of the larger sites surveyed in detail had surficial unhumified peat thicker than 90 cm (averaged across the peatland area deeper than 2 m).

Open and treed fens were the dominant peatland types (70% of peatlands surveyed), followed by open and treed bogs (15%). Peatlands with tree cover less than 10% accounted for 33% of all the surveyed peatlands (Table 6a).

In the Hearst study area as a whole, 21% of the entire area is estimated to be peatland (Table 6b). Almost 200 000 ha are conifer swamp (58% of all peatlands), and another 57 000 ha are thicket swamp (16.9%). Of more interest in terms of peat materials are the deeper, and less treed, bogs and fens. Almost 32 000 ha of peatland are bogs, and 4500 ha of these are estimated to have tree cover of less than 10% (Photo 1). The more minerotrophic fens are more abundant in the Hearst area, and are estimated at 36 000 ha, of which 15 000 ha are open fen with tree cover less than 10% (Photo 2).

Bogs and fens have the greatest peat-depths in the Hearst area (Tables 6c and 6d). Based on all of the peat cores taken in the area (747 cores), bogs had average peat depths of 2.3 m, and fens had average depths of 2.2 m. Conifer swamps, thicket swamps and marshes were all found to have peat depth figures averaging less than 2 m. These figures, and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat-volumes in the Hearst study area (Table 7).

The total estimate of peat occurring in open bogs in the Hearst area is 99 million cubic metres, with a further 628.6 million cubic metres in bogs with tree cover ranging from 10 to 25%. Open fens are estimated to contain 329.3 million cubic metres; and treed fens, 446.1 million cubic metres. As a result, the total peat volumes occurring in peatlands that are predictably deeper than 2 m are estimated to be in the order of 1 503 000 000 m³ of peat *in situ*. The extensive areas of shallower peats occurring under conifer swamp, thicket swamp and marsh contain further peat volumes in the order of 3 355 000 000 m³, for a study-area total of over 4 850 000 000 m³ of *in situ* peat.

5.2 FOLEYET

The Foleyet study area (Figure 4; lat. 48°N to 49°N, long. 82°W to 84°W) is bordered on the north by the same clayey-till ground moraine as occurs over much of the Hearst study area. Most of the area to the south and west, however, is characterized by broad and discontinuous expanses of sandy-till ground moraine overlying

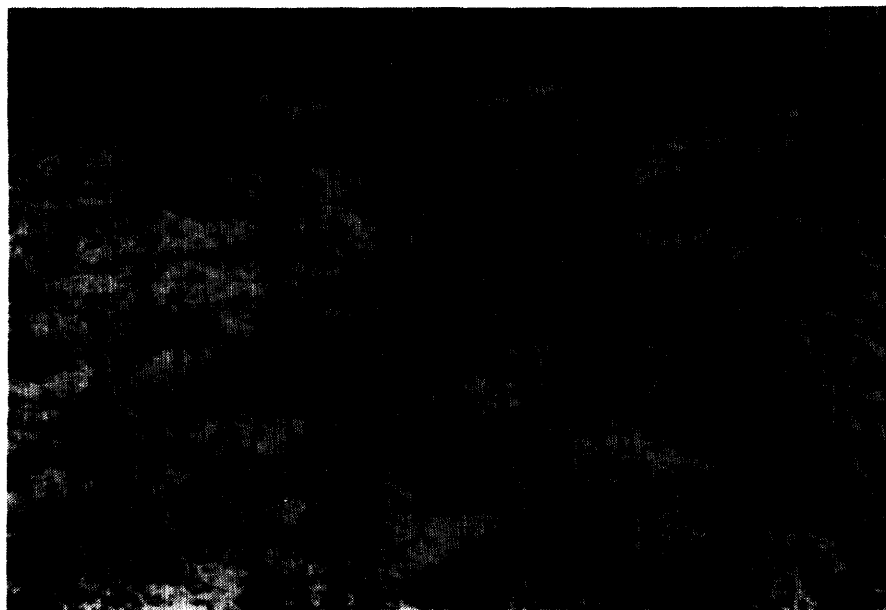


Photo 1. Treed bog, in this case with low-density tree growth (10 to 15% cover), is the most frequent type of bog in the Hearst study area, and in northeastern Ontario as a whole (42G-451).

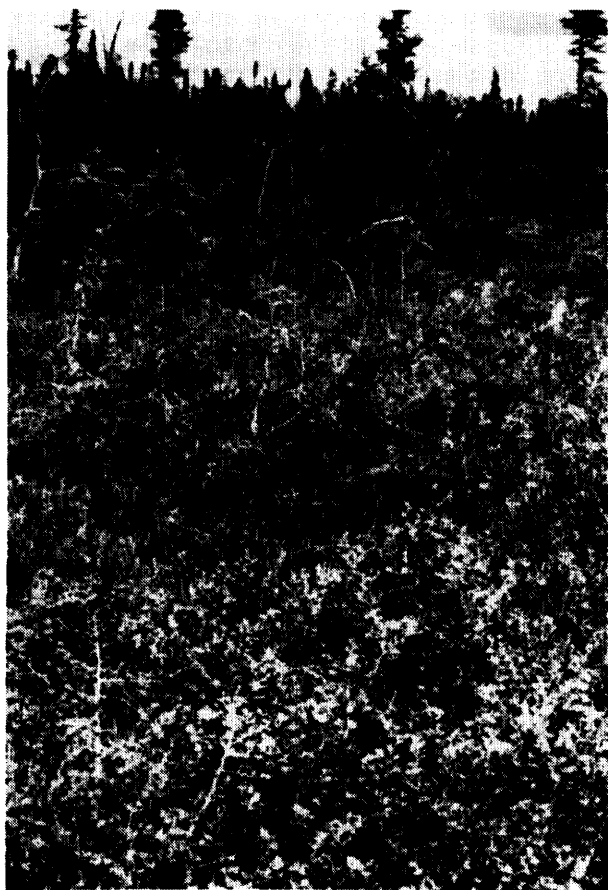


Photo 2. Fens are less frequent than bogs in northeastern Ontario, but these species-diverse, more minerotrophic peatlands become more common towards the west in the Hearst study area. In this open low-shrub fen northwest of Hearst, characteristic species such as *Potentilla fruticosa*, *Scirpus cespitosus*, and *Equisetum fluviatile* were abundant, with white cedar (*Thuja occidentalis*) and showy orchids (*Cypripedium reginae* and *Platanthera dilatata*) also present (42F-3).

Shield topography. Peatlands in this type of terrain are small, scarce, and usually topographically contained. The vast majority of peatlands in the Foleyet study area are found in the intervening, central area of impermeable glaciolacustrine Lake Barlow–Ojibway deposits of varved clays and silt. This low, flat terrain supports extensive, unconfined conifer swamps and treed bogs, with the deeper peat basins characterized by more open bog and poor fen vegetation, in addition to low-density treed bogs, fens and poor fens.

Almost 5500 ha of peatland, at 6 sites, were surveyed in detail (see Table 4 and Appendix 1), with a measured total volume of peat *in situ* of 101.8 million cubic metres. Almost half of the total area surveyed was more than 2 m deep, and contained 67.3 million cubic metres of peat, 56% of which was well-humified peat (von Post H4+) suitable for consideration as potential fuel peat. The proportion of these deeper deposits with tree cover less than 10% varied from 24 to 79%. Five of

these deposits were more than 150 ha in area, ranging from 292 to 910 ha of deposit greater than 2 m deep.

Numerous other peatlands occur in the Foleyet study area, particularly in the north and northeast. Ten of these were surveyed at a reconnaissance level, covering a total area of 2250 ha (Table 5). These sites have an estimated total peat volume of 57 million cubic metres, 54% of which was found to be well-humified (von Post H4+). Although only limited coring was undertaken on these sites, five of them appeared to contain significant peat deposits in excess of 2 m deep, and had average areas of more than 200 ha total peatland.

Overall, the surveyed quantities of peat were significant, and suggest almost equal proportions of unhumified peats of interest for its horticultural potential, and well-humified peats for consideration in terms of fuel uses. Four of the larger sites surveyed in detail had surficial unhumified peat thicker than 90 cm (averaged across the peatland area deeper than 2 m).

Open and treed fens were the dominant peatland types (39% of peatland surveyed), followed by open and treed bogs (29%). Peatlands with tree cover less than 10% accounted for 27% of all the surveyed peatlands (Table 6a).

In the Foleyet study area as a whole, 18% of the area is estimated to be peatland (Table 6b). An estimated 220 000 ha are conifer swamps (75% of all peatland) and another 9 250 ha are thicket swamps (3%). Of more interest in terms of peat materials are the deeper and less treed bogs and fens. Almost 37 500 ha of peatland are bogs, and 3300 ha of these are estimated to have tree cover of less than 10%. The more minerotrophic fens are less abundant, estimated at 20 400 ha, of which 4600 ha are open fen with tree cover less than 10%.

Bogs and fens have the greatest peat-depths in the Foleyet study area (Table 6c and 6d). Based on all the peat cores taken in the area (954 cores), bogs had average peat-depths of 2.6 m; fens, 2.3 m. Conifer swamps and marshes were found to have peat depths averaging 2.0 m or less. These figures, and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat-volumes in the Foleyet study area (Table 7).

The total estimate of peat occurring in open bogs in the Foleyet study area is 100.2 million cubic metres, with a further 750.1 million cubic metres in bogs with tree cover ranging from 10 to 25%. Open fens are estimated to contain 96.4 million cubic metres of *in situ* peat, and treed fens 379.7 million cubic metres. As a result, it is estimated that the total peat-volumes occurring in peatlands that are predictably deeper than 2 m is in the order of 1 326 400 000 m³ of peat *in situ*. The extensive areas of shallower peats occurring under conifer swamp, thicket swamp and marsh contain further peat volumes in the order of 3 238 100 000 m³, for a study-area total of over 4 564 500 000 m³ of peat *in situ*.

5.3 COCHRANE–KAPUSKASING

The Cochrane–Kapusksing study area (see Figure 4; lat. 49°N to 50°N, long. 81°W to 83°W) has the highest proportion of peatland of any area studied in the Peatland Inventory Project. The majority of the area's surficial geomorphology is stone-free clay-till ground moraine deposited during the Cochrane Readvance, a flat to gently undulating terrain broken occasionally by north–south esker systems. The eskers are generally aligned within topographically low areas, and are often flanked by large, more-or-less unconfined peatlands. To the north in the study area occurs the higher and better-drained Pinard Moraine. In this case, the peatlands are less frequent; but in the large glacio-lacustrine clay plains just to the south of this moraine, peatlands are extremely frequent and semi-continuous. They extend as a distinctive landscape mosaic towards the Kesagami Plateau to the northeast of the study area.

Over 6000 ha of peatlands, at 10 sites, were surveyed in detail (see Table 4 and Appendix 1), with a measured total volume of peat *in situ* of 98.2 million cubic metres. Almost one-third of the total area surveyed was more than 2 m deep, and this area contained 55.8 million cubic metres of peat, 80% of which was well-humified (von Post H4+) and suitable for consideration as potential fuel peat. The proportion of these deeper deposits with tree cover less than 10% varied from 19 to 98%. Three of the sites had areas about 150 ha or more with depths greater than 2 m, and the proportion of these sites with tree cover less than 10% varied from 83 to 95%. These three sites had areas of peat deeper than 2 m of 145 ha, 301 ha and 1016 ha. The last site was only partly surveyed due to its large extent, and can be considered typical of some of the sites in the northeastern portion of the study area (42H-82).

Seventeen other peatlands were surveyed at a reconnaissance level, covering a total of 7100 ha (see Table 5). These sites have an estimated total volume of 156 million cubic metres of peat, 76% of which was found to be well-humified (von Post H4+). Although only limited coring was undertaken on these sites, at least 9 of them appeared to contain significant peat deposits in excess of 2 m deep, and had an average size of more than 400 ha of peatland.

Overall, the surveyed quantities of peat were significant, although many of the largest deposits were not close to major transportation routes. Well-humified peat predominated; none of the larger sites surveyed in detail had surficial, unhumified peat thicker than 85 cm (averaged across the peatland area deeper than 2 m).

On the sites surveyed during the inventory, bog was by far the most dominant vegetation-type encountered (85% of peatland surveyed). Open bogs, with tree cover less than 10%, covered 7900 ha (60%) on these sites; and treed bogs, 3250 ha (25%). Fens were documented on 10% of this surveyed peatland area (1360 ha). The combined coverage by open bogs and fens was 66% of all surveyed peatlands (see Table 6a).

Across the Cochrane–Kapusksing study area as a whole, 33% of the landscape was estimated to be peat-

land. An estimated 281 000 ha were conifer swamp (53% of all peatland), and thicket swamp was estimated to cover another 49 000 ha (9% of all peatland). The thicket swamps were especially abundant as successional communities on cut-over conifer-swamp peatlands. The deeper and less-treed peatland types, the bogs and fens, are more relevant as peat resources. Almost 170 000 ha of peatland were bog, and 46 000 ha of these were considered to have tree cover of less than 10%. The more minerotrophic fens covered 17 400 ha, of which 11 300 ha were open fen with tree cover less than 10%.

Bogs and fens were found to occur on the deepest peat deposits in the Cochrane–Kapusksing study area (Table 6c and 6d). Based on all the peat cores taken in the area (1073 cores), bogs had an average peat depth of 2.1 m (856 cores), with open bogs occurring on deeper peats (average 2.3 m). Fens had an average peat depth of 3.5 m (111 cores), again with open fens occurring on slightly deeper peats. Conifer swamps and thicket swamps were found to have peat depths averaging 1.0 m or less. These figures, and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the Cochrane–Kapusksing study area (Table 7).

The total estimated peat volume in open bogs in the Cochrane–Kapusksing area is 1 021 600 000 m³, with a further 2 084 800 000 m³ in bogs with tree cover ranging from 10 to 25%. Open fens are estimated to contain 384 400 000 m³ of *in situ* peat; and treed fens, a further 152 600 000 m³. As a result, it is estimated that the total peat volumes occurring in peatlands predictably deeper than 2 m is in the order of 3 650 000 000 m³ of peat *in situ*. The extensive areas of shallower peats occurring under conifer swamp, thicket swamp and marsh contain further peat volumes in the order of 2 760 000 000 m³, for a study-area total of over 6 410 000 000 m³ of peat *in situ*.

5.4 TIMMINS–KIRKLAND LAKE

The Timmins–Kirkland Lake area (see Figure 4; lat. 48°N to 49°N, Ontario–Quebec border to long. 82°W) was the largest study area surveyed in northeastern Ontario (21 000 km²), and contained some of the most interesting peatland complexes and peat deposits encountered during the inventory. The northwestern portion of the study area is flat, clayey-till ground moraine, but the majority of the study area is covered by the gently rolling glaciolacustrine clay deposits of proglacial Lake Barlow–Ojibway.

To the south in the study area, these lacustrine deposits tend to be of a coarser texture, and thin sandy-till ground moraines discontinuously overlay the more rugged Shield terrain occurring in the extreme south. Relatively bare bedrock predominates in the Larder Lake area.

Prominent throughout the area, especially on the clay plains, are esker systems and esker–outwash complexes, within which the less frequent peatlands are

confined in topographically defined kettles and sandy depressions. As in the Cochrane–Kapuskasing area, the esker systems appear to follow generally lower north–south depressions across the undulating clay plain; and as a result, large, deeper peatlands are often located in the vicinity of these esker systems.

Eleven sites were surveyed in detail, and had a total peatland area of 8315 ha (see Table 4 and Appendix 1). These sites had a measured total volume of 150.7 million cubic metres of *in situ* peat. About 43% of this surveyed area was more than 2 m deep, and these

deeper areas contained 103 million cubic metres of peat, 64% of which was well-humified peat (von Post H4+) suitable for consideration as potential fuel peat. The proportion of these deeper areas of the peatlands having tree cover less than 10% varied from 50 to 98%. Of the 11 detailed survey sites, 9 had more than 150 ha of peatland greater than 2 m deep, and these deeper areas ranged from 176 to 724 ha in size (averaging 380 ha).

In the Timmins–Kirkland Lake study area, the inventory indexed more than 300 peatland sites greater



Photo 3. This large, open peatland (42A-185) is one of many large and inaccessible peatlands not surveyed in the Timmins–Kirkland Lake study area. It is located in Wilkie Township; Iroquois Falls is visible on the horizon at right.

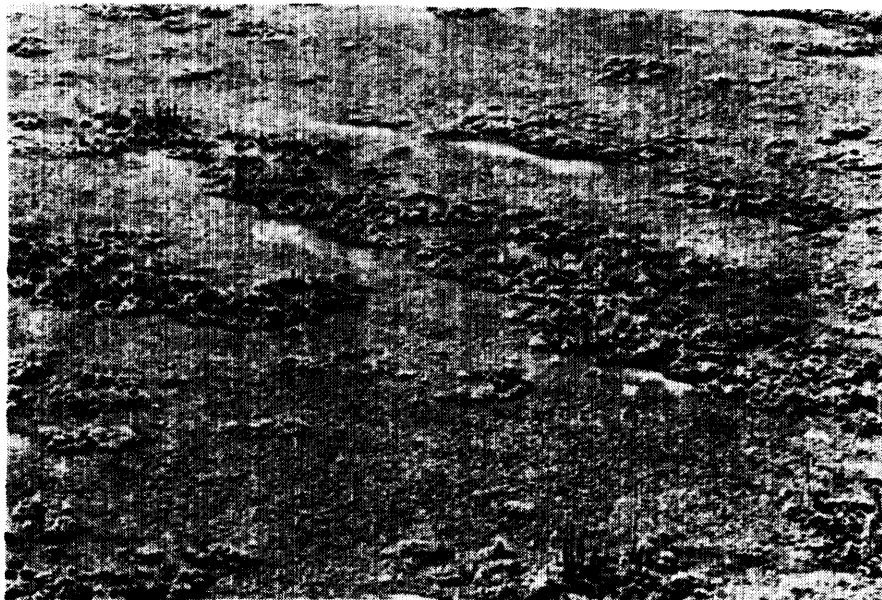


Photo 4. Extremely open bogs, with little shrub or graminoid cover, are encountered occasionally in the Northern Clay Belt, such as here at site 42H-284 in the Cochrane area, and at 32E-17, 42A-76, and other sites.

than about 100 ha (Appendix 4.4; Photo 3). Of these sites, a further 18 peatlands were studied at a reconnaissance level, covering a total area of 12 822 ha of peatland (see Table 5). These sites had an estimated total peat volume of 254 million cubic metres, 63% of which was considered to be well-humified (von Post H4+). Although only limited coring was undertaken on these sites (207 cores), 6 of them appeared to contain significant peat deposits in excess of 2 m deep, and had an average size of about 700 ha total peatland.

Overall, the surveyed quantities of peat were highly significant, and many of the sites were proximal to transportation routes. The data suggest that well-humified peats predominated in terms of volumes. However, 4 of the larger sites surveyed in detail had unhumified peat 1 m or thicker, averaged over the peatland area deeper than 2 m (Appendix 1.4), which suggests that some of the peatlands in this study area are worth consideration in terms of horticultural-peat production.

In the Timmins–Kirkland Lake study area as a whole, over 15% of the landscape was estimated to be peatland (Table 6b). As is the case in the whole north-east, conifer swamp was the most common peatland type, estimated to cover 162 500 ha (51% of all peatland). Thicket swamp was estimated to cover another 48 000 ha (15%), and was frequent as a post-cutting successional type on areas that were formerly conifer swamp. The deeper and less treed peatland types, the bogs and fens, were estimated to cover 104 000 ha of peatland. Open bog, with tree cover less than 10%, was estimated to cover 26 500 ha (Photo 4), and open fen (including open poor fen and low-density treed poor fen) was estimated to cover a further 9600 ha.

Bogs and fens were found to have the greatest peat depths in the study area (Table 6c and 6d). Based on the total number of cores taken during the inventory (1322 cores), the average depth of peat under bogs was 2.3 m (977 cores), with the open bogs averaging slightly deeper (2.4 m). Fens (including poor fens) had average depth values of 2.4 m (296 cores). Conifer swamps and thicket swamps were found to have depths averaging 1.6 m or less. These figures, and depth figures derived from averaging peat-depths per site (Table 6d), were used to estimate total peat volumes in the Timmins–Kirkland Lake study area (Table 7).

The total estimated peat-volume of open-bog peatland in the Timmins–Kirkland Lake study area is 607 800 000 m³, with an additional 1 260 800 000 m³ in bogs having 10 to 20% tree cover. Open fens (including poor fens) are estimated to contain 61 400 000 m³ of peat *in situ*, and treed fens to contain 219 500 000 m³. As a result, it is estimated that the total regional peat-volume in peatlands that are predictably deeper than 2 m is in the order of 2 150 000 000 m³ of *in situ* peat. In addition, the extensive areas of shallow peat occurring under conifer swamps, thicket swamps, hardwood swamps and marshes are estimated to contain a further 2 758 300 000 m³ of peat, for a study-area total of over 4 900 000 000 m³ of *in situ* peat of various types and qualities.

5.5 NEW LISKEARD

Most of the New Liskeard study area (see Figure 4; lat. 47°N to 48°N, Ontario–Quebec border to long. 80°30'W) displays distinctly more rugged terrain than the study areas to the north. The dominant topographic features are parallel northwest-trending bedrock faults, which form the Lake Timiskaming Rift Valley. The central and eastern parts of this valley are occupied by a glaciolacustrine clay plain, commonly known as the Little Clay Belt, deposited in proglacial Lake Barlow–Ojibway. Peatlands in the study area most commonly occur on this clay plain. To the south and west in the area are uplands composed of Precambrian bedrock, discontinuously overlain by stony-to-bouldery sandy till, with an undulating or hilly topography. Peatlands are less frequent in these uplands and are more strongly confined by the bedrock topography. They are also more strongly ombrotrophic, whereas the peatlands on the calcareous clay plains of the New Liskeard lowlands are, for the most part, strongly minerotrophic swamp complexes.

Seven sites were surveyed in detail, and had a total peatland area of 5137 ha (see Table 4 and Appendix 1). These sites had a measured total volume of 94.5 million cubic metres of *in situ* peat. Only about 35% of this surveyed area was more than 2 m deep. These deeper areas contained about 44.1 million cubic metres of peat, 54% of which was considered to be well-humified peat (von Post H4+), suitable for consideration as potential fuel-peat. However, five of these seven deposits, including all sites on the Little Clay Plain, had high stump-contents (average, 3.3%; Appendix 1), and an estimated wood content in the peat of over 50% in the well-humified (H4+) strata (Photo 5).

Five of the seven detailed-survey sites contained areas more than 150 ha in size with peat depths greater than 2 m. Four of these five occurred on the lowland clay plain, but were generally heavily treed, with areas of less than 10% tree cover occupying only 0 to 24% of the sites. The average size of these four sites with peat deeper than 2 m is 300 ha or more; but the combination of high stump-content, dense tree-growth and generally woody peat with relatively high ash-content (Appendix 1.5) suggests little potential for large-scale peat extraction by conventional means or for conventional uses. The expanding local use of the peatlands' perimeters for agricultural pasturage and hay production (Photo 6) suggests an appropriate land use.

The two detailed-survey sites on the Shield in the northwest of the study area are relatively large, are more dominated by moss peats, and have none of the heavy tree-growth and high stump-content of the lowland sites.

Eight additional sites were surveyed at a reconnaissance level, covering a total area of 1780 ha (see Table 5). These sites had an estimated total volume of 26 million cubic metres, 50% of which was considered to be well-humified peat (von Post H4+). Limited coring was done on these sites, but only one of them suggested

possible peat depths of more than 2 m. Again, the peatlands were heavily treed: on seven of the eight sites, tree cover of less than 10% was encountered on only 0 to 11% of the individual peatlands.

On the sites surveyed, conifer swamp was the dominant peatland type, with a total area of 3290 ha (48% of the peatland surveyed). A further 2000 ha of thicket swamp was encountered. Bogs occupied 790 ha (11%) of peatland, mainly on the Precambrian uplands. Fens were encountered on 685 ha (10%) of the peatlands, usually occurring as a vigorous successional community following previous fires on conifer swamp sites in the lowland clay plain.

In the New Liskeard study area as whole, about 13% of the total area was estimated to be peatland (see Table 6b). As in the case of the individual survey sites, conifer swamp (65 275 ha; 61%) and thicket swamp (30 400 ha; 28%) dominated the peatland landscape. Bogs were estimated to cover 5760 ha (5.4%), of which about 2340 ha had tree cover of less than 10%. Fens covered an estimated 3730 ha (3.5%), mostly on clay-plain sites, and most of this area had tree cover less than 10% (3100 ha).

The bog peatlands, most of which were in well-defined Shield basins, were very deep, averaging 4.1 m



Photo 5. A recently cut drainage-ditch through peatland 31M-18 in the New Liskeard study area. This illustrates the significant stump content in many of the peatlands of the Little Clay Belt.



Photo 6. Agricultural clearing of the shallow perimeters of peatlands by windrowing or burning is extensively practised in the New Liskeard study area (31M-27).

across 116 cores (Table 6c). The remainder of the peatland types, represented in our inventory primarily by clay-plain sites, occurred on peats that averaged less than 2 m in depth. These figures, and depth figures derived from averaging peat-depth per site (Table 6d), were used to estimate total peat-volumes in the New Liskeard study area (Table 7).

The total estimated peat-volume for the whole study area was 1 874 900 000 m³; but of this total, only about 249 000 000 m³ were estimated to occur under bogs and fens. Although in the northeast these two peatland types predictably occur on peats deeper than

2 m, fens in the New Liskeard area do so only marginally, and do not usually occur on peats suitable for extraction by conventional means. Approximately 85% of the total peat estimated for this study area occurred under the peatland types of conifer swamp and thicket swamp. On the basis of detailed survey data, the majority of this peat is woody and has a high stump-content. Most of the bogs in the New Liskeard area, some of which suggest consideration in terms of peat extraction, occur on the Precambrian Shield in the western portion of the study area.

6.0 Peatland Vegetation and Environmental Processes

One of the primary objectives of the inventory was to map and characterize peatland vegetation types, both to provide a descriptive data base for the disposition and management of peatlands, and to facilitate the extrapolation of site-specific resource data to the region as a whole. A brief description of the major plant communities identified on each of the peatland types follows (Section 6.1, Peatland Vegetation Types and Successional Relationships in Northeastern Ontario).

The variability and distinctiveness of the different vegetation communities associated with peatland ecosystems are the result of vegetative responses to edaphic factors, which in turn are conditioned by the peat substrates and the hydrological regimes. Data on these environmental processes are presented in Section 6.2, Environmental and Physiognomic Characteristics.

6.1 PEATLAND VEGETATION TYPES AND SUCCESSIONAL RELATIONSHIPS IN NORTHEASTERN ONTARIO

The following synopsis is based on the sites included in Appendix 5 and other published reports, and follows the classification system (Jeglum et al. 1974; Riley and Michaud 1994) outlined in Appendix 3. Additional dominance types can be found in the Open File Reports on each study area. Common names of the species cited below are listed in Appendix 3.

6.1.1 Marsh

Deep Marsh rarely occurs on peat, and was not the focus of the inventory. The major community types, however, are those dominated by *Eleocharis palustris*, *Equisetum fluviatile*, *Glyceria borealis*, *Phragmites communis*, *Scirpus acutus*, *S. validus*, *S. rubrotinctus*, and *Typha latifolia* (Jeglum and Boissonneau 1977).

Shallow Marsh, with higher overall cover values and occurring along the shores of lakes and rivers, includes the deep-marsh dominance types. Where shallow marsh occurs on peat, the dominance types have affinities with fens, and were usually dominated by *Carex lasiocarpa* and *C. rostrata*.

Meadow Marsh usually occurs on peat, and is dominated by *Calamagrostis canadensis* and *Carex rostrata* (–*C. limosa*). Also reported in northeastern Ontario are series dominated by *Carex aquatilis*, *C. lacustris*, *C. stricta*, *C. vesicaria* and *Scirpus cyperinus* (Jeglum and Boissonneau 1977). In meadow marshes, several other species were observed as very frequent at low cover values; e.g., *Chamaedaphne calyculata*, *Carex chordorrhiza*, *Iris versicolor* and *Potentilla palustris*. Shrub-Rich Marsh also occurs, usually dominated by *Myrica gale* (–*Betula pumila*), *Chamaedaphne calyculata*, or *Spiraea alba*. Meadow marsh, shrub-rich marsh and thicket swamp often occur as complex patterns related to the

proximity of open water, such as along beaver-dammed streams and along watercourses (Photo 7).

6.1.2 Swamp

Thicket Swamp occurs on peat and non-peat substrates. The major dominance-type observed on peat was *Alnus rugosa* (–*Salix* spp.–*Ledum groenlandicum*–*Betula pumila*), with *Myrica gale* (–*B. pumila*) also occurring. Others types include *Cornus stolonifera*, *Betula pumila*, *Salix bebbiana*, *S. planifolia* and *S. pyrifolia* (Jeglum and Boissonneau 1977).

Hardwood Swamp was noted on peat only in the New Liskeard area, and normally occurs elsewhere along spring-flooded rivers. It is dominated by *Fraxinus nigra*, *Populus balsamifera* and *Ulmus americana*.

Conifer Swamps were the most common peatland vegetation type; but, because of generally shallow depths, they were not surveyed in detail. Jones et al. (1983), Jeglum and Boissonneau (1977) and others have discussed this formation in detail. On nutrient-rich sites, *Thuja occidentalis*–*Larix laricina*, and *L. laricina* (–*Alnus rugosa*–*Betula pumila*) dominate (Photo 8). On sites dominated by *Picea mariana*, a nutrient-rich and herb-rich series is present, *P. mariana*–*Alnus rugosa* (OG12, OG13; Jones et al. 1983), as well as a nutrient-poor and herb-poor series, *Picea mariana*–*Ledum groenlandicum*–*Chamaedaphne calyculata* (OG11, OG14; Jones et al. 1983).

6.1.3 Fen

Open Fen Pools are frequent components of patterned fens, dominated by *Menyanthes trifoliata*–*Carex limosa*–*C. livida*, and *Carex lasiocarpa* (–*C. limosa*).

These pool phases grade into Open Graminoid Fens, in which the major dominance types are *Carex lasiocarpa*, and *Menyanthes trifoliata* (–*C. limosa*). Less frequently observed dominance types include *Scirpus hudsonianus* (–*Rhynchospora alba*–*Menyanthes trifoliata*), *Carex exilis*, *C. limosa* (–*M. trifoliata*), *Iris versicolor* (–*Equisetum* spp.), and *Carex michauxiana*. *Carex flava* has also been noted as dominating an open graminoid fen type, but probably on very shallow peats or on non-peat substrates (Jeglum and Boissonneau 1977). The most frequent associate species, at low cover values, are *Larix laricina*, *Betula pumila*, *Chamaedaphne calyculata*, *Salix pedicellaris*, *Drosera rotundifolia*, and *Vaccinium oxycoccos*.

Open Shrub-Rich Fens include low-shrub and tall-shrub physiognomic groups, both with similar dominance types. The major series is dominated by *Betula pumila* (–*Andromeda glaucophylla*–*Kalmia polifolia*–*Chamaedaphne calyculata*), with the more minor types including *Andromeda glaucophylla*–*Chamaedaphne calyculata*, and the species-rich, *Potentilla fruticosa*–type of highly calcareous sites. On shallow peats, *Myrica gale* and *Spiraea alba* can also dominate (Jeglum and Boissonneau 1977).



Photo 7. Shallow marsh, shrub-rich marsh and thicket swamp complexes are typical of the wetter shore areas along rivers and lakes of the Clay Belt. This example occurs in a basin with considerable organic accumulation, near Timmins.

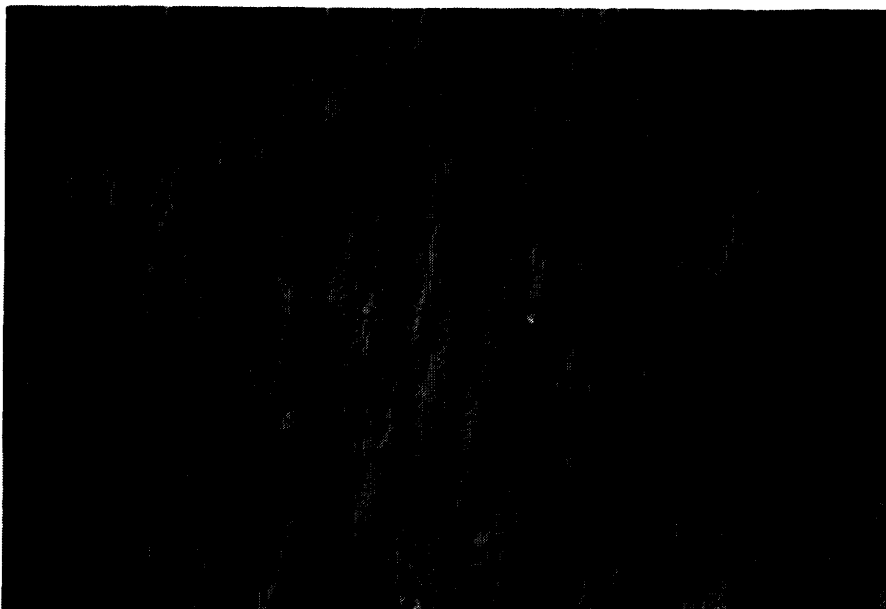


Photo 8. Conifer swamp is by far the most frequent type of peatland in northeastern Ontario, usually occurring on shallower peats than do bogs or fens. Black spruce and tamarack co-dominate in this nutrient-rich, species-rich swamp (42A-175).

The most frequent and dominant bryophytes in open fens were *Sphagnum angustifolium*, *S. magellanicum*, *S. fuscum*, *S. fallax*, *S. rubellum*, *S. subsecundum*, *Campylium stellatum*, *Drepanocladus revolvens*, *D. exannulatus*, and *Tomenthypnum nitens*.

Open Poor Fen was regularly used as a classification unit in northeastern Ontario, to refer to a vegetation type with the overall appearance and dominance types of open bog and an intermediate surface-water pH (4.8 to 5.2, averaging 5.0). Poor fen predictably included a number of species at low cover values that are normally associated with more nutrient-rich sites;

e.g., *Betula pumila*, *Salix pedicellaris*, *Iris versicolor*, *Equisetum fluviatile*, and others. In open graminoid poor-fens, *Menyanthes trifoliata* (–*Carex limosa*) was the most common type. Most of the open fens observed were shrub-rich, and the dominance type was usually *Chamaedaphne calyculata*–*Ledum groenlandicum* (–*Betula pumila*–*Salix pedicellaris*).

Treed Graminoid Fens were dominated by *Larix laricina*–*Picea mariana*–*Menyanthes trifoliata*–*Carex* spp. The dominant graminoid cover was usually *Carex limosa*, *C. chordorrhiza* and/or *C. lasiocarpa*.

Treed Shrub-Rich Fens were the most common type of treed fen, with both low-shrub and tall-shrub units. The major series was *Larix laricina*-*Betula pumila* (-*Andromeda glaucophylla*-*Chamaedaphne calyculata*). However, more nutrient-poor treed fens also occurred, with dominance types such as *Larix laricina*-*Picea mariana*-*Betula pumila*, *L. laricina*-*P. mariana*-*Alnus rugosa*, and even *P. mariana*-*Ledum*

groenlandicum. These types of treed fen also occur as Treed Poor Fens, which are more similar in physiognomy and species composition to the treed bog category, but have a surface-water pH in the intermediate range (4.9 to 5.0), uniformly low tree-cover values (10 to 12%), and frequently contain species such as *Iris versicolor*, *Menyanthes trifoliata*, *Betula pumila* and *Carex limosa*, at low cover values (Photo 9).



Photo 9. Characteristic of the Northern Clay Belt are frequent poor fens, which are intermediate between bog and fen in species composition, water pH and appearance. They occur most frequently with low-density tree cover, and are difficult to distinguish from other peatland types using remote-sensing techniques (42G-451).

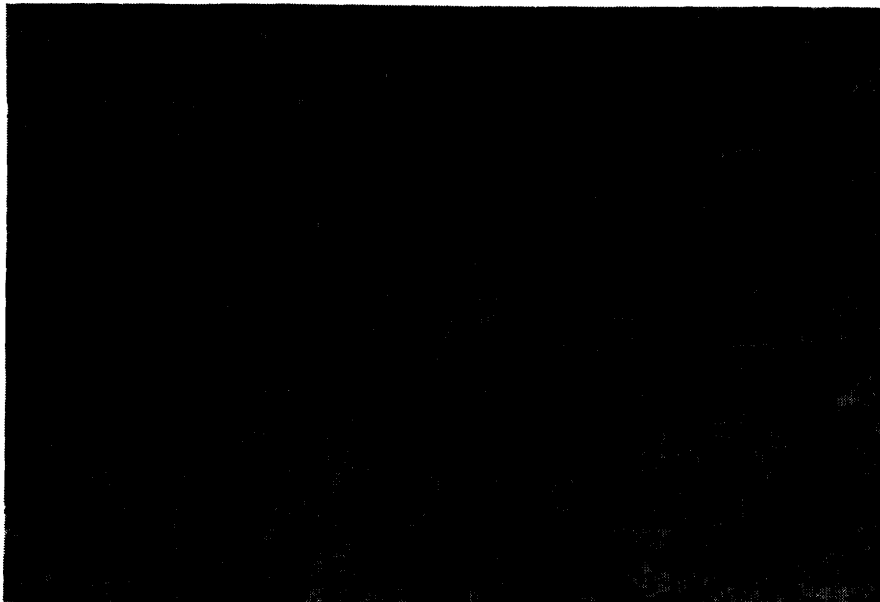


Photo 10. During the inventory, open bogs were considered to include bogs with tree cover up to 10%. Such sites as this one at peatland 42H-231 were dominated by a dense shrub layer of leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Ledum groenlandicum*) and other heath species.

The most frequent and dominant bryophytes on treed fens were *Sphagnum angustifolium*, *S. magellanicum*, *S. warnstorffii*, *S. fuscum*, *S. rubellum*, *Pleurozium schreberi*, *Drepanocladus exannulatus*, *Aulacomnium palustre*, and *Hylocomium splendens*.

6.1.4 Bog

Open Bog Pools occurred infrequently in patterned bogs, and more frequently where there was in-filling. *Carex limosa*–*Scheuchzeria palustris* was observed as a dominance type in the latter situation.

Open Graminoid Bogs, some with relatively sparse graminoid cover, were common. The major dominance types were *Carex oligosperma* (–*Eriophorum spissum*) and *C. exilis*. The minor series included *Carex limosa*, *C. pauciflora* and *Eriophorum spissum*. Jeglum and Boissonneau (1977) also reported *Carex paupercula* and *Scheuchzeria palustris* as dominance types.

Open Shrub-Rich Bog, both dwarf-shrub and low-shrub phases, was the most common physiognomic group of bogs (Photo 10). The major dominance type was *Chamaedaphne calyculata*–*Kalmia polifolia*–*Ledum groenlandicum*, with *L. groenlandicum* also occurring as a dominance type. The most frequent associates to these series were *Picea mariana*, *Carex oligosperma*, *Eriophorum spissum* and *Vaccinium oxycoccos*.

The most frequent and dominant bryophytes in open bog sites were *Sphagnum fuscum*, *S. angustifolium*, *S. rubellum*, *S. magellanicum*, and *Polytrichum strictum*.

Treed Bogs are very common in northeastern Ontario, especially on the perimeters of open-bog peatlands where they can also be transitional to nutrient-poor conifer swamps. Treed bogs also occur predictably on the crests or the summits of raised bogs, which are common in the region. These raised bogs were observed as ranging from 1 to 2 m above the elevation of the surrounding areas. In most cases, the “flanks” of these raised bog “crests” were dominated by open graminoid bogs and, less frequently, by open low-shrub bogs.

Treed Graminoid Bog was dominated by *Picea mariana*–*Carex oligosperma*, but *C. pauciflora* and *Eriophorum spissum* were also co-dominant on some sites.

Treed Low-Shrub Bog was the most common type of treed bog, the major dominance types being *Picea mariana*–*Chamaedaphne calyculata* and *P. mariana*–*Ledum groenlandicum* (–*C. calyculata*). The most frequent associates of these series at lower cover values were *Kalmia polifolia*, *Andromeda glaucophylla*, *Vaccinium myrtilloides*, *V. angustifolium*, *V. oxycoccos*, *Gaultheria hispidula*, *Carex pauciflora*, and *Eriophorum spissum*.

The most frequent and dominant bryophyte species in treed-bog sites were *Sphagnum fuscum*, *S. angustifolium*, *S. magellanicum*, *Polytrichum strictum*, *Pleurozium schreberi*, *Dicranum undulatum* and *Cladonia mitis*.

6.2 ENVIRONMENTAL AND PHYSIOGNOMIC CHARACTERISTICS

A relatively limited data-set on the environmental and physiognomic characteristics of the peatland vegetation types is presented to provide some descriptive measures of the variability and distinctiveness of the various vegetation communities. Within the almost continuous gradient of vegetation ecosystems occurring on peatlands, the classification system recognizes the most predictably recurring types, and many individual sites may be considered somewhat transitional between types.

A limited number of surface-water samples (10 to 15 cm below water tables) were recovered for element determination (Table 8) using ICAP spectrometry (Ca, Fe, Mg, Mn, Cu, Zn, Al, P) and flame-emission photometry (Na, K), after filtering through Whatman 40 Ashless filters. In terms of nutrients such as calcium, potassium and magnesium, there is a general decrease in total-element composition from swamps and marshes, through fens, to bogs.

Based on the data on Table 8 and the average pH values of water samples measured in the field, the concentrations of most elements tested were found to correlate strongly with pH. Strong positive correlations were found in the case of calcium ($r = +0.73$), magnesium ($r = +0.80$), sodium ($r = +0.58$), and potassium ($r = +0.66$). Strong negative correlations were found in the case of copper ($r = -0.74$), manganese ($r = -0.67$), aluminum ($r = -0.68$), phosphorus ($r = -0.65$), and lead ($r = -0.67$). The values are based on the mean values for the following vegetation types ($n = 7$): marsh, open fen, treed fen, open poor fen, treed poor fen, open bog and treed bog. The values may be high because they correlate mean rather than individual data.

A graph plotting total concentrations of calcium and magnesium versus copper, manganese, aluminum, phosphorus and lead for each vegetation type illustrates relationships similar to those of surface-water pH versus average depth-to-water (Figure 5). Elements negatively correlating with water pH probably reflect the greater solubility and mobility of these elements at a lower pH.

The peatland classification units have characteristic mean values for physiognomic canopy strata (Table 9) that reflect the cover distinctions used in the classification keys (Appendix 3). However, they also illustrate the relative biomass productivity of these types, decreasing in overall cover values from treed to open associations. Within particular physiognomic groups there is a slight decline in above-ground cover values from fen to bog systems. A similar decrease is also apparent in the average number of vascular-plant species occurring in these systems.

The highest measurements of surface-water pH (an index of nutrient availability) were observed in marshes (5.1 to 6.0, average 5.7) and swamps (4.8 to 6.1, average 5.4), with fens in an intermediate range (4.8 to 6.6, average 5.5), and with bogs distinctly more acidic (3.5 to 4.8, average 4.3).

Table 8. Minor-element composition of surface waters of northeastern Ontario peatlands.

Peatland Type	Calcium (ppm)	Iron (ppm)	Magnesium (ppm)	Manganese (ppm)	Copper (ppm)	Zinc (ppm)	Aluminum (ppm)	Phosphorus (ppm)	Lead (ppm)	Sodium (ppm)	Potassium (ppm)
Marsh	4.28±1.12 3.49–5.56 (3)	0.09±0.08 0.05–0.18 (3)	2.67±2.59 1.17–5.66 (3)	<0.006±0.004 <0.003–0.01 (3)	<0.009±0.010 <0.003–0.020 (3)	0.01+0.01 0.01–0.02 (3)	<0.09±0.14 <0.01–0.25 (3)	<0.12±0.16 <0.01–0.30 (3)	<0.15±0.21 <0.03–0.04 (3)	12.4±0.00 — (3)	2.0±0.9 1.4–2.6 (3)
Thicket Swamp	—	—	—	—	—	—	—	—	—	—	—
Conifer Swamp	44.540 (1)	0.990 (1)	10.010 (1)	0.790 (1)	<0.00700 (1)	<0.010 (1)	<0.250 (1)	<0.3 (1)	<0.4 (1)	— (0)	— (0)
Open Bog	1.00±1.28 0.36–1.28 (23)	0.16±0.07 0.06–0.31 (23)	0.15±0.08 0.04–0.34 (23)	<0.029±0.041 <0.003–0.190 (23)	<0.015±0.012 <0.003–0.020 (23)	<0.02±0.01 <0.01–0.02 (23)	<0.17±0.11 <0.01–0.25 (23)	<0.20±0.14 <0.01–0.30 (23)	<0.27±0.18 <0.03–0.40 (23)	1.8±1.4 0.8–5.2 (8)	1.0±0.5 0.5–2.0 (8)
Treed Bog	<1.38±0.91 <0.40–1.97 (13)	0.21±0.12 0.09–0.54 (13)	0.19±0.12 0.07–0.26 (13)	<0.082±0.119 <0.007–0.370 (13)	0.016±0.006 0.007–0.020 (13)	<0.02±0.01 <0.01–0.03 (13)	<0.22±0.08 <0.04–0.25 (13)	<0.26±0.11 <0.01–0.30 (13)	<0.34±0.14 <0.03–0.40 (13)	1.4±0.3 1.2–1.6 (4)	0.9±0.1 0.8–1.0 (4)
Open Fen	6.87±1.98 1.42–37.62 (9)	<0.29±0.21 <0.04–0.63 (9)	1.57±2.60 0.35–8.47 (9)	<0.025±0.021 <0.003–0.060 (9)	0.010±0.007 0.003–0.020 (9)	<0.01±0.01 <0.01–0.02 (9)	<0.20±0.10 <0.01–0.25 (9)	<0.24±0.13 <0.01–0.30 (9)	<0.32±0.16 <0.03–0.40 (9)	2.1±0.1 2.0–2.2 (2)	1.3±0.7 0.8–1.8 (2)
Treed Fen	2.94±1.05 1.21–4.21 (8)	<0.17±0.15 <0.04–0.36 (8)	0.58±0.28 0.22–1.02 (8)	<0.03±0.04 <0.003–0.11 (8)	<0.006±0.004 <0.003–0.010 (8)	<0.01±0.01 <0.01–0.02 (8)	<0.08±0.12 <0.01–0.25 (8)	<0.100±0.138 <0.001–0.30 (8)	<0.14±0.14 <0.03–0.40 (8)	1.3±0.05 0.6–1.8 (5)	<1.3±1.5 0.2–4.0 (5)
Open Poor Fen	2.00±1.50 1.02–4.21 (4)	<0.30±0.22 <0.04–0.52 (4)	0.34±0.17 0.10–0.56 (4)	<0.017±0.018 <0.003–0.040 (4)	<0.007±0.004 <0.003–0.010 (4)	<0.02±0.01 <0.01–0.02 (4)	<0.13±0.14 <0.01–0.25 (4)	<0.16±0.17 <0.01–0.30 (4)	<0.22±0.21 <0.03–0.40 (4)	1.2±1.1 0.4–2.0 (2)	<0.5±0.5 <0.2–0.8 (2)
Treed Poor Fen	2.95±2.38 1.33–5.68 (2)	0.36±0.08 0.30–0.45 (2)	0.59±0.49 0.33–1.15 (2)	0.03±0.02 0.02–0.05 (2)	0.008±0.003 0.004–0.010 (2)	0.02±0.00 — (2)	0.17±0.13 0.07–0.25 (2)	<0.020±0.17 <0.01–0.30 (2)	<0.28±0.21 <0.03–0.40 (2)	1.60 — (1)	0.5 — (1)
Open Fen (Including Open Poor Fen)	5.37±10.09 1.02–38.62 (13)	<0.29±0.20 <0.04–0.63 (13)	1.19±2.21 0.10–8.47 (13)	<0.022±0.020 <0.003–0.060 (13)	<0.010±0.005 <0.003–0.020 (13)	<0.01±0.01 <0.01–0.02 (13)	<0.18±0.11 <0.01–0.25 (13)	<0.21±0.14 <0.01–0.30 (13)	<0.29±0.18 <0.03–0.40 (13)	1.7±0.8 0.4–2.2 (4)	<0.9±0.7 <0.2–1.8 (4)
Treed Fen (Including Treed Poor Fen)	2.86±1.42 1.21–5.68 (10)	<0.22±0.16 <0.04–0.45 (10)	0.58±0.33 0.22–1.55 (10)	<0.029±0.035 <0.003–0.110 (10)	<0.007±0.004 <0.003–0.010 (10)	<0.01±0.01 <0.01–0.02 (10)	<0.11±0.12 <0.01–0.25 (10)	<0.13±0.15 <0.01–0.30 (10)	<0.18±0.19 <0.03–0.40 (10)	1.3±0.4 0.6–1.8 (6)	<1.2±1.4 <0.2–4.0 (6)

All values are in parts per million. The first shown is the mean value ± 1 standard deviation (± 1 SD); the second, the range of values obtained; and the third, the number of observations (in parentheses).

Table 9. Physiognomic and environmental characteristics of peatland classification units, northeastern Ontario peatlands.

Classification Units	Number of Sample Sites mean $\pm$ 1 SD range	Surface-Water pH mean $\pm$ 1 SD range	Average Depth-to-Water (cm) mean $\pm$ 1 SD range	Peat Depth (cm) mean $\pm$ 1 SD range	Tree Cover > 150 cm (%) mean $\pm$ 1 SD range	Shrub Cover > 150 cm (%) mean $\pm$ 1 SD range	Shrub, Tree spp. Cover > 150 cm (%) mean $\pm$ 1 SD range	Graminoid/Herb Cover (%) mean $\pm$ 1 SD range	Bryophyte/Lichen Cover (%) mean $\pm$ 1 SD range	Average No. of Vascular Plant Species mean $\pm$ 1 SD range
MARSH	5	5.7 $\pm$ 0.4 5.1–6.0	2 $\pm$ 10 –6–11	218 $\pm$ 135 120–450	0	+	3 $\pm$ 5 +–13	60 $\pm$ 27 24–95	30 $\pm$ 41 0–95	15 $\pm$ 4 10–18
Thicket SWAMP	12	5.3 $\pm$ 0.3 4.8–5.6	25 $\pm$ 13 8–53	143 $\pm$ 82 60–340	4 $\pm$ 4 0–11	38 $\pm$ 15 16–70	25 $\pm$ 14 6–50	14 $\pm$ 22 2–82	62 $\pm$ 35 0–90	20 $\pm$ 8 10–33
Conifer SWAMP*	13	5.4 $\pm$ 0.3 4.9–6.1	31 $\pm$ 11 14–52	171 $\pm$ 92 40–350	34 $\pm$ 13 20–75	9 $\pm$ 9 0–35	22 $\pm$ 23 2–83	13 $\pm$ 4 2–15	84 $\pm$ 11 65–99	20 $\pm$ 4 15–25
Cedar, tamarack, alder dominant	3	5.6 $\pm$ 0.4 5.3–6.1	40 $\pm$ 13 26–52	212 $\pm$ 56 170–275	28 $\pm$ 3 25–30	18 $\pm$ 18 0–35	26 $\pm$ 12 12–36	9 $\pm$ 5 6–15	78 $\pm$ 18 65–98	20 $\pm$ 4 16–24
Black spruce dominant, alder < 15% cover	10	5.3 $\pm$ 0.2 4.9–5.6	28 $\pm$ 9 14–38	159 $\pm$ 100 40–350	35 $\pm$ 15 20–75	6 $\pm$ 5 0–12	20 $\pm$ 27 2–83	6 $\pm$ 4 2–11	86 $\pm$ 9 75–99	20 $\pm$ 4 15–25
OPEN BOG	32	4.3 $\pm$ 0.4 3.5–4.8	22 $\pm$ 12 –3–58	293 $\pm$ 119 90–515	2 $\pm$ 2 0–8	+	27 $\pm$ 18 2–78	16 $\pm$ 10 2–40	99 $\pm$ 0	13 $\pm$ 3 8–16
OPEN Pool BOG	1	4.6	–3	495	0	0	2	16	95	8
OPEN Graminoid BOG	15	4.3 $\pm$ 0.4 3.8–4.8	17 $\pm$ 5 8–26	256 $\pm$ 90 105–370	2 $\pm$ 2 0–7	0	15 $\pm$ 4 5–21	21 $\pm$ 8 11–20	99 $\pm$ 1 95–99	13 $\pm$ 3 10–18
OPEN Shrub-Rich BOG	16	4.3 $\pm$ 0.4 3.5–4.8	29 $\pm$ 13 10–58	316 $\pm$ 131 90–515	2 $\pm$ 2 +–8	+	39 $\pm$ 10 18–78	9 $\pm$ 5 2–17	99 $\pm$ 0	12 $\pm$ 3 8–16
OPEN Dwarf-Shrub BOG	6	4.4 $\pm$ 0.2 4.2–4.7	25 $\pm$ 6 19–35	284 $\pm$ 101 160–420	1 $\pm$ 1 +–2	0	32 $\pm$ 10 20–45	7 $\pm$ 2 5–11	99 $\pm$ 0	13 $\pm$ 3 10–16
OPEN Low-Shrub BOG	10	4.2 $\pm$ 0.5 3.5–4.8	31 $\pm$ 15 10–58	335 $\pm$ 148 90–515	3 $\pm$ 3 +–8	+	43 $\pm$ 21 18–78	10 $\pm$ 6 2–17	99 $\pm$ 0	12 $\pm$ 3 8–16
TREED BOG	17	4.3 $\pm$ 0.3 3.8–4.8	28 $\pm$ 13 11–59	309 $\pm$ 113 150–500	14 $\pm$ 5 10–25	0	31 $\pm$ 19 12–88	9 $\pm$ 4 3–14	98 $\pm$ 2 92–99	15 $\pm$ 2 11–18
TREED Graminoid BOG	2	4.1 $\pm$ 0.2 3.9–4.2	24 $\pm$ 1 23–24	330 $\pm$ 85 270–390	11 $\pm$ 1 10–12	0	16 $\pm$ 6 12–20	15 $\pm$ 0	99 $\pm$ 0	17 $\pm$ 1 16–17
TREED Low-Shrub BOG	15	4.3 $\pm$ 0.3 3.8–4.8	29 $\pm$ 13 11–59	307 $\pm$ 119 150–500	15 $\pm$ 5 10–25	0	33 $\pm$ 19 16–88	9 $\pm$ 4 3–14	98 $\pm$ 2 92–99	15 $\pm$ 3 11–18
Low-Density TREED BOG	10	4.2 $\pm$ 0.3 3.8–4.8	26 $\pm$ 9 11–46	336 $\pm$ 108 200–500	11 $\pm$ 1 10–14	0	29 $\pm$ 14 12–66	11 $\pm$ 4 3–15	99 $\pm$ 0	16 $\pm$ 2 11–18
Medium-Density TREED BOG	6	4.4 $\pm$ 0.4 3.9–4.8	27 $\pm$ 12 16–48	273 $\pm$ 129 150–450	18 $\pm$ 3 15–22	0	25 $\pm$ 8 16–40	8 $\pm$ 3 4–12	97 $\pm$ 3 92–99	15 $\pm$ 3 11–18
High-Density TREED BOG	1	4.5	59	260	25	0	88	3	95	15

Table 9 (continued).

Classification Units	Number of Sample Sites mean $\pm$ 1 SD range	Surface-Water pH mean $\pm$ 1 SD range	Average Depth-to-Water (cm) mean $\pm$ 1 SD range	Peat Depth (cm) mean $\pm$ 1 SD range	Tree Cover >150 cm (%) mean $\pm$ 1 SD range	Shrub Cover >150 cm (%) mean $\pm$ 1 SD range	Shrub, Tree spp. Cover >150 cm (%) mean $\pm$ 1 SD range	Graminoid/Herb Cover (%) mean $\pm$ 1 SD range	Bryophyte/Lichen Cover (%) mean $\pm$ 1 SD range	Average No. of Vascular Plant Species mean $\pm$ 1 SD range
OPEN FEN (excl. OPEN POOR FEN)	22	5.5 $\pm$ 0.4 4.9–6.6	15 $\pm$ 11 –10–52	294 $\pm$ 141 80–660	3 $\pm$ 3 0–8	+	27 $\pm$ 23 3–90	23 $\pm$ 13 5–55	83 $\pm$ 18 40–99	25 $\pm$ 7 19–34
OPEN Pool FEN	3	5.5 $\pm$ 0.5 5.1–6.0	–4 $\pm$ 6 –10–2	297 $\pm$ 65 245–370	0	0	+	21 $\pm$ 5 16–25	17 $\pm$ 16 5–35	15 $\pm$ 6 8–19
OPEN Graminoid FEN	11	5.3 $\pm$ 0.3 4.9–5.9	11 $\pm$ 7 –3–24	333 $\pm$ 166 80–660	3 $\pm$ 3 0–6	+	11 $\pm$ 5 3–18	31 $\pm$ 14 12–55	78 $\pm$ 22 40–99	25 $\pm$ 5 19–34
OPEN Low-Shrub FEN	9	5.5 $\pm$ 0.5 4.8–6.6	15 $\pm$ 7 5–25	256 $\pm$ 117 120–520	3 $\pm$ 3 0–8	+	33 $\pm$ 11 22–58	16 $\pm$ 7 5–30	90 $\pm$ 9 70–99	25 $\pm$ 9 11–42
OPEN Low-Shrub FEN (post-fire succession)	2	6.0 $\pm$ 0.2 5.8–6.2	36 $\pm$ 13 20–52	258 $\pm$ 14 240–275	1 $\pm$ 1 +–2	0	85 $\pm$ 7 80–90	14 $\pm$ 2 12–15	75 $\pm$ 21 60–90	27 $\pm$ 1 26–28
OPEN POOR FEN	7	5.0 $\pm$ 0.1 4.8–5.2	17 $\pm$ 10 8–38	220 $\pm$ 101 110–370	5 $\pm$ 3 1–8	0	25 $\pm$ 7 16–37	13 $\pm$ 6 6–23	94 $\pm$ 5 85–95	19 $\pm$ 2
OPEN Graminoid POOR FEN	2	4.9–5.0	15–19	220–300	7 $\pm$ 2 5–8	0	20 $\pm$ 4 17–22	21 $\pm$ 4 18–23	99 $\pm$ 0	20 $\pm$ 4 17–22
OPEN Low-Shrub POOR FEN	5	5.0 $\pm$ 0.2 4.8–5.2	17 $\pm$ 12 8–38	163 $\pm$ 80 100–370	5 $\pm$ 3 1–8	0	27 $\pm$ 8 16–37	10 $\pm$ 4 6–15	92 $\pm$ 5 85–95	19 $\pm$ 1 17–20
TREED FEN	15	5.6 $\pm$ 0.5 4.8–6.2	19 $\pm$ 9 9–37	231 $\pm$ 85 100–375	12 $\pm$ 3 10–17	6 $\pm$ 10 0–30	31 $\pm$ 13 15–62	21 $\pm$ 13 4–50	92 $\pm$ 10 70–99	28 $\pm$ 8 17–46
TREED Graminoid FEN	4	5.3 $\pm$ 0.6 4.8–6.1	16 $\pm$ 12 9–33	245 $\pm$ 82 150–350	11 $\pm$ 2 10–13	1 $\pm$ 3 0–5	22 $\pm$ 4 16–25	23 $\pm$ 6 18–32	97 $\pm$ 2 95–99	23 $\pm$ 4 17–27
TREED Shrub-Rich FEN	11	5.7 $\pm$ 0.4 4.9–6.2	21 $\pm$ 9 10–37	226 $\pm$ 89 100–375	13 $\pm$ 3 10–17	8 $\pm$ 12 0–30	34 $\pm$ 14 15–62	21 $\pm$ 15 4–50	90 $\pm$ 11 70–99	29 $\pm$ 8 21–46
TREED Low-Shrub FEN	8	5.8 $\pm$ 0.3 5.3–6.2	19 $\pm$ 8 10–28	239 $\pm$ 93 120–375	13 $\pm$ 3 10–17	1 $\pm$ 2 0–5	39 $\pm$ 13 25–62	26 $\pm$ 14 15–50	93 $\pm$ 10 70–99	32 $\pm$ 9 21–46
TREED Tall-Shrub FEN	3	5.2 $\pm$ 0.3 4.9–5.5	26 $\pm$ 10 20–37	193 $\pm$ 82 100–250	11 $\pm$ 0	26 $\pm$ 4 23–30	21 $\pm$ 6 15–27	5 $\pm$ 2 4–6	80 $\pm$ 5 75–85	23 $\pm$ 4 21–28
Low-Density TREED FEN	11	5.6 $\pm$ 0.5 4.8–6.2	20 $\pm$ 10 9–37	228 $\pm$ 76 100–350	11 $\pm$ 1 10–13	8 $\pm$ 12 0–30	28 $\pm$ 12 15–45	20 $\pm$ 13 4–50	89 $\pm$ 10 70–99	25 $\pm$ 6 17–39
Medium-Density TREED FEN	4	5.6 $\pm$ 0.3 5.3–5.9	17 $\pm$ 7 10–28	241 $\pm$ 117 120–375	16 $\pm$ 1 15–17	2 $\pm$ 1 0–3	38 $\pm$ 17 25–62	27 $\pm$ 13 17–45	98 $\pm$ 2 95–99	34 $\pm$ 10 25–46
TREED POOR FEN*	3	4.9 $\pm$ 0.1 4.9–5.0	17 $\pm$ 2 15–19	340 $\pm$ 113 270–470	10 $\pm$ 1 10–11	0	21 $\pm$ 7 16–29	16 $\pm$ 7 8–20	96 $\pm$ 2 95–99	17 $\pm$ 1 16–18

* Not subdivided in this table, due to the small number of samples.

+ Indicates mean <0.5%.

 Based on sample sites presented in the phytosociological analysis (Appendix 5). Values are reported as means $\pm$ 1 standard deviation, followed by the range of values averaged.

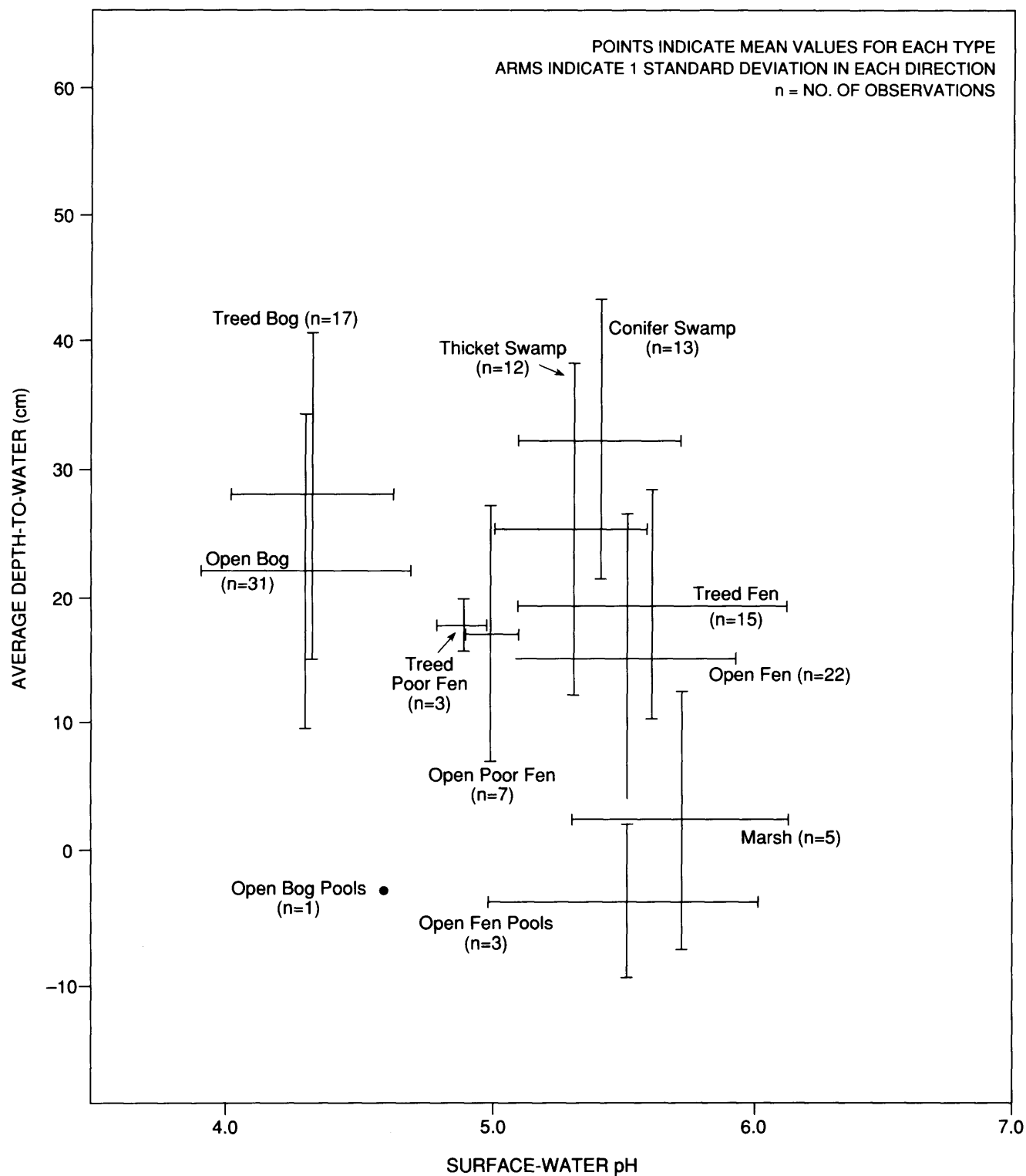


Figure 5. Relationship of surface-water pH and average depth-to-water for major peatland vegetation types.

The average depth-to-water for the various formations may be viewed as a rough measure of the moisture-aeration regime of particular sites (Jeglum 1974), which varied in a similar manner. Marshes were the wettest sites, with an average depth-to-water of 2 cm (range, -6 to +11 cm). Fens had an average depth-to-water of 17 cm (-10 to +52 cm); bogs, 24 cm (-3 to +59 cm); and swamps, 28 cm (8 to 53 cm)—the driest type of sites. Considerable variation also occurred within the bog and fen formations, with the open pool and graminoid phases being much wetter (i.e., having lower average depth-to-water values) than the shrub-rich and the treed phases.

The relationship between surface-water pH and average depth-to-water was plotted for these major formations (Figure 5) to illustrate the general relationships between these vegetation types. In terms of overall vegetation succession, the principal temporal parameter affecting the peatland systems in northeastern Ontario is peat accumulation. This operates as a strong unidirectional factor in most peatland successional scenarios, because net accumulation exceeds decomposition even in situations where the rate of net accumulation may be low; e.g., in some swamps.

For northeastern Ontario, Table 6c indicates the average peat depths found under these peatland types during the course of the inventory (4989 individual measurements). The average peat depths vary in relation to vegetation type in the same pattern as indicated above: marsh, 1.6 m ($n = 3$); hardwood swamp, 1.3 m

($n = 5$); thicket swamp, 1.8 m ($n = 321$); conifer swamp, 1.8 m ($n = 701$); treed fen, 2.3 m ($n = 800$); treed bog, 2.0 m ($n = 617$); open fen, 2.1 m ($n = 785$); and open bog, 2.5 m ($n = 1757$).

The strong correlations between surface-water pH, average depths-to-water, peat depths, and surface-water nutrients suggest a consistent environmental partitioning of the vegetation types, reflected in the distinct differences in species composition and coverage between types. These data indicate that certain successional scenarios occur on peatlands over a long period of time.

Successional trends and the rates of change would necessarily be modified by particular hydrological regimes or by anthropogenic changes to the major environmental parameters. The assessment of successional trends is also based on sites interpreted as transitional. For example, bog sites with persisting or dead woody-fen elements such as *Larix laricina* or *Betula pumila* suggest a succession from fen to bog, whereas the opposite succession was not interpreted on undisturbed sites. The prevalence of "poor fens" in northeastern Ontario is of particular interest from this point of view, as is the distinctive patterning of some bog sites (Photo 11).

The major successional relationships are presented schematically in Figure 6. This diagram suggests that, given a stable hydrological and climatic regime, and a long-enough period of organic accumulation, the major successional trends are from wetter to effectively drier conditions (i.e., increasing average depths-to-water)

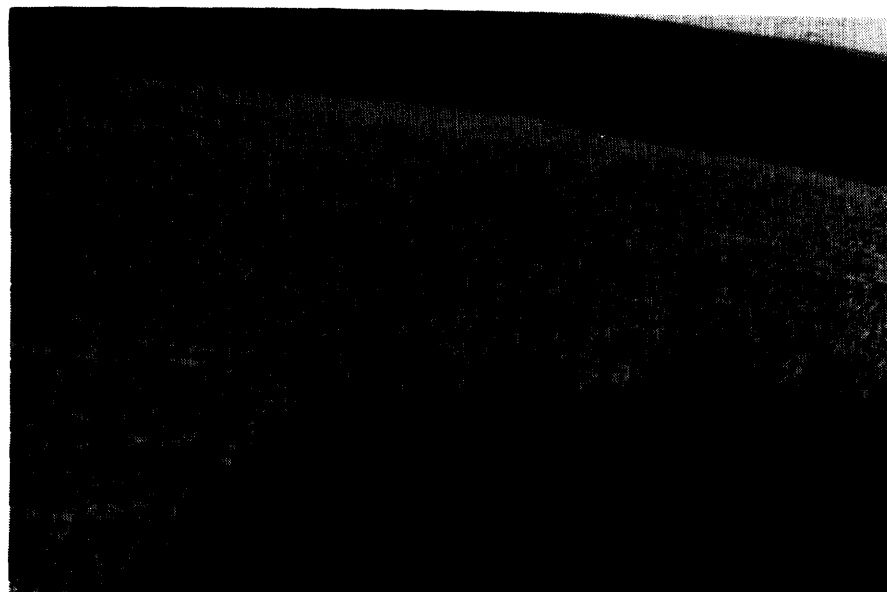


Photo 11. Some of the confined, esker-related bogs in the eastern portion of the region have distinct vegetation patterns suggestive of the eccentric patterns of raised bogs in eastern Canada. Alternatively, the arcuate patterns of open bog and treed bog (ridges) may persist from an earlier successional phase on the site, during which time "string" fens occurred across the site, and drainage downslope from left to right was stronger than at present.

and from minerotrophic to ombrotrophic nutrient regimes. Both of these trends could occur at the same time as a general paludification of the landscape across large areas. This may be viewed as a general succession towards bog and swamp ecosystems.

On a site-specific basis, this scenario is often apparent in the stratigraphy of sites, as interpreted from the peat-type profiles of specific sites; but it deserves closer site-specific study of the macrofossil and pollen assemblages represented in the peat stratigraphy.

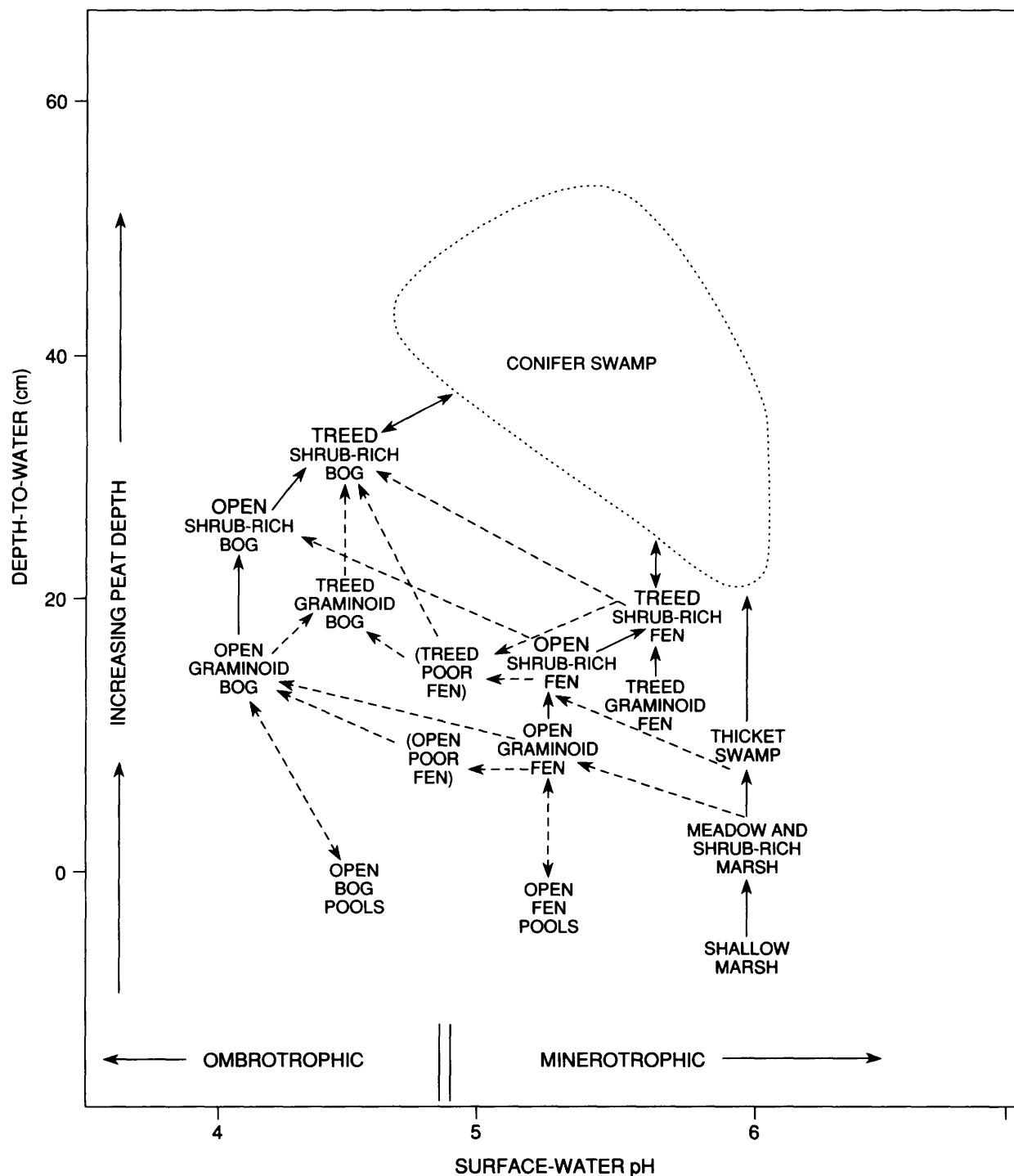


Figure 6. Schematic of apparent relationships between major peatland types. Major trends are indicated with unbroken (solid) arrows; less major relationships, with broken arrows.

7.0 Physical and Chemical Characteristics of Peat in Northeastern Ontario

The characteristics of the peat, as well as their spatial and stratigraphic distribution, are critical to the attribution of specific peat-resource potential to specific peatlands. As part of the peatland inventory program, 698 samples from 109 stratigraphic cores were tested for their physical and chemical properties (Riley 1989a; *see also* Section 3.5, Laboratory Tests and Analysis of Results). The cores were selected by field teams to represent the typical stratigraphy of peatlands surveyed in detail. The following results emphasize the overall regional characteristics of the peat analyzed in terms of different potential uses, specifically for energy and horticultural purposes. For site-specific evaluation, the full data set is presented in Appendix 2.

In addition, peat profiles representative of the major peatland types surveyed in the region are presented in Figure 7. They illustrate the typical peat stratigraphy underlying the major peatland types, and the distribution of elements within these profiles.

7.1 FUEL-GRADE PEAT

As discussed previously, fuel-grade peat in Ontario can be defined as organic material having more than 4165 cal/g net heating value and less than 25% ash content. As a general rule of thumb, in the field and in the summary tables of this report, fuel-grade peats were considered to have a degree of humification of H4 or more on the von Post scale (Appendix 1).

In northeastern Ontario, 271 of the peat samples analyzed had the above properties, and the test results follow:

Property	Mean	Standard Deviation	Range
Net heating value (cal/g)	4724	±297	4180–5985
Volatile matter (%)	67.7	±3.9	50.0–81.4
Moisture content (% wet)	87	±5	62–96
Dry bulk density (g/cm ³)	0.14	±0.05	0.05–0.35
Wet bulk density (g/cm ³)	1.05	±0.04	0.88–1.21
Ash content (%)	6.2	±2.7	1.4–17.0
Total carbon (%)	52	±4	38–59
Hydrogen (%)	5.4	±0.5	3.7–6.5
Sulphur (%)	0.11	±0.10	0.01–0.81
Humification (von Post scale)	4.3		
Percentage, moss peat	66	±31	
Percentage, sedge peat	28	±29	
Percentage, woody peat	7	±14	

Trace elements that may be problematic as eventual emissions from combustion plants were also analyzed. The results are equivalent to or less than those found in Finnish fuel-peats, for which the resultant emission levels are documented (Hasanen 1982).

Trace Element (ppm)	Mean	Standard Deviation	Range
Arsenic	<0.42	±0.40	<0.1–2.1
Mercury	<0.58	±0.30	<0.01–5.0
Lead	<5.2	±7.3	<2–75
Zinc	<10.2	±18.3	<2–198
Manganese	50	±76	4–1020

On an operational basis, peat materials that are less humified (i.e., H1–3) can also be considered potential fuel peats if their net heating value is sufficiently high. In these cases, the bulk densities of the peat may be less attractive in terms of materials handling, but still economically viable. Of all the peat samples tested, 67% (466) qualified as fuel-grade peat on the basis of having greater than 4165 net calories per gram, and ash contents less than 25%. The following results indicate that these peats differ very little from the above-reported values for H4+ peats only.

Property	Mean	Standard Deviation	Range
Net heating value (cal/g)	4666	±322	176–5985
Volatile matter (%)	69.9	±5.5	54.5–85.8
Moisture content (% wet)	89	±5	62–96
Dry bulk density (g/cm ³)	0.19	±0.05	0.04–0.35
Wet bulk density (g/cm ³)	1.04	±0.06	0.84–1.78
Ash content (%)	5.7	±3.0	0.8–20.3
Total carbon (%)	51	±4	5.9–58.9
Hydrogen (%)	5.3	±0.6	2.7–6.5
Sulphur (%)	0.11	±0.10	0.01–0.95
Humification (von Post scale)	3.6		
Percentage, moss peat	69	±32	
Percentage, sedge peat	23	±27	
Percentage, woody peat	9	±17	

Trace elements increase slightly because of a greater proportion of surficial peats.

7.2 HORTICULTURAL-GRADE PEAT

In general, the requirements for horticultural-grade peat materials are for fibrous organic materials that are resistant to rapid decomposition (i.e., sphagnum-moss peats), with high cation-exchange capacities and high absorptive capacities. A total of 170 of the peat samples collected in northeastern Ontario had a humification level of H1–3 (von Post scale) and were reported as containing more than 70% moss peat (including some brown-moss peats as well as sphagnum peats). The following parameters have results of horticultural interest, which suggest that horticultural-grade peat is widespread in the region.

Property	Mean	Standard Deviation	Range
Cation exchange capacity (meq/100 g)	180	±69	50–382
Peat pH (in H ₂ O)	4.9	±0.8	3.5–7.0
Peat pH (in CaCl ₂)	4.0	±0.9	2.7–6.5
Conductivity (µmho/cm)	55	±41	4–275
Fibre content (% fibres >0.15 mm)	74	±20	28–100
Moisture content (%)	91	±4	76–96
Dry bulk density (g/cm ³)	0.09	±0.04	0.04–0.26
Absorptive Capacity	23	±9	6–55
Ash content (%)	3.9	±2.3	0.8–15
Nitrogen (%)	1.6	±0.7	0.6–7.0
Phosphorus (ppm)	578	±682	140–9040
Potassium (ppm)	1213	+1076	10–8600
Calcium (ppm)	10226	±8784	1100–32900
Humification (von Post scale)	2.3	±0.7	
Percentage, moss peat	92	±10	
Percentage, sedge peat	7	±9	
Percentage, woody peat	2	±5	

If all peat samples with a reported moss content of more than 70% and a von Post humification of H1–4 are included, the inclusion of H4 peats results in a decrease in the overall horticultural quality of the peat, especially in terms of pH, fibre content, bulk density and absorptive capacity. However, horticultural-peat producers often use H4 peats where necessary, and the characteristics of all H1–4 peats (n = 305) with more than 70% moss content are reported below.

Property	Mean	Standard Deviation	Range
Cation exchange capacity (meq/100 g)	184	±69	43–493
Peat pH (in H ₂ O)	5.2	±0.8	3.5–7.0
Peat pH (in CaCl ₂)	4.4	±1.0	2.7–6.5
Conductivity (µmho/cm)	48	±33	4–275
Fibre content (% fibres >0.15 mm)	65	±20	26–100
Moisture content (%)	90	±4	75–96
Dry bulk density (g/cm ³)	0.10	±0.04	0.04–0.26
Absorptive Capacity	19	±9	6–55
Ash content (%)	5.1	±2.9	0.8–20.8
Nitrogen (%)	1.7	±0.7	0.6–7.0
Phosphorus (ppm)	487	±527	130–9040
Potassium (ppm)	924	±954	10–8600
Calcium (ppm)	15645	±12286	1100–91200
Humification (von Post scale)	3.1	±1.0	
Percentage, moss peat	89	±10	
Percentage, sedge peat	8	±9	
Percentage, woody peat	3	±7	

7.3 SEDGE PEATS

Poorly decomposed sedge peats (“reed–sedge peats”) are widely marketed for horticultural purposes in the United States, and may also serve some limited local uses. In comparison with moss peats, the peat pH, absorptive capacity and fibre contents are less suitable for horticultural uses. In terms of energy potential, the ash content, total carbon, and trace elements are less attractive than in the more common moss peats. The

following values are relevant, however, to considerations of how much of the peat type composition of a prospective horticultural-peat deposit can be sedge or herbaceous peat without compromising the peat’s horticultural usefulness. The following values (n = 27) are for peats with over 50% sedge composition, von Post humification levels of H1–3, and ash contents of under 25%.

Property	Mean	Standard Deviation	Range
Cation exchange capacity (meq/100 g)	165	±76	68–363
Peat pH (in H ₂ O)	5.9	±0.8	4.0–6.9
Peat pH (in CaCl ₂)	5.1	±0.9	3.2–6.2
Conductivity (µmho/cm)	58	±33	9–150
Fibre content (% fibres <0.15 mm)	54	±13	29–74
Moisture content (%)	88	±4	78–92
Dry bulk density (g/cm ³)	0.12	±0.05	0.07–0.24
Total carbon (%)	49	±4	40–55
Net heating value (cal/g)	4724	±504	3977–5951
Volatile matter (%)	70.0	±4.2	61.0–81.0
Absorptive capacity	13	±4	7–22
Ash content (%)	7.6	±3.6	2.3–17.5
Hydrogen (%)	4.9	±0.8	2.1–5.9
Nitrogen (%)	2.1	±0.4	1.3–2.7
Phosphorus (ppm)	415	±271	160–1102
Potassium (ppm)	733	±687	71–2408
Calcium (ppm)	12703	±5633	3154–22278
Arsenic (ppm)	<0.8	±1.5	<0.1–7.9
Mercury (ppm)	<0.9	±0.2	<0.01–1.00
Lead (ppm)	<11.4	±13.9	<2.0–53.0
Zinc (ppm)	<15.7	±17.3	<3.0–68.0
Manganese (ppm)	191	±396	4–1659
Humification (von Post scale)	2.9	±0.3	
Percentage, moss peat	22	±13	
Percentage, sedge peat	63	±14	
Percentage, woody peat	15	±13	

7.4 BROWN-MOSS PEATS

Although reported elsewhere in North America as being commonly produced in large quantities for horticultural purposes, brown-moss peat was encountered only sporadically in northeastern Ontario, almost always as thin strata (less than 10 cm thick) in the bottom third of the peat profile. For the purposes of this report, these fibric, unhumified lenses of brown-moss peat (usually H3) have been included with the other moss peats.

7.5 VARIABILITY RELATED TO PEAT HUMIFICATION

The Peatland Inventory Project’s field studies relied on field determination of peat humification using the von Post scale. These degrees of humification were the basis of transect profiles of humification levels, and calculations of volumes of peat in deposits. On the basis of laboratory results, the following are the characteristics of each degree of humification (von Post scale) in northeastern Ontario, reported as mean values (Table 10).

The data suggest that the range of test values associated with peat were consistently represented through the use of the von Post scale, especially in the critical H1–5 range. Greater variation occurred in the H6–8

range, due to the limited samples analyzed, and to more difficult field-determinations of those degrees of humification.

Table 10. Peat characteristics of von Post degrees of humification, northeastern Ontario.

	H1 (n=33)	H2 (n=59)	H3 (n=144)	H4 (n=232)	H5 (n=48)	H6 (n=25)	H7 (n=7)	H8 (n=2)
Ash content (%)	2.5	4.0	6.4	7.2	7.3	9.6	7.4	10.4
Net heating value (cal/g)	4309	4307	4631	4619	4620	4475	4603	4532
Dry bulk density (g/cm ³)	0.07	0.09	0.11	0.13	0.17	0.18	0.13	0.17
Volatile matter (%)	78.6	76.3	70.1	67.0	66.5	64.5	66.1	61.9
Total carbon (%)	48.7	48.7	50.2	51.4	50.7	48.5	52.7	47.0
Fiber content (%)	94.1	79.5	58.2	50.6	41.0	39.0	48.0	48.5
Cation exchange capacity (meq/100 g)	206	181	165	171	150	144	197	135
Absorptive capacity	29.1	25.6	15.3	12.6	9.8	10.3	11.3	9.7
Peat pH (H ₂ O)	4.4	4.7	5.5	5.7	5.8	5.8	5.2	6.6

7.6 SCHEMATIC PEAT PROFILES FOR MAJOR PEATLAND TYPES

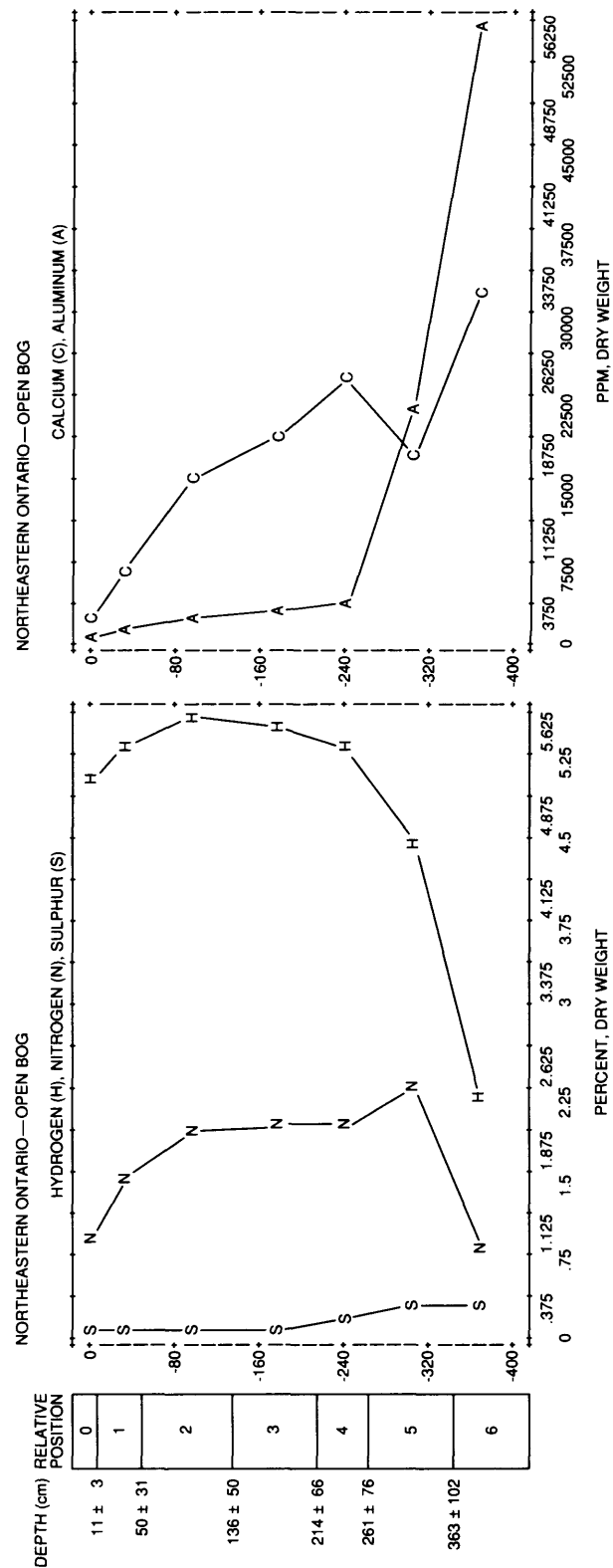
The laboratory results from the 109 peat cores from northeastern Ontario (698 physical samples; Appendix 2) document typical peat-profiles under a number of distinctive and easily recognizable peatland types:

43 profiles under open bog; 12 under treed bog; 18 under open fen and poor fen; 15 under treed fen and poor fen; 16 under conifer swamp; and 5 under thicket swamp. These data have been integrated as schematic peat-profiles under each of these types (Figure 7), to illustrate the typical peat stratigraphy found in northeastern Ontario and the stratigraphic sequestering of elements within the profiles.

Figure 7. Schematic peat profiles, northeastern Ontario.**TYPICAL PEAT PROFILE—OPEN BOG—NORTHEASTERN ONTARIO**Reported values are means, ± 1 standard deviation; n represents the number of values averaged.**Vegetation physiognomy:**

Tree cover (%)	3.1 $\pm$ 2.4	Herbaceous/graminoid cover (%)	11.2 $\pm$ 8.5
Tall-shrub cover (%)	0.0 $\pm$ 0.0	Moss cover (%)	94.2 $\pm$ 4.5
Low-shrub cover (%)	27.7 $\pm$ 12.8	Surface-water pH	4.7 $\pm$ 0.34
Depth to water table (cm)	23.6 $\pm$ 11.4		(10–15 cm below water table)

	Midpoint (cm)	Humification	% Moss	% Sedge	% Woody	% Other	pH (H ₂ O)	Cation Exchange Capacity (meq/100 g)	Conductivity (μ mho/cm)	Fibre Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry, g/cm ³)	Carbon (total %)
0															
1st Quartile	5.5	1.1 $\pm$ 0.3 n = 22	99	1	0	0	4.3	215 $\pm$ 55 n = 22	72.0 $\pm$ 43.0 n = 22	95 $\pm$ 5.7 n = 22	29.8 $\pm$ 3.7 n = 22	2.1 $\pm$.75 n = 22	4329 $\pm$ 207 n = 22	0.07 $\pm$ 0.01 n = 22	48.7 $\pm$ 2.1 n = 22
2nd Quartile	30.5	3.2 $\pm$ 1.2 n = 74	92	7	2	0	4.4	205 $\pm$ 65 n = 74	36.4 $\pm$ 27.4 n = 70	73 $\pm$ 18 n = 74	23.5 $\pm$ 9.8 n = 73	3.4 $\pm$ 1.7 n = 74	4592 $\pm$ 389 n = 71	0.09 $\pm$ 0.04 n = 73	50.7 $\pm$ 3.5 n = 74
3rd Quartile	93	4.1 $\pm$ 1.0 n = 40	86	11	3	0	5.1	195 $\pm$ 58 n = 40	33.8 $\pm$ 11.4 n = 39	53 $\pm$ 10 n = 40	13.6 $\pm$ 3.5 n = 40	4.6 $\pm$ 1.6 n = 40	4842 $\pm$ 326 n = 71	0.11 $\pm$ 0.03 n = 73	53.3 $\pm$ 8.1 n = 74
4th Quartile	175	4.1 $\pm$ 0.7 n = 42	74	20	6	0	5.5	184 $\pm$ 64 n = 42	37.8 $\pm$ 12.5 n = 41	50 $\pm$ 10 n = 41	13.3 $\pm$ 4.3 n = 40	5.5 $\pm$ 2.3 n = 42	4837 $\pm$ 283 n = 42	0.12 $\pm$ 0.04 n = 40	53.8 $\pm$ 2.2 n = 42
25–60% Ash	237.5	4.0 $\pm$ 0.8 n = 55	67	28	3	2	5.9	194 $\pm$ 74 n = 56	47.6 $\pm$ 28.4 n = 55	57 $\pm$ 13 n = 56	15.1 $\pm$ 5.3 n = 56	7.4 $\pm$ 4.0 n = 56	4619 $\pm$ 378 n = 55	0.11 $\pm$ 0.04 n = 55	51.7 $\pm$ 3.1 n = 56
> 60% Ash	312	—	—	—	—	—	6.3	127 $\pm$ 83 n = 4	145 $\pm$ 106 n = 4	63 $\pm$ 24 n = 4	8.0 $\pm$ 1.2 n = 4	27.5 $\pm$ 4.1 n = 4	3432 $\pm$ 115 n = 4	0.15 $\pm$ 0.03 n = 4	50.4 $\pm$ 5.3 n = 4
	369.5	—	—	—	—	—	6.6	166 $\pm$ 86 n = 2	135 $\pm$ 36.8 n = 2	36 $\pm$ 4.2 n = 2	—	69.8 $\pm$ 13.4 n = 4	—	—	15.1 $\pm$ 8.4 n = 4



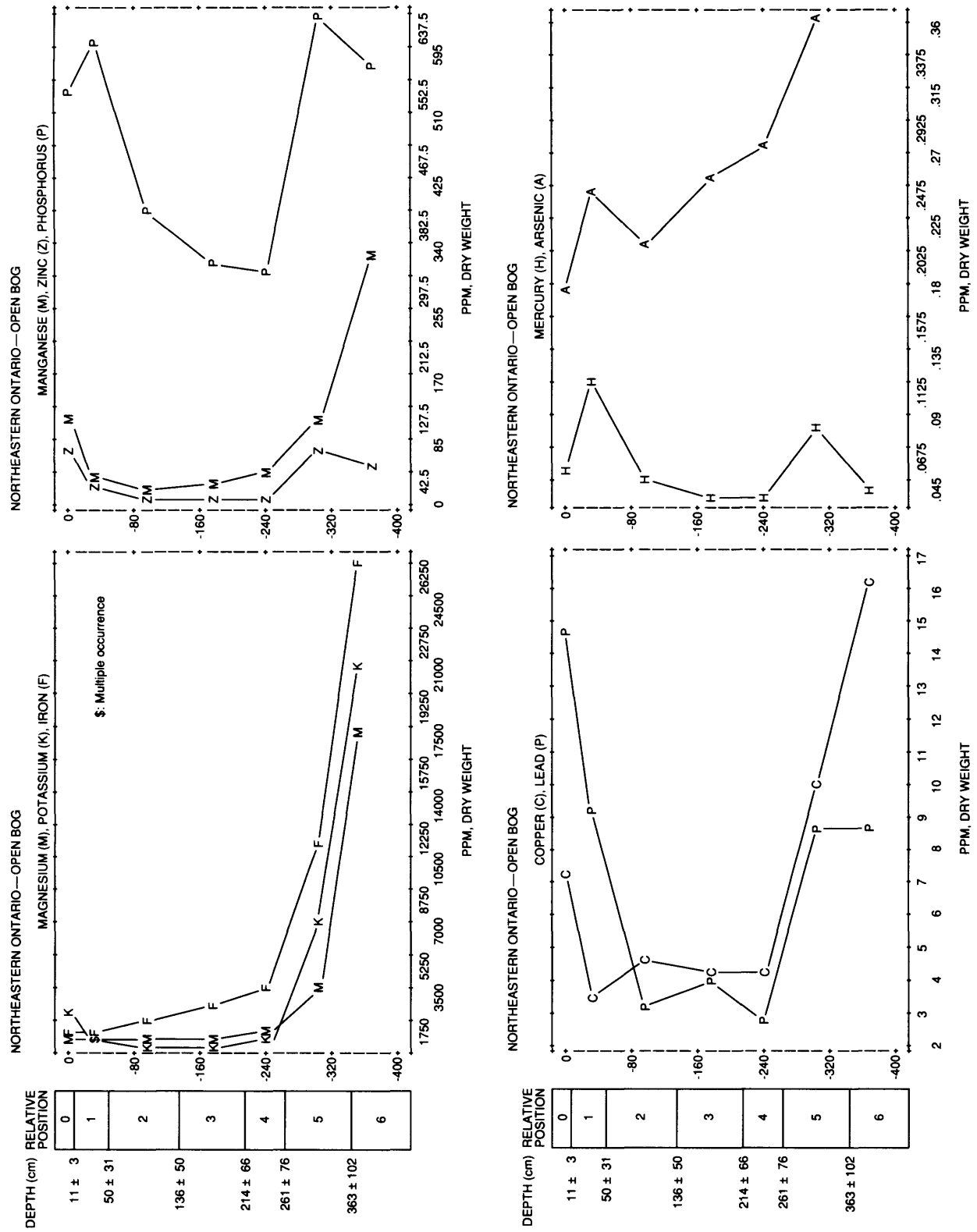


Figure 7a. Schematic peat profiles: Open Bog, northeastern Ontario.

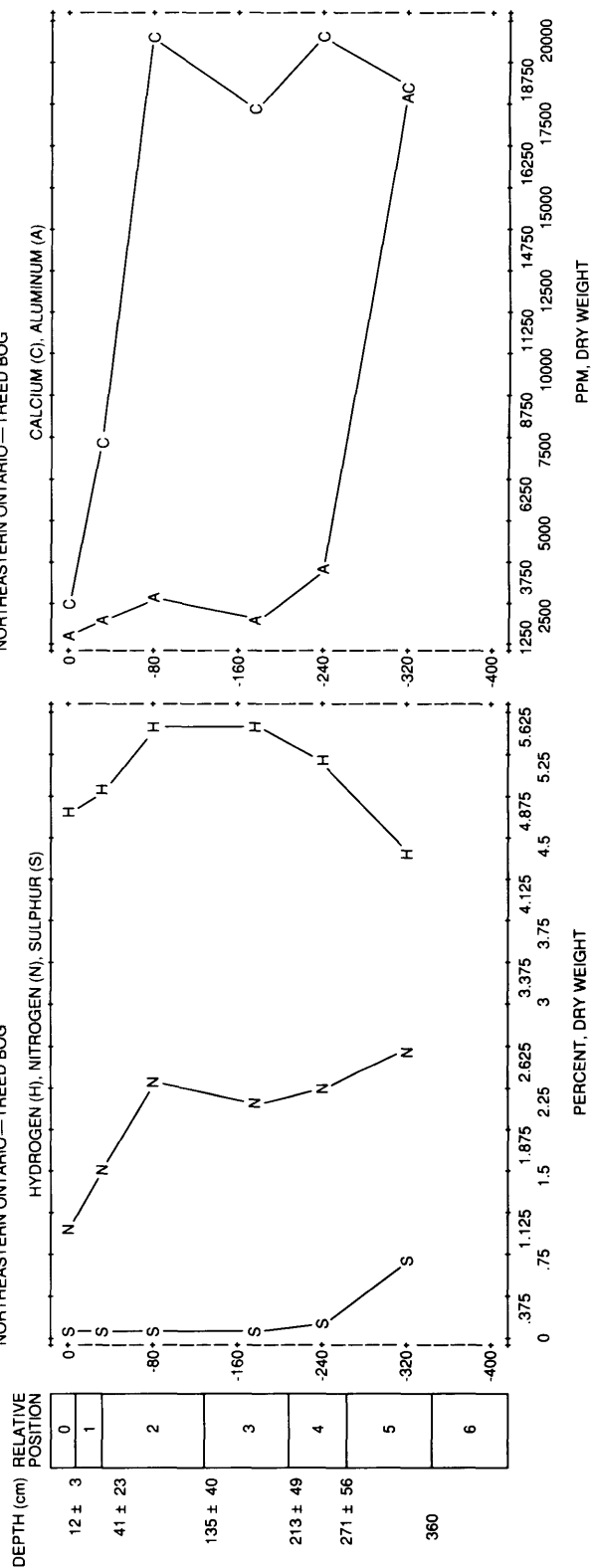
TYPICAL PEAT PROFILE—TREED BOG—NORTHEASTERN ONTARIO

Reported values are means, ± 1 standard deviation; n represents the number of values averaged.

Vegetation physiognomy: Tree cover (%) 15.0 ± 7.3 Herbaceous/graminoid cover (%) 14.6 ± 9.4
 Tall-shrub cover (%) 1.0 ± 2.8 Moss cover (%) 93.5 ± 4.1
 Low-shrub cover (%) 38.2 ± 11.3 Surface-water pH 4.5 ± 0.43
 Depth to water table (cm) 21.9 ± 8.4 (10–15 cm below water table)

	Midpoint (cm)	Humification	Estimated Peat-Type				pH (H ₂ O)	Cation Exchange Capacity (meq/100 g)	Conductivity (μmho/cm)	Fibre Content (%)	Absorbent Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry, g/cm ³)	Carbon (total %)
			% Moss	% Sedge	% Woody	% Other									
0	6	1.3 ± 0.6 n = 3	90	7	3	0	4.3	206 ± 76 n = 3	76.3 ± 18.0 n = 3	85 ± 18 n = 3	32.1 ± 2.2 n = 3	3.9 ± 2.0 n = 3	4263 ± 292 n = 3	0.07 ± 0.02 n = 3	46.4 ± 0.08 n = 3
1st Quartile	26.5	3.0 ± 1.2 n = 20	75	17	9	0	4.4	198 ± 77 n = 20	45.1 ± 46.6 n = 18	66 ± 19 n = 20	17.4 ± 6.0 n = 20	4.5 ± 3.3 n = 20	4541 ± 362 n = 20	0.11 ± 0.04 n = 20	49.4 ± 4.9 n = 20
2nd Quartile	88	3.9 ± 0.5 n = 15	61	23	17	0	5.2	188 ± 72 n = 15	35.2 ± 14.1 n = 13	52 ± 11 n = 15	13.1 ± 3.4 n = 15	5.3 ± 2.2 n = 15	4825 ± 199 n = 14	0.12 ± 0.03 n = 15	52.6 ± 3.5 n = 15
3rd Quartile	174	3.9 ± 0.8 n = 9	59	28	13	0	5.3	171 ± 56 n = 9	33.1 ± 18.3 n = 8	52 ± 14 n = 9	14.3 ± 4.9 n = 9	4.9 ± 2.3 n = 9	5013 ± 466 n = 9	0.11 ± 0.03 n = 9	52.0 ± 2.9 n = 9
4th Quartile	242	4.3 ± 1.4 n = 12	63	31	6	0	5.9	164 ± 74 n = 13	40.7 ± 11.1 n = 12	60 ± 18 n = 13	14.6 ± 4.6 n = 13	6.6 ± 2.7 n = 13	4813 ± 478 n = 13	0.11 ± 0.03 n = 13	51.2 ± 3.4 n = 13
25–60% Ash	315.5	—	—	—	—	—	6.7	85 ± 50 n = 3	164 ± 83.5 n = 3	51 ± 24 n = 3	7.0 ± .9 n = 3	36.1 ± 18.8 n = 3	3307 ± 1271 n = 3	0.19 ± 0.08 n = 3	41.2 ± 16.5 n = 3
>60% Ash	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NORTHEASTERN ONTARIO—TREED BOG



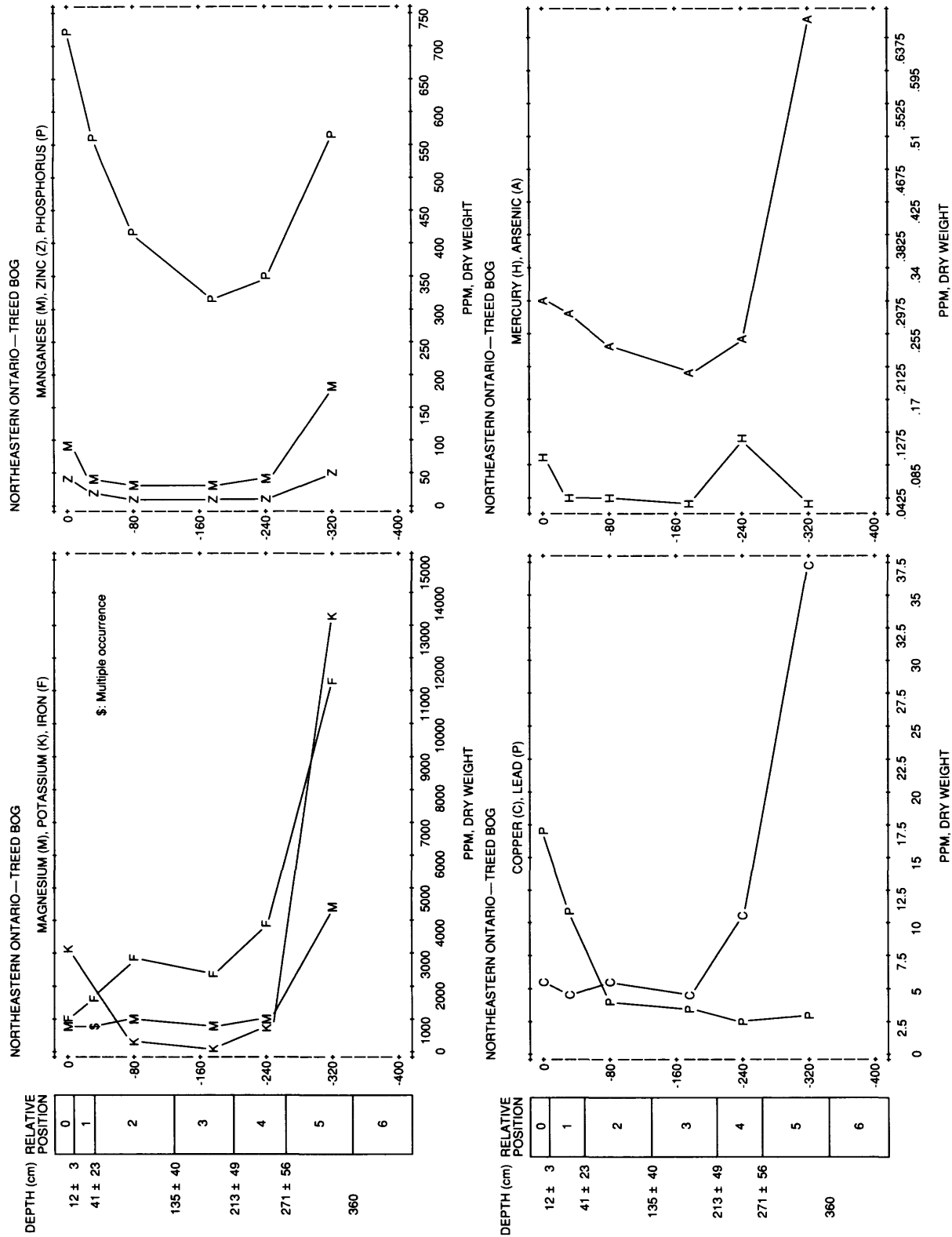


Figure 7b. Schematic peat profiles: Treed Bog, northeastern Ontario.

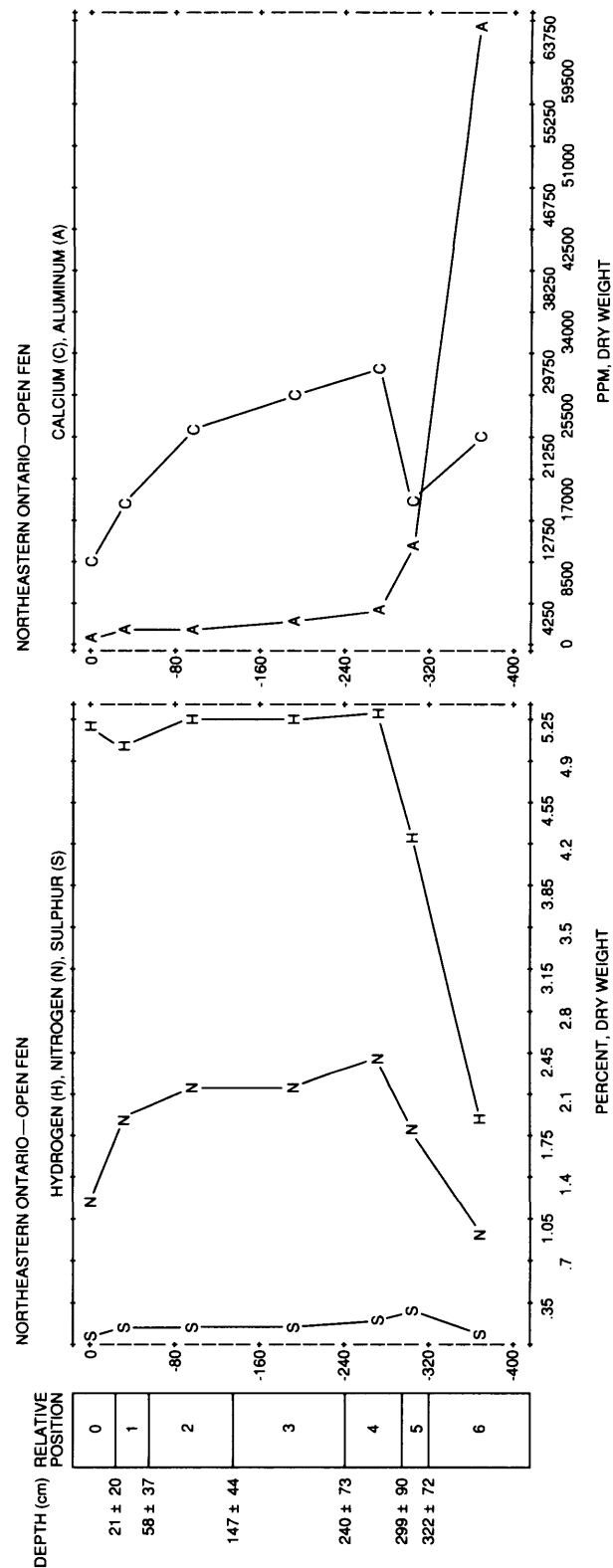
TYPICAL PEAT PROFILE—OPEN FEN—NORTHEASTERN ONTARIO

Reported values are means, ± 1 standard deviation; n represents the number of values averaged.

Vegetation physiognomy:

Tree cover (%)	3.6 $\pm$ 2.5	Herbaceous/graminoid cover (%)	19.2 $\pm$ 11.8
Tall-shrub cover (%)	2.1 $\pm$ 7.3	Moss cover (%)	79.2 $\pm$ 20.7
Low-shrub cover (%)	34.8 $\pm$ 21.3	Surface-water pH	6.0 $\pm$ 6.1
Depth to water table (cm)	22.8 $\pm$ 9.5	(10–15 cm below water table)	

	Midpoint (cm)	Humification	Estimated Peat-Type				pH (H ₂ O)	Cation Exchange Capacity (meq/100 g)	Conductivity (µmho/cm)	Fibre Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry, g/cm ³)	Carbon (total %)
			% Moss	% Sedge	% Woody	% Other									
0	10.5	1.2 ± 0.4 n = 9	96	3	1	0	4.8	172 ± 52 n = 9	97.1 ± 45.3 n = 9	85 ± 18 n = 9	26.0 ± 9.0 n = 9	3.2 ± 1.6 n = 9	4262 ± 69 n = 9	0.08 ± 0.03 n = 9	49.8 ± 2.1 n = 9
1st Quartile	39.5	3.0 ± 0.7 n = 27	63	30	7	0	5.3	136 ± 58 n = 27	52.3 ± 38.0 n = 26	58 ± 24 n = 27	16.8 ± 10.1 n = 27	5.3 ± 2.5 n = 27	4548 ± 433 n = 27	0.12 ± 0.06 n = 27	50.9 ± 2.6 n = 27
2nd Quartile	102.5	3.7 ± 0.5 n = 17	55	35	9	0	5.8	118 ± 46 n = 17	36.4 ± 12.7 n = 17	43 ± 12 n = 17	10.6 ± 3.3 n = 17	5.9 ± 3.4 n = 16	4762 ± 149 n = 17	0.14 ± 0.04 n = 17	53.1 ± 2.3 n = 17
3rd Quartile	193.5	4.1 ± 0.8 n = 16	59	34	6	0	6.1	139 ± 48 n = 16	40.3 ± 9.7 n = 16	50 ± 17 n = 16	11.4 ± 3.9 n = 16	6.9 ± 2.1 n = 16	4675 ± 213 n = 16	0.14 ± 0.06 n = 16	51.3 ± 3.0 n = 16
4th Quartile	269.5	4.1 ± 0.9 n = 24	68	22	10	0	6.1	146 ± 51 n = 24	50.0 ± 15.5 n = 24	49 ± 16 n = 24	12.5 ± 6.3 n = 24	9.3 ± 3.7 n = 24	4426 ± 216 n = 24	0.14 ± 0.07 n = 24	49.3 ± 5.0 n = 24
25–60% Ash	310.5	—	—	—	—	—	5.9	73 ± 35 n = 3	121 ± 70.0 n = 2	37 ± 14 n = 3	6.5 ± 3.5 n = 3	45.1 ± 4.4 n = 3	2642 ± 276 n = 2	0.29 ± 0.21 n = 3	30.5 ± 3.3 n = 3
>60% Ash	337	—	—	—	—	—	6.8	55 n = 1	68 n = 1	34 n = 1	2.50 n = 1	76.2 n = 1	—	0.32 n = 1	13.8 n = 1



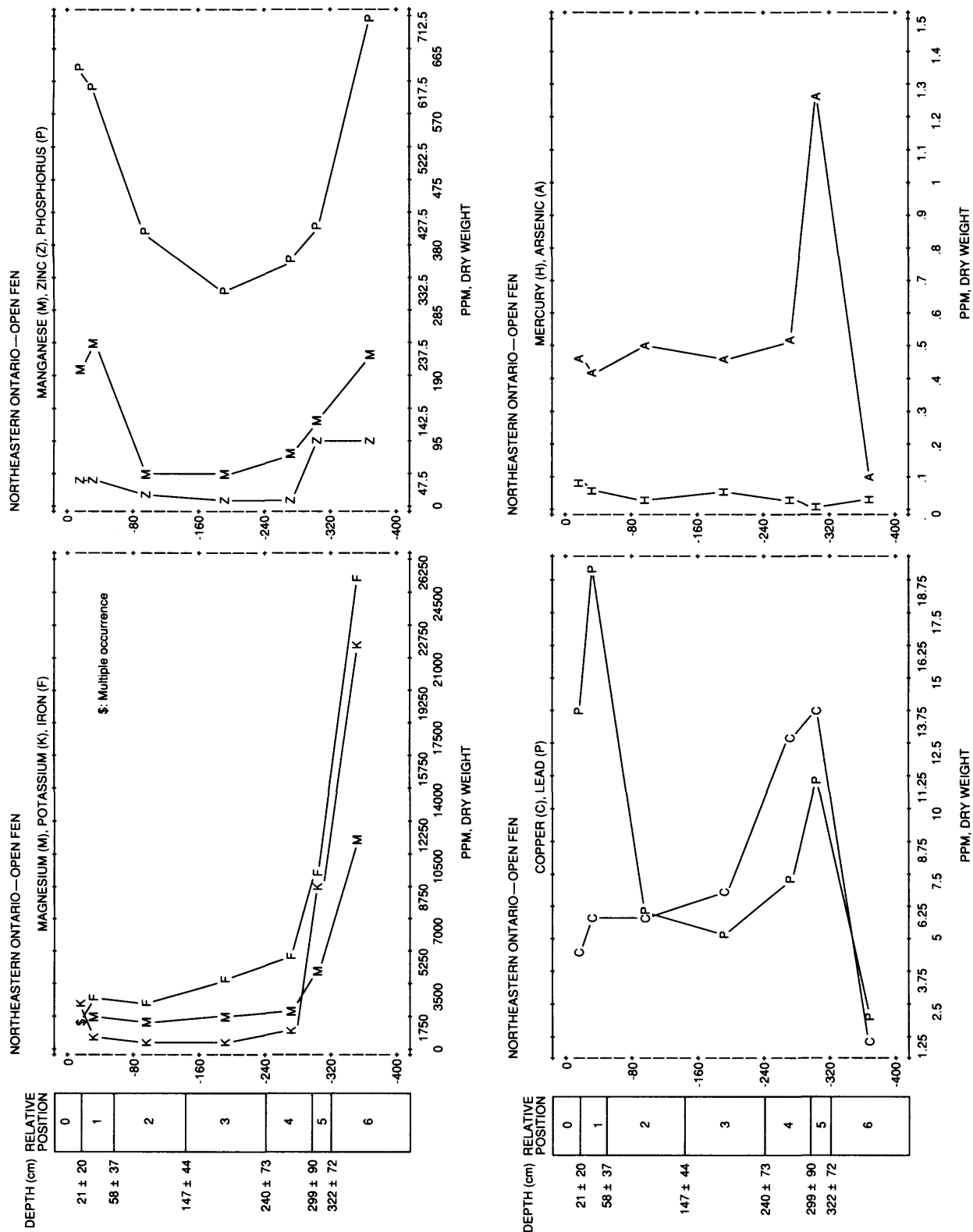


Figure 7c. Schematic peat profiles: Open Fen (including Open Poor Fen), northeastern Ontario.

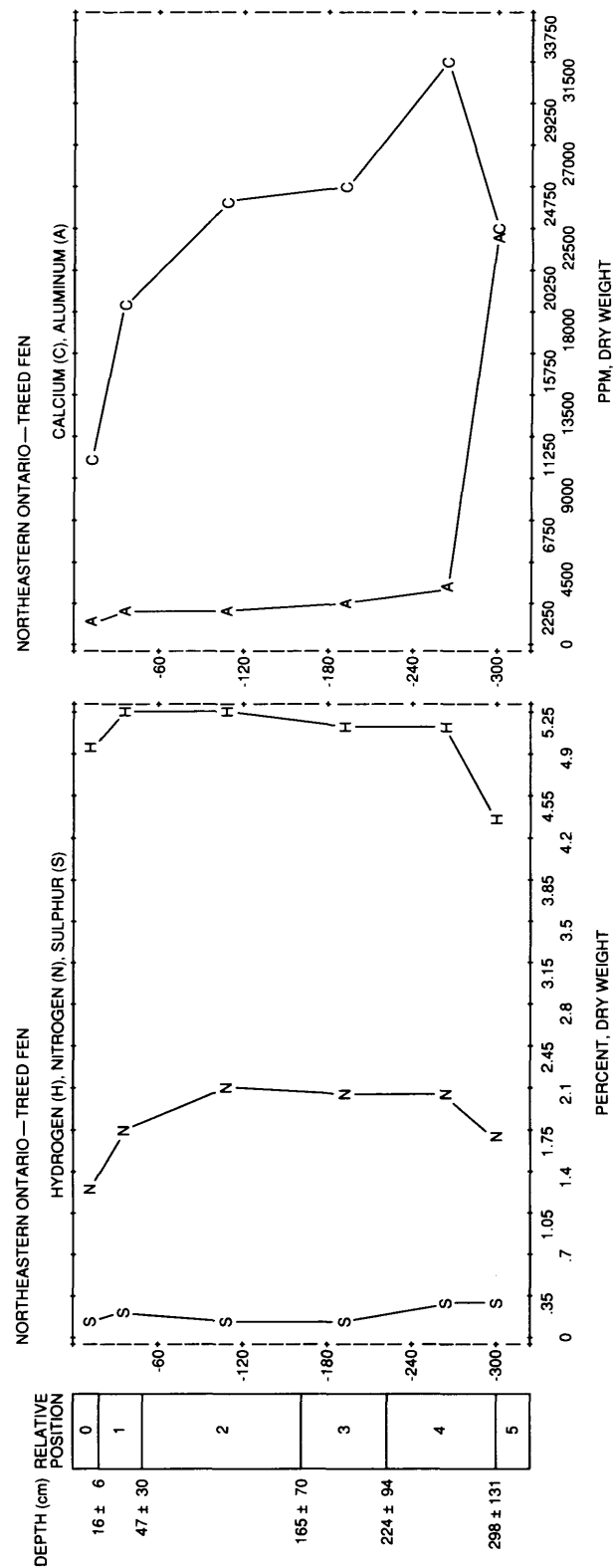
TYPICAL PEAT PROFILE—TREED FEN—NORTHEASTERN ONTARIO

Reported values are means, ± 1 standard deviation; n represents the number of values averaged.

Vegetation physiognomy:

Tree cover (%) 15.4 ± 4.4 Herbaceous/graminoid cover (%) 25.7 ± 13.0
 Tall-shrub cover (%) 0.0 ± 0.0 Moss cover (%) 95.9 ± 1.4
 Low-shrub cover (%) 29 ± 9.8 Surface-water pH 5.4 ± 3.2
 Depth to water table (cm) 21.8 ± 7.1 (10–15 cm below water table)

Midpoint (cm)	Estimated Peat-Type				pH (H ₂ O)	Cation Exchange Capacity (meq/100 g)	Conductivity (μ mho/cm)	Fibre Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry, g/cm ³)	Carbon (total %)
	Humification	% Moss	% Sedge	% Woody	% Other								
0													
1st Quartile	1.6 $\pm$.8 n = 7	91	4	4	0	4.5	134 $\pm$ 40 n = 7	87 $\pm$ 14 n = 7	24.7 $\pm$ 5.1 n = 7	3.3 $\pm$ 2.0 n = 7	4241 $\pm$ 77.2 n = 7	0.09 $\pm$ 0.03 n = 7	49.0 $\pm$ 2.0 n = 7
2nd Quartile	3.0 $\pm$.7 n = 25	64	29	8	0	5.5	116 $\pm$ 50 n = 25	48 $\pm$ 18 n = 25	12.3 $\pm$ 6.0 n = 25	5.6 $\pm$ 2.1 n = 25	4481 $\pm$ 365 n = 25	0.15 $\pm$ 0.05 n = 25	49.4 $\pm$ 4.9 n = 25
3rd Quartile	3.8 $\pm$.6 n = 15	54	34	12	0	5.7	116 $\pm$ 46 n = 15	39 $\pm$ 13 n = 15	10.0 $\pm$ 4.0 n = 15	5.9 $\pm$ 2.2 n = 15	4591 $\pm$ 296 n = 15	0.17 $\pm$ 0.06 n = 15	50.7 $\pm$ 4.2 n = 15
4th Quartile	4.1 $\pm$ 1.0 n = 15	55	36	9	0	5.9	105 $\pm$ 27 n = 15	41 $\pm$ 16 n = 15	10.2 $\pm$ 5.6 n = 15	6.8 $\pm$ 2.8 n = 15	4646 $\pm$ 260 n = 15	0.17 $\pm$ 0.08 n = 15	50.0 $\pm$ 3.6 n = 15
25–60% Ash	4.7 $\pm$ 1.0 n = 24	52	39	6	4	6.2	105 $\pm$ 36 n = 25	35 $\pm$ 16 n = 24	8.8 $\pm$ 4.4 n = 25	10.1 $\pm$ 4.7 n = 25	4344 $\pm$ 375 n = 25	0.21 $\pm$ 0.08 n = 25	47.8 $\pm$ 5.3 n = 25
> 60% Ash	4.0 n = 1	—	—	—	—	6.0	50 n = 1	33 n = 1	8.7 n = 1	45.2 n = 1	2141 $\pm$ 507 n = 2	0.18 n = 1	27.0 $\pm$ 6.2 n = 2



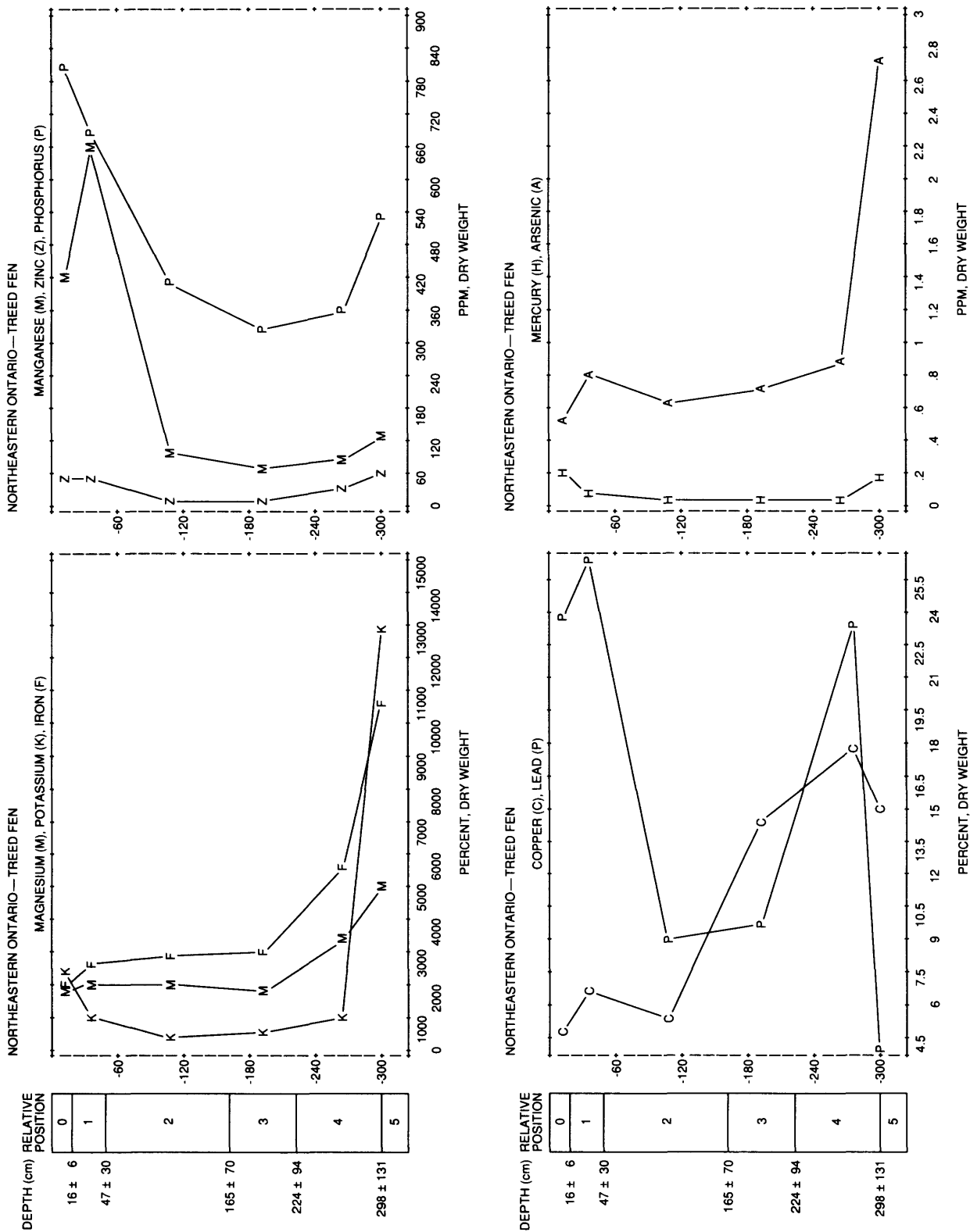


Figure 7d. Schematic peat profiles: Treed Fen (including Treed Poor Fen), northeastern Ontario.

TYPICAL PEAT PROFILE—CONIFER SWAMP—NORTHEASTERN ONTARIO

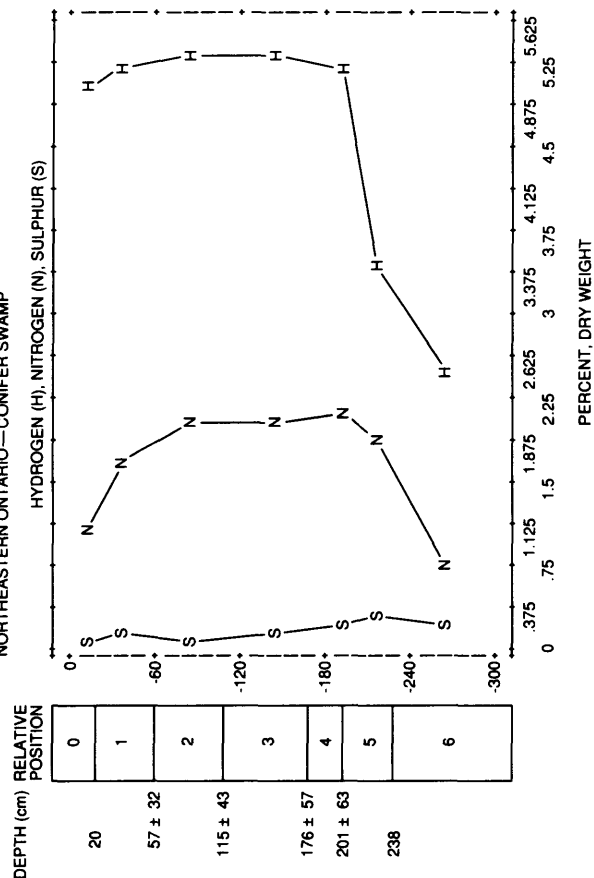
Reported values are means, ± 1 standard deviation; n represents the number of values averaged.

Vegetation physiognomy:

Tree cover (%) 53.1 ± 18.5 Herbaceous/graminoid cover (%) 22.4 ± 12.9
 Tall-shrub cover (%) 11.5 ± 15.6 Moss cover (%) 63.8 ± 20.8
 Low-shrub cover (%) 49.9 ± 32.6 Surface-water pH 5.6 ± 0.48
 Depth to water table (cm) 34.7 ± 23.4 (10–15 cm below water table)

	Midpoint (cm)	Estimated Peat-Type			pH (H ₂ O)	Cation Exchange Capacity (meq/100 g)	Conductivity (μ mho/cm)	Fibre Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry, g/cm ³)	Carbon total (%)
		Humification	% Moss	% Sedge	% Woody	% Other							
0	10	2.0 n = 1	100	0	0	0	97 n = 1	73 n = 1	21.4 n = 1	4.3 n = 1	4107 n = 1	0.13 n = 1	47.6 n = 1
1st Quartile	38.5	3.3 ± 1.0 n = 18	23	19	57	0	157 ± 49 n = 18	51 ± 12 n = 17	9.2 ± 3.4 n = 18	11.2 ± 4.3 n = 18	4290 ± 344 n = 18	0.15 ± 0.05 n = 18	47.0 ± 4.9 n = 18
2nd Quartile	86	$3.5 \pm .6$ n = 15	21	33	47	0	161 ± 88 n = 15	52 ± 16 n = 15	10.8 ± 4.4 n = 15	10.5 ± 4.6 n = 15	4292 ± 337 n = 15	0.14 ± 0.06 n = 15	48.1 ± 3.8 n = 15
3rd Quartile	145.5	3.9 ± 1.1 n = 12	30	32	38	0	170 ± 78 n = 12	52 ± 15 n = 11	11.1 ± 4.0 n = 12	10.6 ± 3.5 n = 12	4576 ± 388 n = 12	0.13 ± 0.05 n = 12	46.8 ± 3.4 n = 12
4th Quartile	188.5	4.5 ± 1.5 n = 17	10	39	29	1	196 ± 81 n = 17	46 ± 15 n = 17	10.6 ± 3.6 n = 17	12.5 ± 3.5 n = 16	4229 ± 453 n = 17	0.14 ± 0.05 n = 17	46.1 ± 3.0 n = 17
25–60% Ash	219.5	—	10	80	10	0	154 ± 50 n = 8	37 ± 7.2 n = 8	9.0 ± 2.5 n = 8	47.1 ± 11.6 n = 8	2442 ± 798 n = 8	0.16 ± 0.03 n = 8	29.3 ± 7.1 n = 8
>60% Ash	263	—	—	—	—	—	62 ± 33 n = 4	18 ± 14 n = 4	4.6 ± 1.3 n = 4	69.8 ± 7.2 n = 4	1740 ± 401 n = 3	0.33 ± 0.12 n = 4	16.4 ± 2.2 n = 4

NORTHEASTERN ONTARIO—CONIFER SWAMP



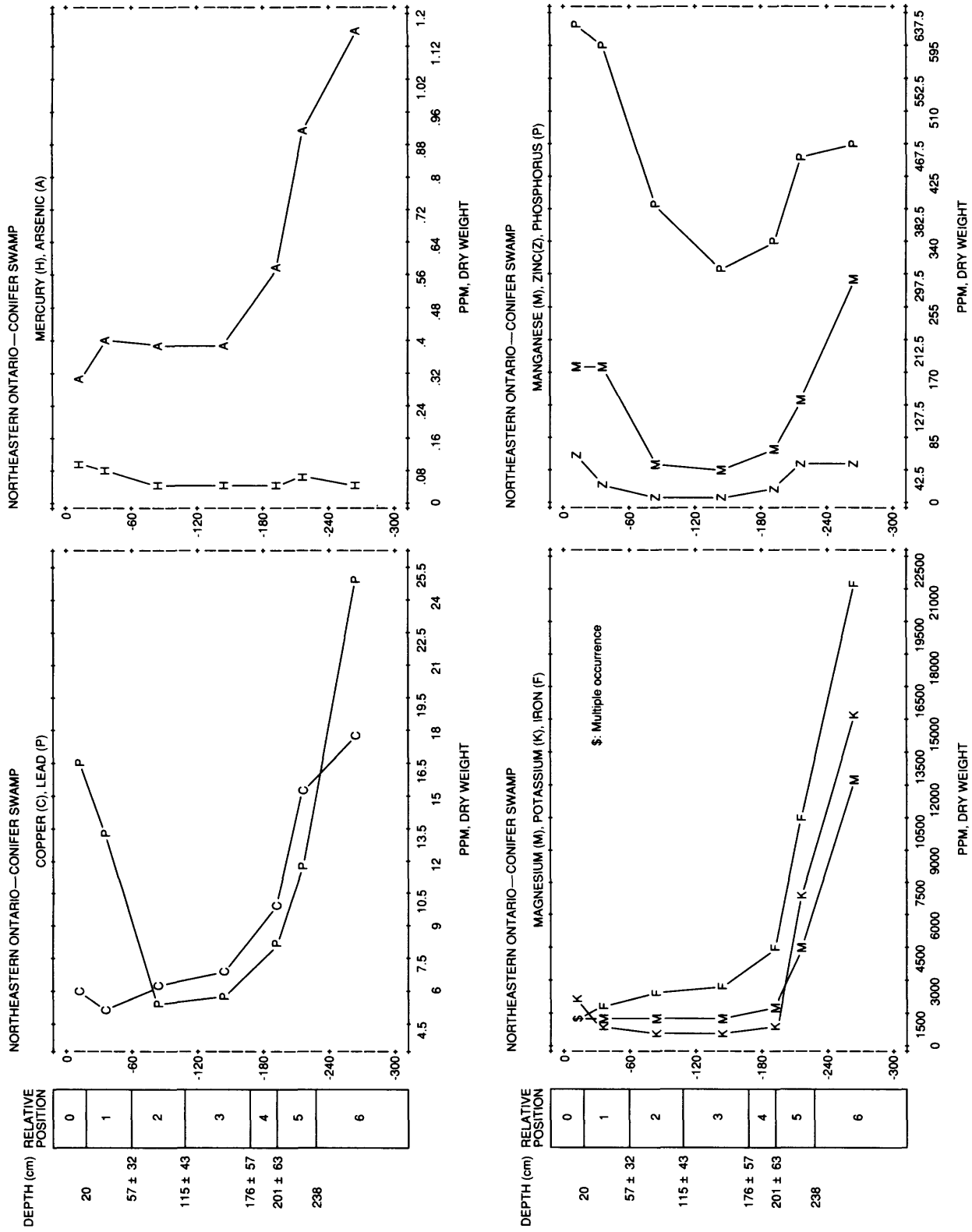


Figure 7e. Schematic peat profiles: Conifer Swamp, northeastern Ontario.

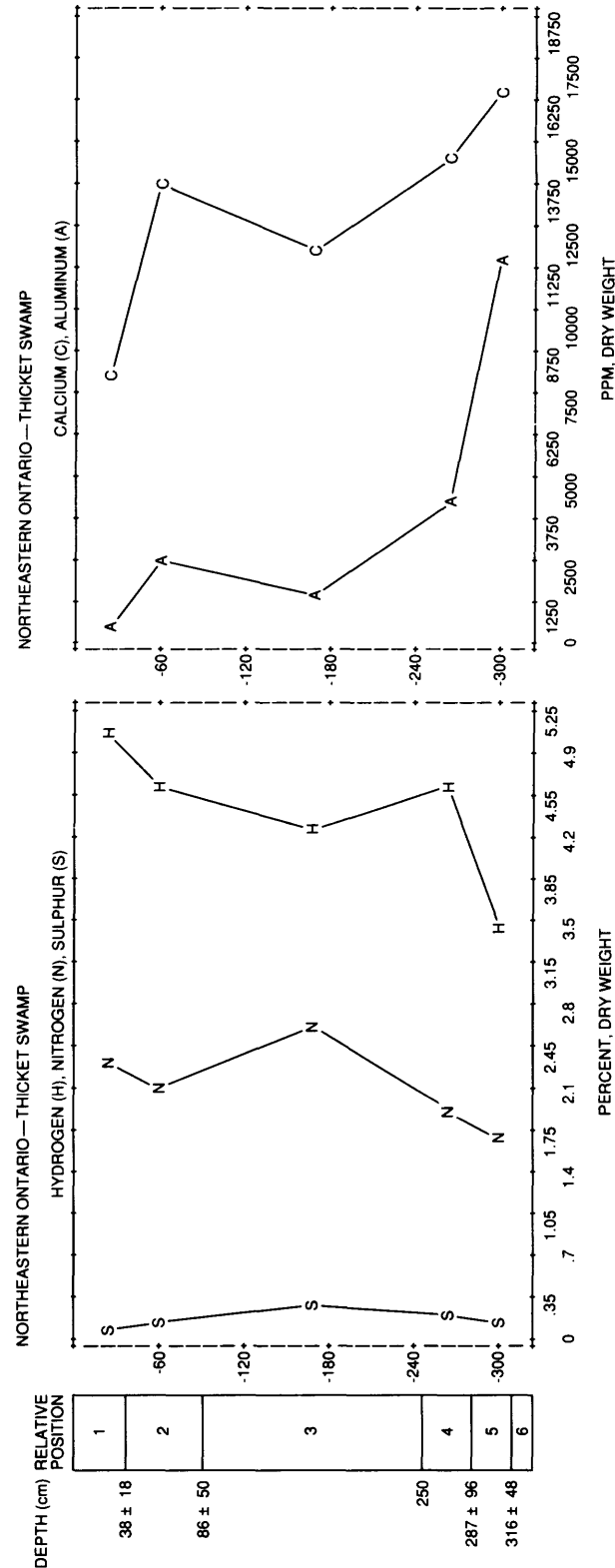
TYPICAL PEAT PROFILE—THICKET SWAMP—NORTHEASTERN ONTARIO

Reported values are means, ± 1 standard deviation; n represents the number of values averaged.

Vegetation physiognomy:

Tree cover (%) 7.8 ± 6.2 Herbaceous/graminoid cover (%) 27.5 ± 18.9
 Tall-shrub cover (%) 46.2 ± 37.3 Moss cover (%) 65.3 ± 28.7
 Low-shrub cover (%) 64.2 ± 25.9 Surface-water pH 5.5 ± 0.48
 Depth to water table (cm) 23.6 ± 11.4 (10–15 cm below water table)

	Midpoint (cm)	Estimated Peat-Type			pH (H ₂ O)	Cation Exchange Capacity (meq/100 g)	Conductivity (μ mho/cm)	Fibre Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry, g/cm ³)	Carbon (total %)
		Humification	% Moss	% Sedge	% Woody	% Other							
0													
1st Quartile	19	3.0 n = 2	15	40	45	0	5.6 n = 2	51 $\pm$ 3.5 n = 2	10.2 $\pm$.4 n = 2	6.0 $\pm$ 0.05 n = 2	4969 $\pm$ 281 n = 2	0.13 $\pm$ 0.01 n = 2	51.3 $\pm$ 1.0 n = 2
2nd Quartile	62	3.4 $\pm$.6 n = 5	32	24	44	0	6.0 n = 5	59 $\pm$ 10 n = 5	10.7 $\pm$ 3.5 n = 5	10.6 $\pm$ 6.8 n = 5	4295 $\pm$ 392 n = 5	0.12 $\pm$ 0.02 n = 5	48.7 $\pm$ 4.4 n = 5
3rd Quartile	168	3.0 n = 1	40	50	10	0	6.5 n = 1	60 n = 1	18.6 n = 1	9.0 n = 1	5143 n = 1	0.10 n = 1	49.2 n = 1
4th Quartile	268.5	3.8 $\pm$.5 n = 5	44	26	30	0	6.3 n = 5	48 $\pm$ 6.7 n = 5	10.7 $\pm$ 3.7 n = 5	16.0 $\pm$ 7.8 n = 5	3880 $\pm$ 220 n = 4	0.13 $\pm$ 0.04 n = 5	46.8 $\pm$ 5.9 n = 5
25–60% Ash	301.5	—	—	—	—	—	6.4 n = 4	36 $\pm$ 9.0 n = 4	6.8 $\pm$ 2.2 n = 4	39.0 $\pm$ 5.8 n = 4	2289 $\pm$ 327 n = 4	0.21 $\pm$ 0.07 n = 4	34.2 $\pm$ 4.4 n = 4
>60% Ash	—	—	—	—	—	—	—	—	—	—	—	—	—



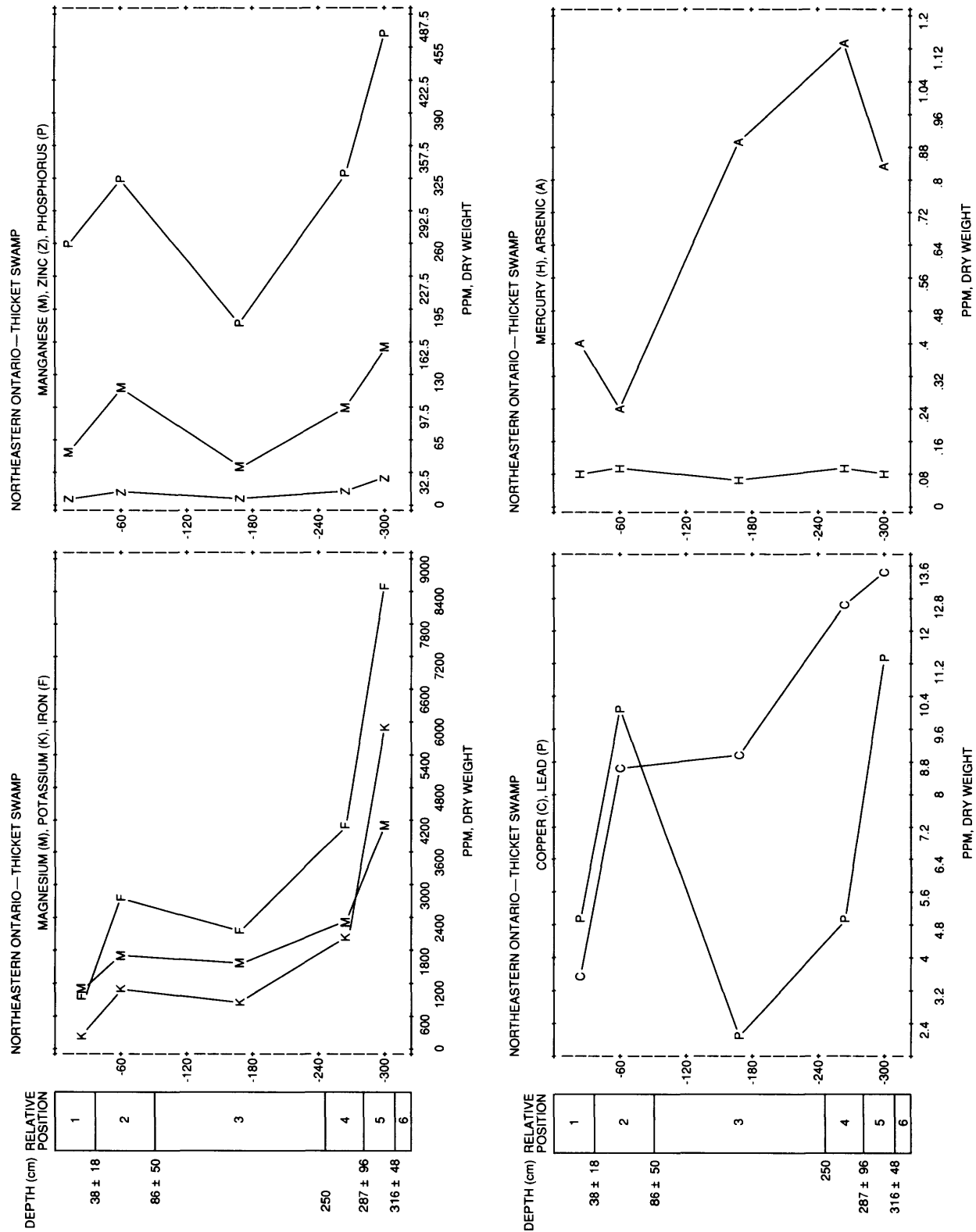


Figure 7f. Schematic peat profiles: Thicket Swamp, northeastern Ontario.

8.0 Regional Peat-Resource Evaluation

The Peatland Inventory Project was designed to quantify numerous aspects of the peat and peatland resources of northeastern Ontario. The following regional evaluation is based primarily on the extensive field studies already described, from which an overview of the region's peat volumes and peatland distribution is also drawn.

An area of 77 690 km² of northeastern Ontario was surveyed during the Peatland Inventory Project. The study areas are not characteristic of northeastern Ontario as a whole; rather, they include the highest concentrations of peatlands in northeastern Ontario south of the James Bay Lowland. These areas coincided in large part with certain geomorphological features of the region where, over the last 8000 years, extensive, largely unconfined peatlands have developed. The glacial and postglacial features of particular interest in the northeast were the extensive clay deposits of the Northern Clay Belt and Little Clay Belt, derived from deposition in proglacial Lake Barlow–Ojibway and from active glacial deposition of clay till by the Cochrane Readvance of the Late Wisconsinan glaciation.

The Clay Belts are also landscapes that are actively occupied, where peatlands are an economically significant landscape feature. Forestry on peatlands represents the major use of peatlands and the backbone of the pulp-and-paper industry in the region. Agriculture on shallow or cleared organic soils is widespread, especially in the New Liskeard area, but also throughout the Northern Clay Belt. The transportation infrastructure of the region is well developed. Within this context, the development of a peat-resource industry represents an opportunity worth consideration. Critical considerations should be the quantity and quality of the resource, the means and costs of production and transportation to local and southern markets, the marketability of peat and peat products (including energy peat) within a competitive Canadian industry, and the environmental effects of development.

The Peatland Inventory Project addressed the issues of the quantity and quality of the resource, the former by direct measurement and regional extrapolation, and the latter by evaluating the peat in the field and analyzing representative peat samples in the laboratory.

8.1 REGIONAL ESTIMATES OF PEATLAND AREAS IN NORTHEASTERN ONTARIO

Estimates of the extent of peatland types were based on an integration of the field studies with supervised Landsat imagery classification (*see* Table 6b). The figures should be viewed as estimates that can be refined through more extensive airphoto interpretation and field study, but they represent the best estimates based on the methods used (*see* Section 3.6, Remote-Sensing

and Regional Estimates of Peatland Areas and Peat Volumes; Figure 8).

The peatlands of the Hearst, Foleyet, Cochrane–Kapusksing and Timmins–Kirkland Lake study areas are, for the most part, extensive and unconfined peatlands associated both with the gently undulating, lacustrine clay plains of postglacial Lake Barlow–Ojibway, and with the flat or undulating clay–till plains (Cochrane Tills). In the south and the west, the bedrock uplands with shallow sandy till confine the peatlands to smaller, localized deposits, as do the outwash deltaic sand deposits between Iroquois Falls, Lake Abitibi and Kirkland Lake (Photo 12). All of these study areas occur at least partly in the Northern Clay Belt, and the frequency of peatlands is distinctively higher on these impermeable substrates.

The Timmins–Kirkland Lake and the Foleyet study areas include significant acreage outside the clay plains. Peatlands are estimated to occupy 16.4% of the total landscape. In the Hearst and Cochrane–Kapusksing areas, which are dominated by clay plains, 27% of these two study areas are estimated to be peatlands. There is a total of 1 479 400 ha in these four study areas. This is probably a slight underestimate, because of difficulties in classifying swamp and marsh types using Landsat imagery at a regional scale.

Conifer swamp dominates the peatland systems of northeastern Ontario, covering an estimated 58% (856 600 ha) of all peatlands. Thicket swamp, much of which is a regenerating succession following the clear-cutting of conifer swamp, is estimated to cover 11% (163 000 ha) of the total peatland area.

The bogs of the Northern Clay Belt study areas cover about 22% of all peatlands, with 5.5% open bog (80 700 ha) and the remainder with more than 10% tree cover (247 000 ha). Many of these bogs are slightly raised or domed bogs, with elevations of 1 to 2 m above the surrounding peatlands.

Fens are estimated to occur on about 6% of the total peatland area, with about 2.3% open fen (33 700 ha) and 3.7% treed fen (54 700 ha). These totals include extensive areas of “poor fen” that occur throughout the clay plains. The estimate for poor fen may be less accurate due to difficulties in field identification of this transitional type and because of similarities in Landsat spectral reflectance with peatland types.

In the Timmins–Kirkland Lake area, for which good data are available, the majority of fens are of the ‘poor fen’ variety. Although resembling bogs in terms of dominance types, numerous vascular-plant species suggesting minerotrophic influences are found at low cover values. These indicator species, and the intermediate surface-water acidity (pH 4.8 to 5.2) even in situations with peat depths more than 2 m, suggest that the very high carbonate contents of the lacustrine clays (10 to 30%) and till clays have a strong, if muted, effect on the peatland systems of the Clay Belt area.

Hardwood swamp, which was not found occurring on true peat substrates at the sites studied in the Northern Clay Belt, was estimated to occur on less than 1800 ha in the region; this estimate is tentative.

Marshes were estimated as occurring on 2.8% of the total peatland area, covering a total area of 41 800 ha. As in the case of hardwood swamp, this estimate of the area of marshes includes riparian systems, which are not always on organic substrates.

The New Liskeard area is distinct from the Northern Clay Belt in terms of the peatland types present. The New Liskeard study area included areas on both the lowland clay plain and the adjacent bedrock uplands. In the latter areas, the larger peat deposits were confined topographically by bedrock or sandy deposits, and were predominantly bogs. On the clay plain, however, the extensive and unconfined peatlands were dominated by swamp—much of which had been

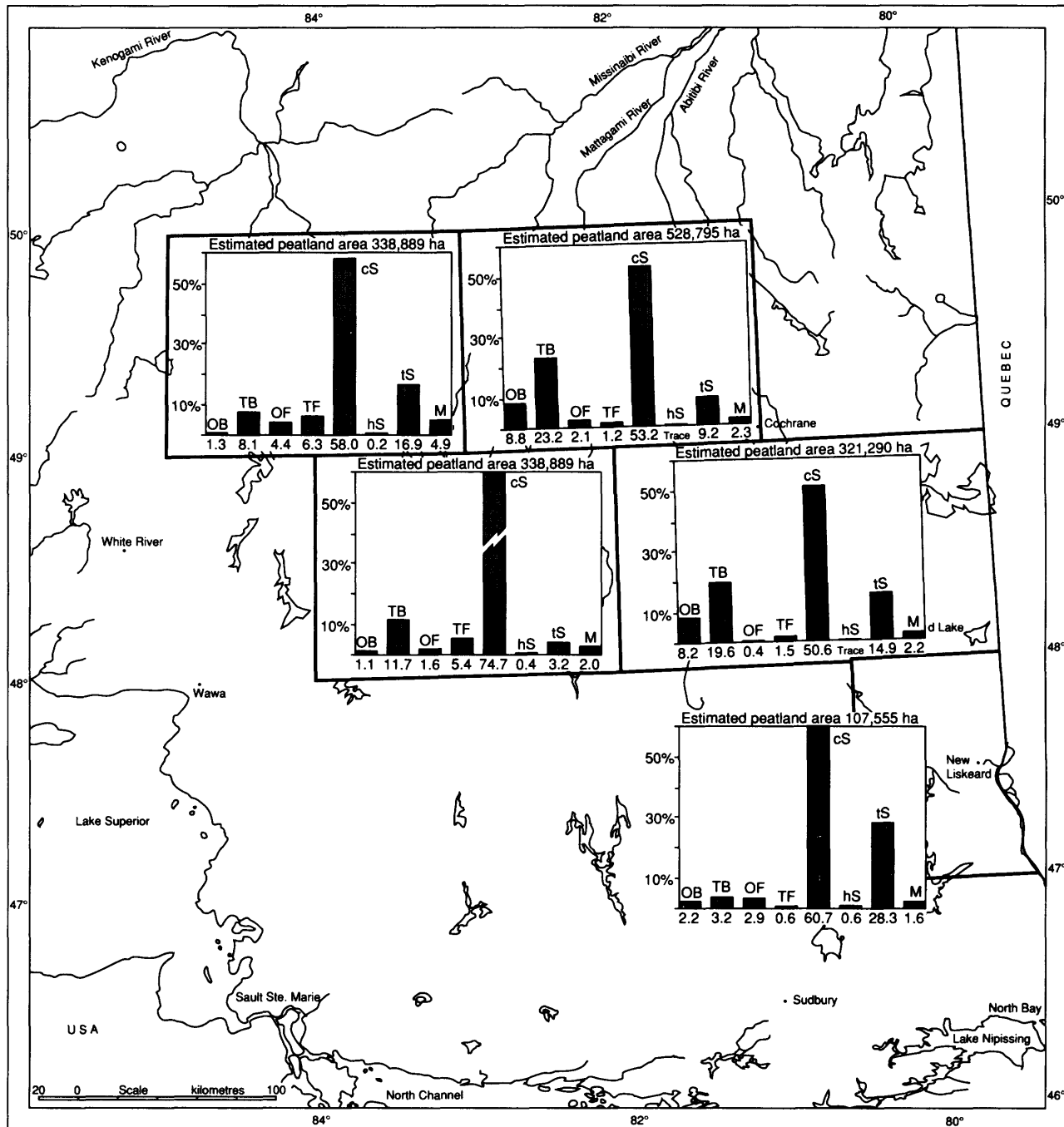


Figure 8. Estimated peatland areas in northeastern Ontario (OB—open bog; TB—treed bog; OF—open fen; TF—treed fen; cS—conifer swamp; hS—hardwood swamp; tS—thicket swamp; M—marsh).

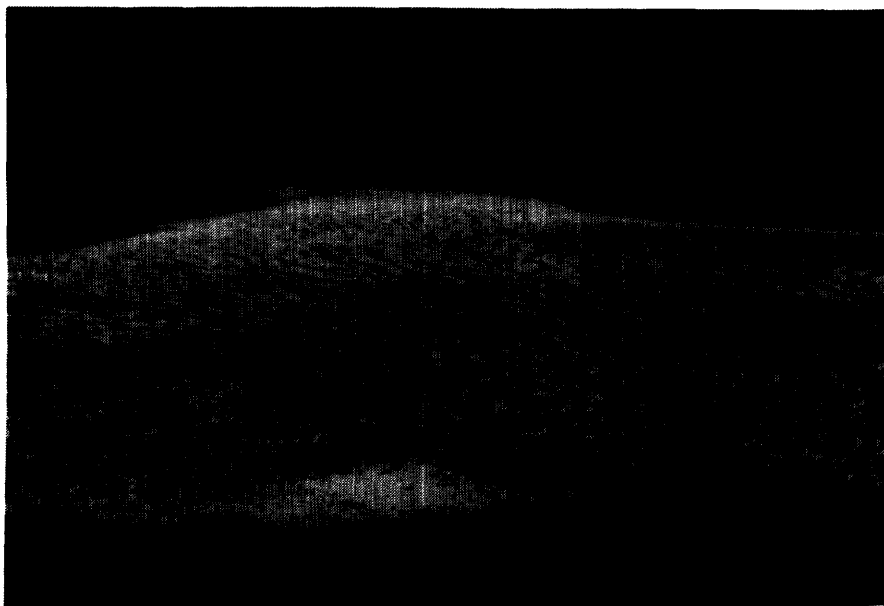


Photo 12. Open-bog peatlands occur throughout the region. On the uplands west of the Little Clay Belt in the New Liskeard study area (41P-8) and between Lake Atibiti and Kirkland Lake (32D-57), these peatlands are more topographically confined than elsewhere in the region, and occasionally occur in basins defined by sand-dune systems (41P-9, 42A-285).

burned, cut over or drained, and thus was often vegetated by immature or regenerating successional communities. The predominance of swamps, the presence of hardwood swamp communities on peatlands, and the vigour and species diversity of some of the thicket swamps and open fens regenerating to conifer swamp, all reflect more southern and nutrient-rich ecosystems. The vegetation of these peatlands reflects the warmer climatic regime of this area in comparison with the Northern Clay Belt.

In the order of frequency, the peatlands of the New Liskeard area occurred as conifer swamp (61%; 65 000 ha); thicket swamp (28%; 30 400 ha); open and treed bog (5%; 5700 ha—mostly on the bedrock uplands); open fen (3%; 3100 ha); treed fen (0.6%; 600 ha); marsh (estimated at 1.6%; 1750 ha); and hardwood swamp (0.6%; 615 ha).

8.2 PEAT RESOURCES OF NORTH-EASTERN ONTARIO

The inventory surveyed peatlands at several levels of detail, varying from detailed field surveys and laboratory analyses, and reconnaissance surveys, to regional studies based on remote-sensing techniques. As in all resource evaluations, the findings of the inventory should be considered in terms of the intensity of investigative effort.

In the course of selecting sites for survey work, peatlands of about 100 ha or more were assigned an identifying number (see Appendix 4). Many deposits were ill-defined and interconnected; but over 1500 individual peatland sites were identified in the five study areas. Of these, a number were selected for surveys, on

the basis of their proximity to transportation routes, their accessibility, the peatland types and the anticipated peat-depths.

8.2.1 Detailed Field Surveys (Probable Resources)

Of the peatland sites, 49 were surveyed at a level of detail considered appropriate for estimates of “probable” resource measurements, but short of the level necessary for actual production-planning. These 49 peatlands covered a total of 28 875 ha, and were surveyed on a grid matrix of transects laid out at 500 m intervals, sampled at every 100 m on those transects (more than 4500 individual peat cores). The data collected were plotted areally as isopach maps, elevation maps and peatland classification maps, and stratigraphically as peat-type profiles and peat humification profiles.

The total measured volume of peat *in situ* in these deposits was 517.4 million cubic metres, 62% of which was well-humified (von Post scale H4+). Within these sites, 11 570 ha were areas with peat deeper than 2 m, excluding any intervals of basal ooze or marl. These deeper portions of the sites contained the majority of the surveyed peat, 314.6 million cubic metres of *in situ* peat, with 65% being well-humified (H4+). Of the 49 sites, 25 had significant areas (i.e., larger than 150 ha in area) of peat deeper than 2 m.

In all of the northeastern Ontario areas surveyed, the proportion of bog and fen vegetation types was much higher than for the region as a whole, reflecting the survey bias towards deep peat deposits. The areas of major peatland types surveyed were as follows:

	Area	Proportion	Average Depth
Open bog	18 184 ha	30%	2.3 m
Treed bog	10 639 ha	17.5%	2.1 m
Open fen (+ poor fen)	9 253 ha	15%	2.3 m
Treed fen (+ poor fen)	9 166 ha	15%	2.1 m
Conifer swamp	8 608 ha	14%	1.5 m
Hardwood swamp	43 ha	—	1.3 m
Thicket swamp	4 154 ha	7%	1.4 m
Marsh	794 ha	1%	

(This includes reconnaissance survey sites; *see also* Tables 6a and 6d.)

Across the region, there is a very high number of peatlands; relatively few were surveyed in detail. Those that were surveyed included a tremendous variability in terms of peat resources. Many of the sites, independent of hydrological, environmental and land use considerations, have significant volumes of potential fuel-peat. Some of them are large enough or aggregated closely enough to warrant consideration in terms of large-scale operations. This is particularly the case in the Timmins–Kirkland Lake study area as a whole, in the Groundhog River area (northwest of Timmins and partly in the Foley study area), and in the northeastern sector of the Cochrane–Kapuska study area. A notable exception in this regard are the peatlands of the New Liskeard lowlands, which are too densely forested, with high stump-contents and generally shallow peat-depths.

Although the overall quantities of potential horticultural peat (i.e., H1–3 moss peats) are enormous, only a relatively few of the sites have average thicknesses of such peat more than 1 m deep over significant areas. However, given the number of peatlands surveyed in detail and the total number of peatlands in the region as a whole, a significant potential is certain. In this regard, several sites in the Timmins–Kirkland Lake study area and the New Liskeard study area appear to have potential for large-scale horticultural-peat development. Furthermore, in terms of small-scale production for local use, for nursery and tree plantations, or for mine-waste amelioration work, a larger number of these and other sites offer suitable quantity and quality of material.

8.2.2 Reconnaissance Field Surveys (Possible Resources)

An additional 79 peatlands covering 32 100 ha were surveyed at a reconnaissance level. On these sites, limited peat-coring was undertaken to evaluate the general resource potential of particular sites, and the suitability of sites for further detailed surveys at a later date. The peat volumes estimated for these sites are more approximate, and a total estimate of 664 million cubic metres of peat indicates “possible” resources. Of the peat encountered in these sites, 68% was well-humified (von Post H4+); many of these sites were very large deposits, within which significant areas deeper than 2 m are certain. The data available on these sites (Appendix 1 and Open File Reports) are of a more limited nature,

but are sufficient to direct the attention of interested individuals towards sites of interest. The level of detail is similar to that undertaken in previous Ontario peatland inventories (e.g., Graham 1979).

8.2.3 Regional Resource Estimates (Inferred Resources)

For the 77 690 km² area surveyed by the inventory in northeastern Ontario, the overall resource estimates were based on the integration of detailed field surveys and remote-sensing surveys (*see* Section 3.6, Remote-Sensing and Regional Estimates of Peatland Areas and Peat Volumes). The same peatland classification system (Appendix 3) was used for all aspects of the inventory, in order to allow the integration of different levels of investigation to infer regional peat and peatland estimates.

Across the study region, peatlands occupy at least 20.5% of the entire landscape: a total of 1 589 000 ha. Of this total area, over 58% was estimated to be conifer swamp (929 900 ha). This figure excludes the considerable areas of former conifer swamp that have been harvested by the forestry industry. Similarly, the estimated area of thicket swamp (193 500 ha; 12.2%) may be an underestimate due to difficulties in assessing the extent of successional thicket swamps on cut-over conifer swamp areas. Hardwood swamp was judged to occur on a very small area and, except in parts of the New Liskeard study area, may not occur predictably on strictly peat substrates. In order to include all major peatland and wetland types, marshes were also considered. Marshes occur on both peat and mineral substrates; the total estimated coverage was 2.7% (45 500 ha) of the total peatland area.

The focus of the regional peatland-resource inventory was on the bogs and fens of the region, which occur on the deepest peats. Approximately 83 000 ha of open bogs were estimated, with tree cover of less than 10%. Treed bogs were estimated to cover a further 250 500 ha (15.8% of all peatland). The total area for all fens was estimated at 92 000 (5.8% of peatland).

These data represent an original attempt at estimating peatland areas across northeastern Ontario. The only other comparable estimates are those calculated by Ketcheson and Jeglum (1972) on the basis of Forest Resource Inventory data. The Peatland Inventory study areas straddle two ecological sections (Clay Belt and Central Transitional); the southern is estimated to have 18% of total land area in peatland, and the northern, 50%. Ketcheson and Jeglum (1972) estimated the extent of black-spruce forest (i.e., conifer swamp) at 8% and 31% of the total land area of the same ecological sections. The Peatland Inventory Project estimates are lower overall, probably reflecting both the degree of cutting of peatland forest in the Clay Belt over the past 20 years, and also the previously mentioned possible underestimates of conifer and thicket swamps attributable to the remote-sensing methodology employed.

The only other regional peatland-area estimate has been done by Monenco Ontario Ltd. (1981). The north-eastern Ontario study areas all fall into what Monenco termed the Eastern Shield Region. Although our study areas occupy only one-quarter of this region, the inventory estimates of total peatland area are greater than those of Monenco Ontario Ltd. for the entire Eastern Shield Region (1 497 000 ha). This large difference in estimates reflects the refinement of methods used; (possibly) the restricted mapping of the extensive swamp areas of northeastern Ontario by Monenco; and the fact that the present inventory focussed on the Clay Belts, the areas of most concentrated peatland.

The average peat depths used to estimate regional peat-volumes were average depth figures derived from the sites surveyed; specifically, averages of the average peat-depths per site by major peatland type, where there were more than 3 core depths per peatland type per site (see Table 6d). These depths were multiplied by the total estimates for peatland types in each study area (see Table 7). These were then summed to indicate regional totals (Table 11).

Of the total regional volume estimate of 20 760 000 000 m³ of peat *in situ*, over half occurs as relatively shallow deposits underlying swamps. However, an estimated 425 000 ha of the total peatland area are bogs and fens, which predictably have depths averaging greater than 2 m. The volume of peat that this represents is about 8 870 000 000 m³, a volume equivalent

to about 1.6 billion tonnes of peat at 50% moisture content (MC), using a conversion factor of 1 m³ of peat *in situ* at about 90% MC = 0.18 t at 50% MC (derived from Scott et al. 1980). If 50% of this volume were exploitable fuel-peat, the energy equivalent would be 216 million tonnes or 1382 million barrels of oil (Monenco Ontario Ltd. 1981).

At least 50% of the overall total areal and volume estimate must be considered unexploitable because of factors such as the noncontinuity of many peatlands, small size, poor accessibility, land use conflicts, environmental conflicts, and, especially in the Clay Belt, poor drainability. In addition, the socioeconomic costs and benefits of development remain to be demonstrated.

However, the regional peat-resource figures and the detailed survey data provided through this resource inventory indicate a vast and almost entirely unexploited material resource. In terms of forestry, the current major peatland-resource industry, the inventory data suggest a significant potential for improving forest site conditions on marginally treed peatlands through drainage practices. In terms of peat extraction, north-eastern Ontario has exceptional quantities of peat with the necessary material characteristics for operations ranging from small-scale bulk production for local horticultural uses, through to large-scale peat-extraction operations, either for horticulture or for energy production for industry.

Table 11. Summary of estimates of peat volumes and peatland types for all study areas in northeastern Ontario.

Peatland Type	Estimated Total Area (ha) in All Study Area	Percentage of Total Peatland Area	Estimated Total Peat Volume (<i>in situ</i> , ×10 ⁶ m ³)	Percentage of Total Estimated Peat Volume
Open Bog	83 044	5.2	1 905.7	9.2
Treed Bog	250 531	15.8	4 820.3	23.2
Open Fen (& Poor Fen)	36 783	2.3	937.3	4.5
Treed Fen (& Poor Fen)	55 330	3.5	1 207.7	5.8
Conifer Swamp	923 876	58.1	9 298.9	44.8
Hardwood Swamp	2 379+	0.2	25.6+	0.1
Thicket Swamp	193 474	12.2	2 130.5	10.3
Marsh	43 532	2.7	435.4	2.1
Totals	1 588 949	100	20 761.4	100
Totals for peatland types with average depths >2 m; in this case, Bog and Fen	425 688	26.8	8 871.0	43

Appendix 1: Summary Tables for Peatlands Surveyed in Northeastern Ontario

- A. Hearst
- B. Foleyet
- C. Cochrane–Kapuskasing
- D. Timmins–Kirkland Lake
- E. New Liskeard

(See Section 3.3, Regional Summary Tables Integrating Detailed Field-Survey and Laboratory Results, for sources and context of data.)

Appendix 1A: Summary tables for peatlands surveyed in the Peterborough area.

1) Detailed survey sites.

DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP			UNHUMIFIED PEAT (H1-H3) *							
	TOTAL AREA	TOTAL VOLUME	VOLUME H4+	TOTAL AREA	TOTAL VOLUME	VOLUME H4+ PEAT	AVERAGE DEPTH	AVERAGE THICKNESS	WEIGHTED AVERAGE PEAT TYPE	WEIGHTED AVERAGE HUMIFICATION	WEIGHTED AVERAGE HEAT VALUE	WEIGHTED AVERAGE ASH CONTENT	WEIGHTED AVERAGE FIBER	WEIGHTED AVERAGE LAB PH
	(ha)	(x10 M ³)	(x10 M ³)	(ha)	(x10 M ³)	(x10 M ³)	(cm) (no. of cores)	(cm) (no. of cores)	(\$ MOSS / 10 - \$ SEDGE / 10 - \$ WOOD / 10 - \$ OTHER / 10) (no. of cores)	(von Post scale) (no. of cores)	(cal/g) (no. of sampled intervals)	(%) (no. of sampled intervals)	(CONTENT (\$)) (no. of sampled intervals)	(LAB PH) (no. of sampled intervals)
42F-11 (D3) (16 657 5516)	299	5.4	4.4	118 (11)	3.2	2.9	1302 (33)	53 (33)	6-3-1-0 (27)	3.0 (26)	4,060 (1)	6.5 (1)	33 (1)	16.4 (1)
42F-13 (D24) (16 653 5509)	143	1.6	1.0	6 (11)	0.1	<0.1	1236 (11)	56 (11)	5-4-1-0 (11)	2.7 (11)	4,443 (2)	7.7 (2)	34 (2)	15.8 (2)
42F-20 (D1) (16 652 5512)	412	4.7	2.5	67 (11)	1.7	1.1	1247 (25)	80 (25)	5-5-0-0 (25)	3.0 (25)	4,401 (2)	6.8 (1)	30 (1)	16.4 (1)
42F-29 (D2) (16 668 5514)	232	3.1	2.3	4 (11)	0.1	<0.1	1251 (7)	100 (7)	7-3-0-0 (7)	2.9 (7)	-	-	-	-
42F-46 (D6) (16 688 5475)	509	5.6	4.4	8 (11)	0.5	0.5	1236 (6)	3 (6)	7-3-0-0 (11)	3.0 (1)	-	-	-	-
42F-54 (D7A) (16 715 5472)	73	1.1	0.7	2 (11)	<0.1	<0.1	1205 (2)	45 (2)	3-5-2-0 (1)	3.0 (1)	4,180 (2)	7.6 (2)	36 (2)	16.3 (2)
42F-55 (D8) (16 717 5471)	254	6.5	4.5	195 (11)	5.5	3.8	1296 (40)	92 (40)	5-5-0-0 (40)	2.9 (40)	4,336 (1)	5.8 (1)	42 (1)	15.8 (1)
42F-56 (D7B) (16 715 5471)	92	2.1	1.6	72 (11)	1.9	1.5	1273 (22)	67 (22)	5-5-0-0 (16)	3.0 (16)	4,149 (1)	8.6 (1)	34 (1)	17.0 (1)
42G-435 (D5) (17 331 5516)	415	9.7	5.4	250 (11)	7.0	4.0	1311 (72)	113 (72)	3-7-0-0 (54)	2.9 (54)	-	-	-	-
42G-439 (D28) (17 321 5507)	241	6.8	4.5	158 (11)	6.0	4.1	1420 (56)	102 (56)	3-6-1-0 (48)	3.0 (47)	3,977 (1)	10.0 (1)	31 (1)	16.2 (1)
42G-446 (D26) (17 340 5498)	192	2.8	2.7	11 (11)	1.0	1.0	1252 (10)	27 (10)	10-0-0-0 (9)	2.6 (9)	4,123 (1)	2.3 (1)	40 (1)	14.0 (1)
42G-450 (D27) (17 338 5487)	485	12.6	10.0	326 (11)	10.3	8.5	1312 (53)	58 (53)	7-3-0-0 (53)	2.8 (53)	4,072 (1)	3.3 (1)	41 (1)	14.2 (1)
42G-456 (D29) (17 287 5478)	309	5.0	3.4	134 (11)	3.7	2.9	1289 (33)	83 (33)	8-2-0-0 (32)	2.8 (32)	4,285 (2)	2.5 (2)	33 (2)	14.0 (2)
42G-466 (D22) (17 317 5466)	155	11.2	3.2	0 (11)	-	-	-	-	-	-	-	-	-	-
42G-470 (D4) (17 744 5460)	172	4.0	3.4	119 (21)	3.4	2.9	1247 (45)	34 (45)	8-1-1-0 (40)	2.9 (40)	4,477 (2)	6.5 (2)	35 (2)	15.8 (2)
TOTAL	13,983	72.2	68.9	1,470	44.4	33.3								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

										TOTAL PEATLAND									
HUMIFIED PEAT (H4+)										PEATLAND CLASSIFICATION									
AVERAGE THICKNESS (cm)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER)	WEIGHTED AVERAGE HUMIFICATION (von Post scale)	WEIGHTED AVERAGE HEAT VALUE (cal/g)	WEIGHTED AVERAGE IASH CONTENT (%)	WEIGHTED AVERAGE LAB FIBER (no. of samples)	WEIGHTED AVERAGE LAB PH (no. of samples)	PERCENTAGE OF PEATLAND WITH <10% TREE COVER	BASAL DOZE (no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	TOTAL PEATLAND STUMP (\$)	M.N.R. ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS					
1249 (33)	6-3-1-0 (33)	4,4 (33)	4,493 (8)	7,8 (8)	30 (80)	16,0 (8)	23	0 (0/33)	TB OF TF M	107 42 140 10	2,5 (19) 1,9 (9) 2,8 (13) - (0)	0,6	HEARST/ 3E	Category B fuel peat deposit.					
1180 (11)	7-2-1-0 (11)	5,1 (11)	4,489 (5)	8,4 (5)	3 (5)	16,1 (5)	-	-	OF TF TS	60 75 8	1,7 (13) 1,6 (23) 2,3 (3)	1,0	HEARST/ 3E						
1177 (25)	5-4-1-0 (25)	4,9 (25)	4,512 (2)	8,1 (4)	33 (4)	16,6 (4)	60	10 (1/25)	OB TB OF TF TS M	10 49 138 121 55 39	2,0 (2) 1,6 (4) 1,7 (49) 1,2 (9) - (0) - (0)	0,5	HEARST/ 3E	Category B fuel peat deposit.					
1151 (7)	5-4-1-0 (7)	4,5 (7)	4,205 (4)	7,4 (4)	31 (4)	15,6 (4)	100	10 (1/7)	OB TB OF TF CS	45 - 38 120 29	1,6 (16) 1,9 (1) 2,0 (3) 1,1 (8) 1,1 (1)	0,2	HEARST/ 3E						
1233 (6)	6-3-1-0 (6)	5,4 (6)	3,782 (3)	12,5 (3)	26 (3)	16,7 (3)	0	0 (0/6)	TB TF	113 396	1,8 (9) 1,5 (25)	0,0	HEARST/ 3E						
1160 (2)	7-2-1-0 (2)	5,2 (2)	4,304 (4)	10,1 (4)	27 (4)	16,5 (4)	0	0 (0/2)	TF	73	1,7 (25)	0,8	HEARST/ 3E						
1204 (40)	4-5-1-0 (40)	4,4 (40)	4,754 (4)	6,5 (4)	30 (4)	16,1 (4)	8	-	OB TB OF TF CS	9 16 4 200 25	2,1 (3) 1,6 (7) - (0) 2,6 (47) - (0)	0,8	HEARST/ 3E	Category A fuel peat deposit.					
1206 (22)	6-3-1-0 (22)	4,6 (22)	4,563 (3)	8,0 (3)	26 (3)	16,5 (3)	5	20 (2/22)	OF TF	7 85	2,5 (4) 2,4 (20)	0,8	HEARST/ 3E	Category B fuel peat deposit.					
1198 (72)	4-5-1-0 (72)	4,3 (71)	4,662 (6)	5,1 (6)	29 (6)	15,7 (6)	11	25 (16/72)	TB OF TF	98 43 274	2,7 (28) 4,0 (4) 2,6 (57)	0,6	HEARST/ 3E	Category A fuel peat deposit.					
1318 (56)	3-6-1-0 (55)	4,4 (55)	4,612 (7)	6,1 (8)	29 (8)	16,1 (8)	5	19 (7/56)	OF TF CS TS	4 210 21 6	5,1 (1) 3,7 (62) 1,0 (1) 3,3 (1)	0,3	HEARST/ 3E	Category A fuel peat deposit.					
1225 (10)	6-3-1-0 (10)	4,7 (9)	5,026 (5)	5,6 (5)	33 (5)	15,2 (5)	100	26 (9/10)	OB OF TS M	30 95 57 10	2,4 (13) 1,3 (13) 0,8 (1) - (0)	0,2	KAPUSKASING/ 3E						
1254 (53)	4-6-0-0 (53)	4,1 (53)	4,660 (6)	5,6 (5)	28 (6)	16,0 (6)	44	18 (5/53)	OB TB OF TF	83 161 53 188	2,5 (16) 2,6 (5) 2,8 (22) 2,9 (15)	0,6	KAPUSKASING/ 3E	Category A fuel peat deposit.					
1206 (33)	5-4-1-0 (33)	4,2 (33)	4,961 (3)	3,1 (3)	30 (3)	15,0 (3)	41	28 (4/33)	TB OF TF	23 43 243	3,2 (6) 2,2 (11) 2,0 (26)	0,6	HEARST/ 3E	Category B fuel peat deposit.					
-	-	-	-	-	-	-	0	-	TF CS TS	107 21 27	0,8 (28) - (0) 0,6 (7)	0,0	HEARST/ 3E						
1213 (45)	5-4-1-0 (45)	4,0 (45)	4,390 (3)	8,3 (3)	29 (3)	16,3 (3)	0	0 (0/45)	TF	172	2,0 (67)	0,5	KAPUSKASING/ 3E	Category B fuel peat deposit.					

Appendix 1A: II) Reconnaissance survey sites.

AREA: HEARST		UNHUMIFIED PEAT (H1-H3) *						
RECONNAISSANCE STUDY SITE	TOTAL PEATLAND AREA	ESTIMATED X AVERAGE DEPTH	ESTIMATED TOTAL VOLUME	ESTIMATED VOLUME H4+	AVERAGE THICKNESS H1-H3	AVERAGE HUMIFICATION (von Post scale)	WEIGHTED AVERAGE PEAT TYPE	
(U.T.M. Grid Reference)	(ha)	(cm) (no. of cores)	(x10 M) (In situ)	(x10 M) (In situ)	(cm) (no. of cores)	(no. of cores)	(S-C-L-OTHER)	
			6 3	6 3	PEAT		(% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10)	(no. of cores)
42F-1 (R8) (16 647 5535)	329	130 (1)	4.5	1.3	30 (1)	3.0 (1)	8-1-1-0	(1)
42F-2 (R7) (16 649 5535)	97	85 (2)	0.9	0.9	5 (2)	3.0 (1)	8-1-1-0	(?)
42F-12 (R10-11) (16 661 5526)	423	118 (6)	5.0	4.7	8 (6)	3.0 (2)	8.5-1.5-0-0	(2)
42F-23 (R49,R50,R51) (16 646 5505)	530	287 (3)	15.2	13.8	27 (3)	1.0 (3)	3-7-0-0	(3)
42F-27 (R53) (16 663 5510)	404	253 (3)	10.2	9.2	26 (3)	2.8 (2)	8.5-1.5-0-0	(2)
42F-33 (R41) (16 713 5504)	140	155 (2)	2.2	1.8	25 (2)	3.0 (2)	8.5-1.5-0-0	(2)
42F-34 (R38-42) (16 716 5506)	563	365 (2)	20.6	9.6	195 (2)	2.9 (2)	3.5-6.5-0-0	(2)
42F-36 (R54,R55) (16 660 5496)	291	124 (3)	3.6	3.4	7 (3)	3.0 (1)	2-8-0-0	(1)
42G-390 (R27) (17 300 5534)	47	160 (1)	0.8	0.8	0 (1)	- -	- -	
42G-391 (R28) (17 302 5534)	78	350 (1)	2.7	1.4	170 (1)	2.6 (1)	9-1-0-0	(1)
42G-392 (R13,R14) (17 311 5538)	614	190 (1)	11.7	3.1	140 (1)	3.0 (1)	4-6-0-0	(1)
42G-393 (R15) (17 314 5541)	218	250 (1)	5.5	5.5	0 (1)	- -	- -	
42G-395 (R17,R19) (17 317 5537)	229	160 (2)	3.7	2.4	55 (2)	2.7 (1)	9-1-0-0	(1)
42G-396 (R21,R22,R23) (17 313 5533)	421	100 (3)	4.2	3.8	10 (3)	2.0 (1)	10-0-0-0	(1)

HUMIFIED PEAT (H4+)					PEATLAND CLASSIFICATION			M.N.R. ADMINISTRATIVE DISTRICT/SITE REGION
AVERAGE THICKNESS H4+ PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	
100 (1)	4.5 (1)	6-2.5-1.5-0(1)	0	A	TF cS †S	47 12 285	1.3 (1) - (0) - (0)	HEARST/3E
80 (2)	5.8 (2)	6.5-0.5-3-0(2)	11	A	OF TF †S M	12 15 51 31	- (0) - (0) 0.9 (2) - (0)	HEARST/3E
110 (6)	5.9 (6)	8-1-1-0 (6)	34	A	OB OF TF cS	118 25 270 10	1.4 (2) - (0) 1.2 (2) 1.0 (2)	HEARST/3E
260 (3)	5.1 (3)	4-6-0-0 (3)	71	A	OF TF	375 155	2.6 (1) 3.0 (2)	HEARST/3E
227 (3)	4.8 (3)	8-2-0-0 (3)	75	A	OB TB TF M	303 36 59 6	2.5 (3) - (0) - (0) - (0)	HEARST/3E
130 (2)	4.6 (2)	6-3-1-0 (2)	0	A	TF	140	1.6 (2)	HEARST/3E
170 (2)	4.2 (2)	3-7-0-0 (2)	8	A	OF TF cS †S M	43 442 52 18 8	2.8 (1) 4.5 (1) - (0) - (0) - (0)	HEARST/3E
117 (3)	4.8 (1)	5-4-1-0 (1)	25	P	OF TF cS M	73 193 22 3	0.8 (1) 1.9 (2) - (0) - (0)	HEARST/3E
160 (1)	5.8 (1)	7-1-2-0 (1)	0	P	TB TF cS	31 8 8	- (0) 1.7 (1) - (0)	HEARST/3E
180 (1)	4.0 (1)	7-1.5-1.5-0(1)	0	P	TF cS	23 55	- (0) 3.5 (1)	HEARST/3E
50 (1)	4.1 (1)	1-9-0-0 (1)	52	A	OF TF cS †S M	317 144 37 83 33	1.9 (1) - (0) - (0) - (0) - (0)	HEARST/3E
250 (1)	4.9 (1)	8-1-1-0 (1)	72	A	OF TF	157 61	- (0) 2.5 (1)	HEARST/3E
105 (2)	5.0 (2)	7.5-1-1.5-0(2)	19	A	OB OF TF †S M	44 88 80 10 7	2.0 (1) - (0) 1.2 (1) - (0) - (0)	HEARST/3E
90 (3)	4.9 (1)	7-2-1-0 (1)	7	A	OB TB OF TF cS †S M	9 188 29 95 31 55 14	1.0 (1) - (0) - (0) - (0) - (0) 0.2 (1) 1.8 (1)	HEARST/3E

Appendix 1A: II) Reconnaissance survey sites (continued).

AREA: HEARST		UNHUMIFIED PEAT (H1-H3) *						
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha)	ESTIMATED AVERAGE DEPTH (cm) (no. of cores)	ESTIMATED TOTAL VOLUME (x10 M ³) (in situ)	ESTIMATED VOLUME (x10 M ³) (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) % MOSS/10 - % SEDGE/10 - % WOOD/10 - % OTHER/10 (no. of cores)	
42G-397 (R25) (17-317 5532)	119	240 (1)	2.9	2.9	0 (1)	-	-	-
42G-399 (R26) (17 315 5529)	59	130 (1)	0.8	0.3	80 (1)	3.0 (1)	9-1-0-0	(1)
42G-405 (R23A) (17 315 5529)	414	190 (3)	7.9	5.9	47 (3)	2.5 (2)	5-5-0-0	(2)
42G-416 (R30) (17 340 5536)	286	230 (1)	6.6	4.6	70 (1)	2.4 (1)	9-1-0-0	(1)
42G-420 (R32) (17 354 5536)	270	190 (1)	5.1	4.1	40 (1)	3.0 (1)	3-7-0-0	(1)
42G-429 (R33) (17 345 5527)	404	180 (1)	7.3	6.5	20 (1)	3.0 (1)	9-1-0-0	(1)
42G-432 (R56) (17 318 5515)	374	270 (2)	10.0	8.6	40 (2)	3.0 (1)	10-0-0-0	(1)
42G-434 (R35,R37) (17 323 5516)	348	117 (3)	4.1	3.8	7 (3)	3.0 (1)	3-7-0-0	(1)
42G-434A (R36) (17 326 5516)	168	150 (1)	2.5	1.9	40 (1)	3.0 (1)	10-0-0-0	(1)
42G-438 (R40) (17 284 5501)	224	160 (1)	3.6	3.6	0 (1)	-	-	-
42G-458 (R46,R47) (17 296 5470)	565	245 (2)	13.8	11.0	50 (2)	3.0 (2)	3.5-6.5-0-0	(2)
42G-465 (R44,R45) (17 295 5463)	528	310 (1)	16.4	16.4	0 (2)	-	-	(2)
TOTAL	8,143		171	131		* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.		

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			M.N.R. ADMINISTRATIVE DISTRICT/ SITE REGION
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE [(S-C-L-OTHER) % MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH % <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	
240 (1)	4.8 (1)	4-5-1-0 (1)	37	A	OF TF cS	44 49 26	2.4 (1) - (0) - (0)	HEARST/3E
50 (1)	5.6 (1)	8-1-1-0 (1)	32	A	OF TF	19 40	1.3 (1) - (0)	HEARST/3E
143 (3)	4.3 (3)	4-6-0-0 (3)	76	P	OB TB OF TF TS M	9 4 304 91 3 3	1.7 (1) - (0) 1.5 (1) 2.4 (1) - (0) - (0)	HEARST/3E
160 (1)	5.4 (1)	7-2-1-0 (1)	67	A	OB OF TF cS TS	175 17 49 17 28	2.3 (1) - (0) - (0) - (0) - (0)	KAPUSKASING/ 3E
150 (1)	4.6 (1)	2-8-0-0 (1)	55	P	TB OF TF M	48 149 67 6	- (0) 1.9 (1) - (0) - (0)	KAPUSKASING/ 3E
160 (1)	5.0 (1)	6.5-1.5-2-0(1)	39	A	TB OF TF cS M	30 157 109 62 46	- (0) 1.8 (1) - (0) - (0) - (0)	KAPUSKASING/ 3E
230 (2)	4.7 (2)	5.5-3.5-1-0(2)	74	P	OF TF cS M	275 67 10 22	2.7 (2) - (0) - (0) - (0)	HEARST/3E
110 (3)	5.0 (3)	5-4-1-0 (3)	22	P	OF TF cS M	76 59 196 17	- (0) 1.0 (2) 1.5 (1) - (0)	HEARST/3E
110 (1)	5.5 (1)	8-1-1-0 (1)	0	A	TB cS TS	30 120 18	1.5 (1) - (0) - (0)	HEARST/3E
160 (1)	6.8 (1)	8-0-2-0 (1)	5	A	OF TF	11 213	- (0) 1.6 (1)	HEARST/3E
195 (2)	4.2 (2)	4-5-1-0 (2)	16	A	OB TB OF TF	80 20 282 183	- (0) - (0) - (0) 2.5 (2)	HEARST/3E
310 (2)	4.2 (2)	6-3-1-0 (2)	-	P	OF TF	90 438	- (0) 3.1 (2)	HEARST/3E

Appendix 1B: Summary tables for peatlands surveyed in the Foleyet area.

I) Detailed survey sites.

DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP			UNHUMIFIED PEAT (H1-H3) *							
	TOTAL AREA	TOTAL VOLUME	H4+ VOLUME	TOTAL AREA	TOTAL VOLUME	H4+ PEAT VOLUME	AVERAGE DEPTH	AVERAGE THICKNESS	WEIGHTED AVERAGE PEAT TYPE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE
	(ha)	(x10 M ³)	(x10 M ³)	(ha)	(x10 M ³)	(x10 M ³)	(cm)	(cm)	(S-C-L-OTHER)	(von Post)	(cal/g)	(%)	(CONTENT (%))	(LAB PH)
		(in situ)	(in situ)	(basins)	(in situ)	(in situ)			(% SEDGE/10 - % WOOD/10 - % OTHER/10)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)
42B-17 (17 380 5417)	766	13.9	7.4	292 (1)	7.9	3.2	287(90)	98 (90)	8-2-0-0 (90)	2.4 (90)	4,442 (4)	2.3 (4)	79 (4)	4.5(4)
42B-28 (17 407 5422)	11,269	24.1	14.0	624 (2)	16.5	10.5	280(153)	101 (153)	9-1-0-0 (152)	2.3 (152)	4,535 (4)	3.7 (4)	64 (4)	5.1(4)
42B-31 (17 415 5416)	678	12.3	6.5	293 (1)	7.2	4.0	252(58)	91 (58)	9-1-0-0 (58)	2.3 (58)	4,230 (2)	1.9 (2)	93 (2)	4.0(2)
42B-39 (17 423 5416)	11,980	35.1	16.9	910 (1)	22.9	11.2	278(174)	135 (174)	7-3-0-0 (174)	2.5 (179)	4,616 (8)	2.4 (8)	70 (8)	4.7(8)
42B-175 (17 395 5336)	605	14.5	9.9	610 (1)	12.2	8.6	290(76)	80 (76)	7-2-1-0 (76)	2.9 (76)	4,516 (13)	4.8 (13)	58 (13)	5.1(13)
42B-176 (17 400 5342)	119	2.0	1.3	18 (2)	0.6	0.4	254(11)	81 (11)	8-1-1-0 (11)	2.6 (10)	4,051 (4)	6.9 (4)	58 (4)	5.3(4)
TOTAL	5417	101.8	55.9	2747	67.3	37.9								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

TOTAL PEATLAND													
HUMIFIED PEAT (H4+)								PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm)	WEIGHTED AVERAGE PEAT TYPE	WEIGHTED HUMIFICATION	WEIGHTED AVERAGE HEAT VALUE (cal/g)	WEIGHTED AVERAGE ASH CONTENT (%)	WEIGHTED AVERAGE LAB FIBER (%)	WEIGHTED AVERAGE LAB PH	PERCENTAGE OF PEATLAND	BASAL Ooze (no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	TOTAL STUMP CONTENT (\$)	M,N,R DISTRICT/ SITE REGION
(no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10)	(von Post scale) (no. of cores)	(no. of sampled intervals)	(no. of sampled intervals)	(no. of sampled intervals)	(no. of sampled intervals)	(no. of <10% TREE COVER)	(total no. of cores)					
189 (90)	7-2-1-0 (87)	4.2 (87)	4,747 (4)	4.8 (4)	45 (4)	5.7 (4)	79	0 (0/90)	OB	115	2.3 (33)	0.4	KAPUSKASING/ SE
									TB	132	2.3 (25)		Category A fuel land
									OF	311	2.6 (78)		horticultural
									TF	5	3.2 (4)		peat deposit.
									cS	201	1.6 (13)		
									M	2	1.2 (1)		
179 (153)	7-3-0-0 (150)	4.1 (150)	4,695 (8)	5.5 (8)	41 (7)	5.8 (7)	24	27 (3/153)	OB	162	2.8 (48)	0.3	KAPUSKASING/ SE
									TB	397	2.1 (71)		Category A fuel land
									OF	19	1.6 (3)		horticultural
									TF	342	2.5 (72)		peat deposit.
									cS	349	1.8 (32)		
161 (58)	7-2-1-0 (58)	4.1 (58)	4,617 (2)	4.3 (2)	42 (2)	5.2 (2)	41	0 (0/58)	OB	13	2.0 (5)	0.5	KAPUSKASING/ SE
									TB	78	1.8 (9)		Category A fuel land
									OF	273	1.9 (38)		horticultural
									TF	188	2.2 (35)		peat deposit.
									cS	126	0.8 (3)		
143 (174)	7-3-0-0 (170)	4.2 (170)	4,690 (3)	5.8 (3)	56 (3)	5.8 (3)	60	62 (35/174)	OB	193	3.6 (42)	0.2	KAPUSKASING/ SE
									TB	364	2.7 (38)		Category A fuel land
									OF	550	2.4 (109)		horticultural
									TF	398	1.8 (50)		peat deposit.
									cS	475	1.7 (19)		
210 (76)	6-3-1-0 (76)	4.3 (76)	4,659 (9)	5.1 (9)	44 (9)	5.5 (9)	38	0 (0/76)	OF	175	2.0 (32)	0.3	CHAPLEAU/ SE
									TF	230	2.0 (71)		Category A fuel
									cS	198	2.8 (36)		peat deposit.
									M	2	- (0)		
173 (11)	7-2-1-0 (11)	4.6 (11)	4,548 (8)	5.9 (8)	42 (8)	4.9 (8)	51	13 (3/11)	OB	10	4.4 (2)	0.2	CHAPLEAU/ SE
									TB	10	2.2 (1)		
									OF	24	2.2 (2)		
									TF	25	2.7 (4)		
									cS	50	1.6 (33)		

Appendix 1B: II) Reconnaissance survey sites.

AREA: FOLEYET					UNHUMIFIED PEAT (H1+H3) *				
RECONNAISSANCE	TOTAL PEATLAND	ESTIMATED	ESTIMATED	ESTIMATED	AVERAGE	AVERAGE	WEIGHTED AVERAGE		
STUDY SITE	AREA X	AVERAGE DEPTH	TOTAL VOLUME	VOLUME H4+	THICKNESS H1+H3	HUMIFICATION (van Post scale)	PEAT TYPE (S-C-L-OTHER)		
(U ₁ T ₁ M ₁ Grid Reference)	(ha)	(cm) (no. of cores)	6 3 (x10 M) (in situ)	6 3 (x10 M) (in situ)	PEAT (cm) (no. of cores)	(no. of cores)	(% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)		
42B-15 (17 377 5421)	350	165 (6)	5.8	4.1	47 (6)	2.5 (6)	10-0-0-0 (6)		
42B-48 (17 322 5411)	335	50 (2)	1.7	0.0	50 (2)	2.0 (2)	10-0-0-0 (2)		
42B-86 (17 314 5399)	143	515 (2)	7.4	3.4	280 (2)	2.8 (2)	4.5-5.5-0-0 (2)		
42B-87 (17 317 5399)	150	445 (2)	6.7	4.7	130 (2)	2.5 (2)	8-2-0-0 (2)		
42B-91 (17 324 5390)	232	465 (2)	10.8	3.6	310 (2)	3.0 (2)	4-6-0-0 (2)		
42B-92 (17 327 5390)	205	215 (2)	4.4	3.5	45 (2)	2.9 (2)	6.5-3.5-0-0 (2)		
42B-97 (17 352 5499)	276	405 (2)	11.2	3.6	275 (2)	2.0 (2)	10-0-0-0 (2)		
42B-105 (17 374 5395)	349	160 (2)	5.6	3.7	55 (2)	2.0 (2)	10-0-0-0 (2)		
42B-159 (17 405 5343)	205	160 (2)	3.3	2.2	55 (2)	2.0 (2)	10-0-0-0 (2)		
42B-177 (17 381 5361)	11	190 (3)	0.2	0.2	0 (3)	-	-		
TOTAL	2,256		57.0	31.0	* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.				

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION					MUNICIPAL ADMINISTRATIVE DISTRICT/ SITE REGION
AVERAGE THICKNESS H4+ PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL Ooze PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)			
118 (6)	4.1 (6)	9-1-0-0 (6)	17	A	OB TF cS TS M	61 137 113 19 20	1.6 (1) 1.8 (1) 1.6 (4) - (0) - (0)	KAPUSKASING/ 3E		
- (2)	-	-	11	A	OB TB cS M	29 132 161 13	0.5 (1) 0.5 (1) - (0) - (0)	HEARST/ 3E		
235 (2)	4.0 (2)	3-7-0-0 (2)	0	A	TB cS M	81 49 13	5.2 (2) - (0) - (0)	HEARST/ 3E		
315 (2)	4.5 (2)	6-4-0-0 (2)	3	A	TB OF TF cS	67 5 30 48	4.5 (2) - (0) - (0) - (0)	HEARST/ 3E		
155 (2)	4.2 (2)	8-1-1-0 (2)	0	A	TB TF cS M	61 13 156 2	4.5 (1) - (0) 4.8 (1) - (0)	MAW/CHAPLEAU/ 3E		
170 (2)	4.4 (2)	5-5-0-0 (2)	0	A	TB TF cS M	15 11 131 48	- (0) - (0) 2.3 (1) 2.0 (1)	CHAPLEAU/ 3E		
130 (2)	7.0 (2)	10-0-0-0 (2)	20	P	OB TB TF cS	55 86 12 123	4.0 (1) 4.1 (1) - (0) - (0)	KAPUSKASING/CHAPLEAU/ 3E		
105 (2)	4.3 (2)	7-3-0-0 (2)	0	A	TB TF cS M	2 234 111 2	- (0) 5.5 (2) - (0) - (0)	CHAPLEAU/ 3E		
105 (2)	4.3 (2)	7-3-0-0 (2)	30	A	OB TB cS M	61 107 15 22	1.2 (1) 2.0 (1) - (0) - (0)	CHAPLEAU/ 3E		
190 (3)	5.1 (3)	1-0-9-0 (3)	0	A	cS	11	2.0 (3)	CHAPLEAU/ 3E		

Appendix 1C: Summary tables for peatlands surveyed in the Cochrane-Kapuskasing area.

I) Detailed survey sites.

DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										UNHUMIFIED PEAT (H1-H3) *				
	TOTAL AREA	TOTAL VOLUME	VOLUME H4+	TOTAL AREA	TOTAL VOLUME	VOLUME H4+ PEAT	AVERAGE DEPTH	AVERAGE THICKNESS	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE
	(ha)	(x10 M ³) (in situ)	(x10 M ³) (in situ)	(ha)	(x10 M ³) (in situ)	(x10 M ³) (in situ)	(cm)	(cm)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	(% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)
42H-82 (17 460 5495)	12,595	45.4	35.4	1,016 (3)	28.0	23.0	1288 (194)	48 (194)	10-0-0-0 (184)	2.5 (184)	4,438 (6)	3.7 (6)	79 (6)	4.5(6)				
42H-177 (17 460 5475)	540	7.3	5.5	106 (3)	2.6	2.1	1253 (43)	49 (43)	10-0-0-0 (43)	2.4 (43)	4,408 (4)	5.6 (4)	78 (4)	4.8(4)				
42H-209 (17 450 5458)	478	6.7	4.3	145 (2)	3.7	2.9	1265 (41)	61 (41)	9-1-0-0 (41)	2.7 (41)	4,507 (4)	4.6 (4)	76 (4)	4.6(4)				
42H-233 (17 460 5454)	294	3.7	2.8	54 (1)	1.2	1.0	1227 (22)	40 (22)	10-0-0-0 (21)	2.9 (21)	4,006 (2)	1.6 (2)	96 (2)	4.1(2)				
42H-239 (17 472 5447)	274	4.4	3.5	98 (1)	2.7	2.2	1290 (31)	54 (31)	9-1-0-0 (31)	2.9 (31)	4,187 (3)	2.2 (3)	90 (3)	4.9(3)				
42H-241 (17 474 5442)	247	2.8	2.0	51 (2)	1.4	1.1	1271 (25)	47 (25)	10-0-0-0 (24)	2.8 (24)	4,343 (3)	2.2 (3)	88 (3)	4.7(3)				
42H-280 (17 493 5434)	296	4.6	3.6	93 (1)	2.3	1.8	1254 (29)	53 (29)	8.5-0.5-1-0 (25)	2.8 (25)	4,478 (3)	3.4 (3)	84 (3)	4.6(3)				
42G-311 (17 389 5471)	494	6.0	2.9	23 (1)	0.6	0.4	1275 (14)	100 (14)	9-0.5-0.5-0 (13)	2.8 (13)	4,495 (4)	4.1 (4)	74 (4)	5.2(4)				
42G-316 (17 403 5460)	314	4.6	3.7	83 (1)	2.4	2.0	1270 (27)	48 (27)	9.5-0.5-0.5-0 (27)	3.0 (27)	4,579 (4)	2.6 (3)	81 (3)	5.8(3)				
42G-387 (17 425 5435)	490	12.7	9.2	301 (1)	10.9	8.2	1384 (70)	85 (70)	8-1-1-0 (70)	2.8 (70)	4,657 (3)	5.4 (4)	74 (4)	5.7(4)				
TOTAL	16,022	98.2	73.0	1,970	55.8	44.7	* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.											

														TOTAL PEATLAND			
								PEATLAND CLASSIFICATION									
HUMIFIED PEAT (H4+)																	
AVERAGE THICKNESS (cm)	WEIGHTED AVERAGE (PEAT TYPE)	WEIGHTED HUMIFICATION (von Post)	WEIGHTED AVERAGE (HEAT VALUE)	WEIGHTED AVERAGE (ASH CONTENT)	WEIGHTED AVERAGE (LAB FIBER)	WEIGHTED AVERAGE (LAB PH)	PERCENTAGE OF PEATLAND WITH <10% TREE COVER	BASAL AREA (cm thick)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	TOTAL PEATLAND STUMP CONTENT (\$)	M.N.R. ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS			
(no. of cores)	(\$ MOSS /10 - \$ SEDGE/10 - \$ WOOD/10 - \$ OTHER/10)	(no. of cores)	(cal/g)	(no. of samples)	(no. of samples)	(no. of samples)		(no. of cores)			(no. of cores)						
1240 (194)	8-1.5-0.5-0 (18)	4.4 (184)	4,699 (16)	6.4 (16)	63 (16)	5.5(16)	95	23 (41/194)	OB TB CS TS	1,861 723 - 8	2.5 (232) 1.8 (40) 1.0 (10) -	8.0	COCHRANE/ SE	Category A fuel peat deposit.			
1204 (43)	7-2-1-0 (42)	4.1 (42)	4,601 (6)	7.1 (4)	57 (4)	5.9(4)	>98	57 (22/43)	OB TB CS TS	251 289 - -	2.1 (69) 1.1 (31) 0.6 (4) 1.1 (1)	1.8	COCHRANE/ SE	Category B fuel peat deposit.			
1204 (41)	9-1-0-0 (40)	4.2 (40)	4,343 (3)	7.8 (6)	56 (6)	5.9(6)	86	36 (20/41)	OB TB CS TS	320 137 19 2	2.1 (65) 1.7 (16) 0.4 (6) -	2.9	COCHRANE/ SE	Category B fuel peat deposit.			
1187 (22)	9-1-0-0 (21)	4.1 (21)	4,508 (8)	6.3 (8)	54 (8)	5.0(8)	81	19 (9/22)	OB TB CS TS	176 118 - -	1.7 (40) 1.5 (16) 0.2 (3) 0.2 (3)	1.0	COCHRANE/ SE	Category B fuel peat deposit.			
1236 (31)	7-2-1-0 (31)	4.2 (31)	4,444 (9)	8.7 (8)	59 (8)	5.0(8)	96	25 (18/31)	OB TB OPF CS TS M	191 52 4 2 23 2	2.5 (37) 1.9 (60) - 1.6 (2) 0.6 (4) -	0.2	COCHRANE/ SE	Category B fuel peat deposit.			
1224 (25)	8-2-0-0 (24)	4.4 (24)	4,905 (13)	5.3 (13)	62 (13)	5.1(13)	>96	13 (6/25)	OB TB OPF CS TS M	138 70 1 26 4 8	2.3 (34) 1.4 (5) - 2.1 (2) 1.4 (2) -	1.2	COCHRANE/ SE				
1201 (29)	7.5-2-0.5-0 (29)	4.2 (29)	4,568 (11)	7.3 (11)	60 (11)	5.9(11)	19	42 (6/29)	OB TB OF CS TS	96 50 8 134 8	2.3 (19) 2.3 (10) - 1.3 (29) 1.6 (1)	2.1	COCHRANE/ SE	Category B fuel peat deposit.			
1175 (14)	9-0.5-0.5-0 (1)	4.3 (14)	4,429 (5)	7.9 (5)	55 (5)	5.9(5)	55	10 (1/14)	OB TB OPF CS TS TS	161 303 3 14 10 3	1.7 (32) 1.6 (49) - 0.7 (12) 1.2 (2) -	2.1	IKAPUSKASING/ SE				
1222 (27)	7.5-2-0.5-0 (26)	4.2 (26)	4,887 (5)	5.0 (4)	63 (4)	5.2(4)	78	36 (16/27)	OB TB CS TS	246 64 4 -	2.0 (45) 1.9 (11) - 0.6 (2)	1.1	IKAPUSKASING/ SE	Category B fuel peat deposit.			
1299 (70)	6-4-0-0 (70)	4.0 (70)	4,697 (15)	8.7 (14)	64 (14)	6.0(14)	83	13 (6/70)	OF TF CS TS	305 160 25 -	3.8 (75) 2.2 (14) 0.8 (9) 0.7 (1)	0.8	IKAPUSKASING/ SE	Category A fuel peat deposit.			

Appendix 1C: II) Reconnaissance survey sites.

AREA: COCHRANE - KAPUSKASING								
					UNHUMIFIED PEAT (H1+H3) *			
RECONNAISSANCE								
STUDY SITE	TOTAL PEATLAND	ESTIMATED	ESTIMATED	ESTIMATED	AVERAGE	AVERAGE	WEIGHTED AVERAGE	
(U.T.M. Grid	AREA	AVERAGE DEPTH	TOTAL	VOLUME	THICKNESS	HUMIFICATION	PEAT TYPE	
Reference)	(ha)	(cm) (no. of cores)	= VOLUME	H4+	H1+H3	(van Post scale)	(S-C-L-OTHER)	
			6 3	6 3	PEAT	(no. of cores)	(% MOSS /10 -	
			(x10 M)	(x10 M)	(cm) (no. of cores)		% SEDGE/10 -	
			(In situ)	(In situ)			% WOOD/10 -	
							% OTHER/10)	
							(no. of cores)	
42H-127	832	271 (12)	22,6	15,5	85 (12)	2,9 (12)	9-1-0-0 (12)	
(17 452 5491)								
42H-130	894	221 (10)	19,8	14,7	57 (10)	2,5 (10)	10-0-0-0 (10)	
(17 455 5483)								
42H-133	1,229	176 (16)	21,6	17,2	36 (16)	2,7 (16)	10-0-0-0 (16)	
(17 461 5485)								
42H-175	844	224 (8)	18,9	15,4	42 (8)	2,4 (8)	10-0-0-0 (8)	
(17 456 5477)								
42H-195	115	293 (9)	3,4	2,4	82 (9)	3,0 (9)	4-6-0-0 (9)	
(17 429 5464)								
42H-207	494	232 (7)	11,5	9,7	38 (7)	3,0 (7)	10-0-0-0 (7)	
(17 452 5463)								
42H-227	268	150 (6)	4,0	3,0	38 (6)	2,9 (6)	8-0-2-0 (6)	
(17 457 5455)								
42H-230	116	275 (6)	3,2	2,6	50 (6)	3,0 (6)	10-0-0-0 (6)	
(17 461 5443)								
42H-231	532	196 (9)	10,4	8,5	36 (9)	2,9 (9)	10-0-0-0 (9)	
(17 462 5448)								
42H-235	133	186 (7)	2,5	2,1	27 (5)	3,0 (6)	10-0-0-0 (6)	
(17 463 5452)								
42H-237	150	188 (8)	2,8	2,6	15 (8)	3,0 (8)	10-0-0-0 (8)	
(17 465 5446)								
42H-266	560	190 (9)	10,6	8,9	31 (9)	2,4 (6)	9-1-0-0 (6)	
(17 465 5432)								
42H-276	21	154 (5)	0,3	0,3	28 (5)	2,3 (5)	10-0-0-0 (5)	
(17 486 5435)								
42H-283	129	168 (6)	2,2	1,9	25 (6)	2,3 (5)	10-0-0-0 (5)	
(17 499 5430)								
42G-200	357	252 (5)	9,0	6,1	82 (5)	3,0 (5)	9,5-0-0,5-0 (5)	
(17 388 5506)								
42G-323	127	272 (6)	3,5	1,8	133 (6)	2,9 (6)	6-4-0-0 (6)	
(17 418 5470)								
42G-338	318	309 (7)	9,8	5,2	147 (6)	2,8 (6)	8-1,5-0,5-0 (6)	
(17 371 5446)								
TOTAL	7,119		156,1	117,7	* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.			

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			M.N.R. ADMINISTRATIVE DISTRICT/ SITE REGION - DISTRICT
AVERAGE THICKNESS H4+ PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS / 10 - % SEDGE / 10 - % WOOD / 10 - % OTHER / 10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	
186 (12)	4.7 (12)	8-1-1-0 (12)	76	P	OB TB OF	584 200 48	3.2 (7) 2.0 (4) 2.0 (1)	COCHRANE/ 3E
164 (10)	4.6 (10)	9-1-0-0 (10)	80	P	OB TB	711 183	2.2 (10) - (0)	COCHRANE/ 3E
140 (16)	4.1 (16)	9-0.5-0.5-0 (16)	79	P	OB TB cS	963 266 -	1.9 (14) 2.0 (4) 0.4 (1)	COCHRANE/ 3E
182 (8)	4.5 (8)	8-2-0-0 (8)	90	P	OB TB	761 83	2.3 (8) - (0)	COCHRANE/ 3E
211 (9)	4.1 (9)	4-6-0-0 (9)	17	P	OF TF	20 95	3.4 (3) 2.8 (6)	KAPUSKASING/ 3E
194 (7)	4.6 (7)	9-0-1-0 (7)	76	A	OB TB cS	374 118 2	2.2 (5) 2.2 (1) 1.9 (1)	COCHRANE/ 3E
112 (6)	4.2 (6)	9-0.5-0.5-0 (6)	15	P	OB TB cS	41 24 203	1.8 (2) - (0) 1.4 (4)	COCHRANE/ 3E
225 (6)	4.3 (6)	9-0-1-0 (6)	80	P	OB TB	93 23	2.7 (5) 3.0 (1)	COCHRANE/ 3E
160 (9)	4.0 (9)	9-1-0-0 (9)	65	P	OB TB M	345 178 9	2.0 (8) 1.4 (1) - (0)	COCHRANE/ 3E
160 (7)	4.2 (7)	9-1-0-0 (7)	56	P	OB TB cS	75 58 -	2.1 (4) 2.0 (2) - (2)	COCHRANE/ 3E
173 (8)	4.9 (8)	9-1-0-0 (8)	49	P	OB TB	74 76	2.6 (4) 1.3 (3)	COCHRANE/ 3E
159 (9)	4.8 (9)	7-2-1-0 (9)	55	P	OB TB OPF cS M	308 203 18 20 11	2.5 (5) - (0) 2.0 (1) 0.9 (3) - (0)	COCHRANE/ 3E
126 (5)	4.4 (5)	8-1-1-0 (5)	84	P	OB TB cS	18 3 -	1.9 (3) 1.8 (1) 0.4 (1)	COCHRANE/ 3E
143 (6)	4.0 (6)	6-3-1-0 (6)	65	A	OB TB cS	84 20 25	1.9 (4) 1.9 (1) 0.8 (1)	COCHRANE/ 3E
170 (5)	4.4 (5)	7-2-1-0 (5)	78	A	OF cS TS	279 33 45	3.1 (3) 1.5 (1) 1.2 (1)	KAPUSKASING/ 3E
138 (6)	4.0 (6)	5-5-0-0 (6)	18	P	TB OF TF	14 24 89	1.8 (1) 2.6 (2) 3.1 (3)	KAPUSKASING/ 3E
163 (7)	4.2 (7)	7-3-0-0 (7)	27	P	OB OF TF	11 76 231	5.7 (1) 4.1 (2) 2.0 (4)	KAPUSKASING/ 3E

Appendix 1D: Summary tables for peatland surveyed in the Timmins–Kirkland Lake area.**I) Detailed survey sites.**

DETAILED STUDY SITE (U ₂ T ₂ M ₂ Grid Reference)	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP			UNHUMIFIED PEAT (H1-H3) *							
	TOTAL AREA	VOLUME	H4+	TOTAL AREA	TOTAL VOLUME	H4+ PEAT	AVERAGE DEPTH	AVERAGE THICKNESS	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE
	(ha)	(x10 M ³)	(x10 M ³)	(ha)	(x10 M ³)	(x10 M ³)	(cm) (no. of cores)	(cm) (no. of cores)	(S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	(von Post scale) (no. of cores)	(cal/g) (no. of sampled intervals)	(%) (no. of sampled intervals)	(CONTENT (\$)) (no. of sampled intervals)	(LAB PH) (no. of sampled intervals)
42A-24 (17 475 5425)	500	14.3	6.8	360 (1)	12.5	6.2	1361 (83)	180 (83)	8-1-1-0 (83)	2.8 (76)	4,688 (8)	5.9 (7)	70 (7)	15.6 (7)
42A-42 (17 509 5418)	1,374	28.1	14.5	692 (1)	21.3	12.1	1321 (100)	138 (100)	9-1-0-0 (100)	2.8 (97)	4,874 (5)	5.1 (4)	62 (4)	15.3 (4)
42A-53 (17 542 5422)	1,216	25.6	14.3	724 (1)	19.9	13.1	1284 (145)	97 (145)	8-2-0-0 (144)	2.6 (144)	4,696 (6)	5.2 (7)	62 (7)	15.6 (7)
42A-76 (17 547 5422)	449	8.3	3.4	215 (1)	6.1	2.8	1273 (51)	154 (51)	9-1-0-0 (51)	2.7 (51)	4,708 (5)	2.1 (5)	76 (5)	14.0 (5)
42A-131 (17 513 5403)	422	7.5	5.4	188 (1)	5.5	4.5	1299 (45)	58 (45)	9-1-0-0 (41)	2.7 (41)	4,624 (2)	3.5 (2)	77 (2)	14.7 (2)
42A-133 (17 514 5407)	554	8.3	4.7	176 (2)	4.0	3.3	1262 (53)	67 (53)	9-1-0-0 (50)	2.4 (50)	4,419 (1)	4.7 (1)	98 (1)	14.8 (1)
42A-171 (17 479 5389)	1,380	24.6	15.4	621 (1)	17.8	12.8	1287 (103)	82 (103)	9-1-0-0 (96)	2.4 (96)	4,675 (2)	-	-	-
42A-203 (17 467 5308)	836	12.2	6.0	234 (1)	5.5	3.6	1236 (62)	78 (62)	9-1-0-0 (56)	2.5 (56)	4,710 (6)	6.0 (6)	71 (6)	14.8 (6)
42A-221 (17 553 5377)	605	7.7	4.8	108 (1)	2.9	2.0	1275 (31)	79 (31)	9-0-1-0 (29)	2.7 (29)	4,630 (4)	4.4 (5)	71 (5)	15.3 (5)

TOTAL PEATLAND														
HUMIFIED PEAT (H4+)							PEATLAND CLASSIFICATION							
AVERAGE THICKNESS (cm)	WEIGHTED AVERAGE PEAT TYPE	WEIGHTED AVERAGE HUMIFICATION	WEIGHTED AVERAGE HEAT VALUE (cal/g)	WEIGHTED AVERAGE ASH CONTENT (%)	WEIGHTED AVERAGE LAB FIBER	WEIGHTED AVERAGE LAB PH	PERCENTAGE OF PEATLAND WITH <10% TREE COVER	BASAL Ooze (cm thick)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	TOTAL PEATLAND STUMP CONTENT (\$)	M,N,R DISTRICT/ SITE REGION	COMMENTS
(no. of cores)	(% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10)	(von Post scale) (no. of cores)	(no. of samples) (intervals)	(no. of samples) (intervals)	(no. of samples) (intervals)	(no. of samples) (intervals)		(no. of cores)			(no. of cores)			
181 (83)	9-1-0-0 (73)	4,1 (65)	4,734 (4)	7,4 (5)	53 (5)	16,1 (5)	64	8 (3/83)	OB	35	3,7 (10)	0,4	COCHRANE/ 3E	Category A fuel peat deposit.
									TB	16	3,8 (5)			
									OPF	90	3,4 (26)			
									TPF	4	3,0 (31)			
									OF	156	3,6 (13)			
									TS	131	2,6 (6)			
									CS	40	2,4 (4)			
									TS	28	3,5 (1)			
183 (100)	8-1-1-0 (99)	4,5 (93)	4,674 (4)	5,4 (4)	57 (4)	14,9 (4)	80	17 (3/100)	OB	191	3,1 (73)	0,6	COCHRANE/ 3E	Category A fuel peat deposit.
									TB	173	1,7 (7)			
									OPF	575	2,8 (36)			
									TPF	74	1,4 (3)			
									OF	3	1,8 (4)			
									CS	162	- (0)			
									TS	139	- (0)			
									M	57	- (0)			
187 (145)	9-1-0-0 (145)	4,6 (145)	4,739 (8)	7,4 (8)	46 (8)	15,9 (8)	90	70 (26/145)	OB	565	2,7 (105)	1,0	KIRKLAND LAKE/	Category A fuel peat deposit.
									TB	218	1,6 (19)			
									OPF	330	2,5 (53)			
									TPF	41	2,4 (1)			
									OF	55	2,2 (12)			
									TS	4	0,8 (2)			
									M	3	- (0)			
119 (51)	8-2-0-0 (51)	5,3 (51)	5,063 (7)	4,3 (6)	50 (6)	14,9 (6)	87	0 (0/51)	OB	286	2,5 (59)	0,3	COCHRANE/ 3E	Category A fuel land horticultural peat deposit.
									TB	85	2,2 (2)			
									OPF	21	- (0)			
									OF	33	1,5 (8)			
									CS	9	- (0)			
									TS	13	- (0)			
									M	2	- (0)			
1241 (45)	9-1-0-0 (45)	5,0 (45)	4,812 (6)	4,8 (6)	52 (6)	15,5 (6)	83	0 (0/45)	OB	232	2,6 (50)	0,8	COCHRANE/ 3E	Category A fuel peat deposit.
									TB	35	2,1 (15)			
									OPF	97	1,4 (9)			
									TPF	3	- (0)			
									CS	11	- (0)			
									TS	41	0,9 (4)			
									M	3	- (0)			
1195 (53)	9-0,5-0,5-0 (52)	4,3 (52)	4,805 (6)	7,0 (6)	51 (6)	15,6 (6)	81	0 (0/53)	OB	216	2,3 (52)	0,1	COCHRANE/ 3E	Category A fuel peat deposit.
									TB	79	2,0 (21)			
									OPF	40	1,5 (10)			
									TPF	37	1,5 (3)			
									CS	46	0,5 (2)			
									TS	119	1,3 (5)			
									M	17	- (0)			
1205 (103)	9-0-0-0 (103)	4,7 (103)	4,930 (10)	5,3 (4)	62 (4)	15,3 (4)	93	69 (21/103)	OB	775	2,5 (137)	0,3	COCHRANE/ 3E	Category A fuel peat deposit.
									TB	241	1,2 (18)			
									OPF	51	1,5 (12)			
									TPF	10	1,5 (3)			
									CS	158	1,2 (2)			
									TS	72	0,7 (3)			
									M	73	- (0)			
1158 (62)	9-0-1-0 (62)	4,6 (62)	4,811 (4)	8,2 (4)	39 (4)	16,1 (4)	81	22 (3/62)	OB	182	2,0 (89)	0,2	TIMMINS/ 3E	Category A fuel peat deposit.
									TB	118	1,6 (20)			
									OPF	220	1,8 (20)			
									TPF	53	1,2 (4)			
									CS	141	- (0)			
									TS	118	- (0)			
									M	4	- (0)			
1196 (31)	9-1-0-0 (31)	5,5 (31)	4,823 (8)	5,1 (8)	53 (8)	15,4 (8)	98	0 (0/31)	OB	341	2,3 (51)	0,4	TIMMINS/ 3E	Category B fuel peat deposit.
									TB	49	- (0)			
									OPF	27	1,3 (1)			
									OF	6	0,8 (2)			
									CS	5	- (0)			
									TS	166	1,1 (9)			
									M	11	- (0)			

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										TOTAL PEATLAND					
										PEATLAND					
										CLASSIFICATION					
HUMIFIED PEAT (H4+)															
AVERAGE THICKNESS (cm)	WEIGHTED AVERAGE PEAT TYPE	WEIGHTED AVERAGE HUMIFICATION	WEIGHTED AVERAGE HEAT VALUE	WEIGHTED AVERAGE ASH CONTENT	WEIGHTED AVERAGE LAB FIBER	WEIGHTED AVERAGE LAB PH	PERCENTAGE OF PEATLAND WITH <10% TREE COVER	BASAL COZE (cm thick)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	TOTAL PEATLAND STUMP CONTENT (\$)	M ₄ N ₄ R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS	
(no. of cores)	(% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10)	(von Post scale)	(cal/g)	(%)	(CONTENT (%))	(OF PEAT)	(AREA WITH COORE / total no. of cores)				(no. of cores)				
						</									

Appendix 1D: II) Reconnaissance survey sites.

AREA: TIMMINS KIRKLAND LAKE								
UNHUMIFIED PEAT (H1-H3) *								
RECONNAISSANCE STUDY SITE	TOTAL PEATLAND AREA	X ESTIMATED AVERAGE DEPTH	= ESTIMATED TOTAL VOLUME	ESTIMATED VOLUME H4+	AVERAGE THICKNESS H1-H3 PEAT	AVERAGE HUMIFICATION (van Post scale)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER)	
(U, T, M, Grid Reference)	(ha)	(cm) (no. of cores)	(x10 M) (In situ)	(x10 M) (In situ)	(cm) (no. of cores)	(no. of cores)	(% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	
42A-15 (17 441 5471)	669	106 (4)	7.1	4.6	38 (4)	2.7 (3)	9-1-0-0 (3)	
42A-19 (17 461 5422)	901	272 (9)	24.5	15.4	101 (9)	2.8 (9)	9-1-0-0 (9)	
42A-25 (17 477 5424)	813	260 (10)	21.1	13.8	90 (10)	3.0 (10)	9-1-0-0 (10)	
42A-40 (17 503 5423)	319	116 (9)	3.7	2.5	38 (9)	2.3 (8)	8-2-0-0 (8)	
42A-41 (17 508 5423)	1,398	231 (22)	32.3	21.5	77 (22)	2.4 (20)	9-1-0-0 (20)	
42A-58 (17 529 5430)	295	167 (7)	4.9	4.0	31 (7)	2.6 (7)	10-0-0-0 (7)	
42A-59 (17 529 5421)	347	191 (8)	6.6	4.3	69 (8)	3.0 (8)	10-0-0-0 (8)	
42A-96 (17 448 5401)	1,477	179 (20)	26.4	18.9	51 (20)	2.2 (20)	9-1-0-0 (20)	

HUMIFIED PEAT (H4+)					PEATLAND CLASSIFICATION			M.N.R. ADMINISTRATIVE DISTRICT/SITE REGION
AVERAGE THICKNESS H4+ PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS/10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	
68 (4)	4.5 (4)	9-1-0-0 (4)	57	A	OB TB OF cS TS M	376 147 7 103 35 1	1.4 (4) - (0) - (0) - (0) - (0) - (0)	COCHRANE/ 3E
171 (9)	4.9 (9)	9-1-0-0 (9)	36	P	OB TB OPF TPF OF cS TS M	291 357 29 1 2 167 23 31	2.8 (6) 2.5 (3) - (0) - (0) - (0) - (0) - (0) - (0)	COCHRANE/ 3E
170 (10)	4.0 (10)	8-1-1-0 (10)	99	A	OB TB OPF TPF OF cS TS M	372 200 98 10 11 39 70 13	2.8 (7) - (0) 2.2 (3) - (0) - (0) - (0) - (0) - (0)	COCHRANE/ 3E
78 (9)	4.6 (9)	10-0-0-0 (9)	62	A	OB TB cS TS M	199 97 7 10 6	1.2 (9) - (0) - (0) - (0) - (0)	COCHRANE/ 3E
154 (22)	4.7 (22)	9-1-0-0 (22)	78	P	OB TB OPF TPF OF cS TS M	860 217 212 9 10 21 9 60	2.4 (14) - (0) 2.3 (7) - (0) 2.2 (1) - (0) - (0) - (0)	COCHRANE/ 3E
136 (7)	4.3 (7)	8-1-1-0 (7)	32	A	OB TB OPF cS TS M	75 160 19 26 13 2	1.7 (4) 1.7 (3) - (0) - (0) - (0) - (0)	COCHRANE/ 3E
123 (8)	4.5 (8)	9-1-0-0 (8)	51	P	OB TB cS TS M	177 104 52 4 10	1.9 (8) - (0) - (0) - (0) - (0)	COCHRANE/ 3E
128 (20)	4.7 (19)	9-1-0-0 (19)	64	A	OB TB OPF TPF cS TS M	730 476 213 10 26 4 18	1.9 (16) 1.6 (1) 1.8 (2) - (0) 0.9 (1) - (0) - (0)	TIMMINS/ 3E

Appendix 1D: Reconnaissance survey sites (continued).

AREA: TIMMINS KIRKLAND LAKE								
						UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE	TOTAL PEATLAND	ESTIMATED	ESTIMATED	ESTIMATED	AVERAGE	AVERAGE	WEIGHTED AVERAGE	
STUDY SITE	AREA	X AVERAGE DEPTH	TOTAL	VOLUME	THICKNESS	HUMIFICATION	PEAT TYPE	
(U.T.M. Grid	(ha)	(cm) (no.	= VOLUME	H4+	H1-H3	(van Post scale)	(S-C-L-OTHER)	
Reference)		of cores)	6 3	6 3	PEAT	(no. of cores)	(% MOSS /10 -	
			(x10 M)	(x10 M)	(cm) (no.		% SEDGE/10 -	
			(in situ)	(in situ)	of cores)		% WOOD/10 -	
							% OTHER/10)	
							(no. of cores)	
42A-102	1,145	177 (20)	20.3	12.5	68 (20)	2.5 (18)	9-1-0-0 (18)	
(17 469 5407)								
42A-123	720	184 (10)	13.2	8.4	67 (10)	2.5 (10)	8.5-1.5-0-0 (10)	
(17 492 5404)								
42A-127	445	427 (7)	19.0	8.5	236 (7)	2.9 (7)	8.5-1.5-0-0 (7)	
(17 595 5401)								
42A-136	279	362 (7)	10.1	9.7	16 (7)	2.8 (4)	9-1-0-0 (4)	
(17 527 5412)								
42A-172	2,422	171 (26)	41.4	23.5	74 (26)	2.6 (24)	9-1-0-0 (24)	
(17 486 5393)								
42A-175	1,028	157 (21)	16.1	7.9	80 (21)	2.7 (21)	9-1-0-0 (21)	
(17 493 5392)								
42A-257	118	143 (7)	1.7	1.3	27 (7)	2.3 (6)	9-1-0-0 (6)	
(17 456 5355)								
42A-296	96	70 (8)	0.7	0.6	9 (8)	2.8 (4)	10-0-0-0 (4)	
(17 551 5318)								
32D-47	176	150 (6)	2.6	1.6	60 (6)	2.7 (5)	9-1-0-0 (5)	
(17 575 5375)								
32D-99	175	142 (6)	2.5	1.8	40 (6)	2.3 (6)	9-1-0-0 (6)	
(17 579 5361)								
TOTAL	12,822		254.1	160.6				

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION				MUN. ADMINISTRATIVE DISTRICT/ SITE REGION
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) 1(% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND WITH % TREE COVER	BASAL Ooze PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)		
121 (18)	4.8 (18)	9-0-1-0 (18)	38	P	OB TB OPF TPF OF TF cS tS	199 369 231 143 6 57 119 21	1.7 (13) 1.5 (4) 2.4 (3) - (0) - (0) - (0) - (0) - (0)	TIMMINS/ 3E	
117 (10)	5.2 (10)	9-0-1-0 (10)	30	A	OB TB OPF TPF cS tS	96 147 115 29 155 178	2.1 (3) 1.7 (3) 1.7 (4) - (0) - (0) - (0)	TIMMINS/ 3E	
191 (7)	4.7 (7)	8-1-1-0 (7)	47	A	OB TB OPF TPF cS M	205 190 5 3 24 18	4.3 (7) - (0) - (0) - (0) - (0) - (0)	COCHRANE/ 3E	
346 (7)	5.5 (7)	10-0-0-0 (7)	28	A	OB TB cS tS M	77 144 48 6 4	3.6 (5) 3.6 (2) - (0) - (0) - (0)	COCHRANE/ 3E	
105 (24)	4.8 (24)	10-0-0-0 (24)	64	A	OB TB OPF TPF cS tS	983 666 565 33 170 5	1.9 (22) 0.9 (3) 1.2 (1) - (0) - (0) - (0)	TIMMINS/ 3E	
77 (21)	4.3 (17)	9-0-1-0 (17)	20	P	OB TB OPF TPF OF TF cS tS M	148 41 360 50 36 311 40 14 28	1.7 (6) 2.5 (1) 1.6 (6) - (0) 1.5 (3) 1.3 (3) - (0) 1.2 (2) - (0)	TIMMINS/ 3E	
116 (7)	5.1 (7)	9-1-0-0 (7)	66	A	OB TB OPF TPF	67 20 11 20	1.6 (5) 0.9 (1) 1.1 (1) - (0)	TIMMINS/ 3E	
61 (8)	6.1 (8)	10-0-0-0 (8)	81	A	OB TB cS	77 15 4	0.7 (8) - (0) - (0)	KIRKLAND LAKE/ 3E	
90 (5)	6.0 (5)	8-2-0-0 (5)	44	A	OB TB cS tS	77 37 43 19	1.4 (4) 1.4 (2) - (0) - (0)	KIRKLAND LAKE/ 3E	
102 (6)	5.4 (5)	8-2-0-0 (5)	59	A	OB TB OPF cS M	94 56 10 5 10	1.5 (5) - (0) 1.0 (1) - (0) - (0)	KIRKLAND LAKE/ 3E	

Appendix 1E: Summary tables for peatlands surveyed in the New Liskeard area.

I) Detailed survey sites.

DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										UNHUMIFIED PEAT (H1-H3) *				
	TOTAL AREA	TOTAL VOLUME	VOLUME H4+	TOTAL AREA	TOTAL VOLUME	VOLUME H4+ PEAT	AVERAGE DEPTH	AVERAGE THICKNESS	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE	WEIGHTED AVERAGE
	(ha)	(x10 M ³)	(x10 M ³)	(ha)	(x10 M ³)	(x10 M ³)	(cm)	(cm)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)	(no. of cores)
	**	(in situ)	(in situ)	(no. of basins)	(in situ)	(in situ)												
41P-8 (17 541 5312)	562	16.7	9.8	337 (1)	13.5	8.1	1310 (73)	25 (73)	16-2,5-1,5-0 (73)	2.9 (72)	5,309 (6)	5.7 (6)	63 (6)	14.3 (6)				
41P-9 (17 543 5309)	615	10.2	5.8	113 (1)	2.6	1.3	1294 (46)	108 (46)	5-4-1-0 (46)	2.8 (46)	5,684 (4)	4.1 (4)	53 (4)	14.1 (4)				
31M-18 (17 599 5284)	1,421	23.3	6.7	498 (1)	8.8	5.5	1224 (56)	176 (56)	3-2-5-0 (54)	2.9 (53)	4,686 (4)	10.8 (4)	58 (4)	16.3 (4)				
31M-20 (17 604 5284)	1,015	15.3	7.2	163 (2)	3.3	3.0	1213 (15)	86 (15)	3-2-5-0 (15)	2.5 (15)	-	-	-	-				
31M-21 (17 610 0280)	754	12.3	3.2	228 (1)	4.9	2.8	1215 (34)	185 (34)	4-3-3-0 (34)	3.0 (34)	4,390 (1)	5.5 (1)	66 (1)	16.6 (1)				
31M-27 (17 594 5275)	510	11.8	3.2	343 (1)	8.8	2.7	1300 (62)	218 (62)	4-1-5-0 (61)	2.8 (61)	14,497 (10)	10.8 (10)	57 (10)	16.6 (10)				
31M-31 (17 595 5269)	260	4.9	1.1	111 (1)	2.2	0.8	1239 (22)	182 (22)	2-1-7-0 (21)	2.8 (21)	4,688 (1)	8.8 (1)	48 (1)	16.2 (1)				
TOTAL	15,137	94.5	37.0	1,793	44.1	24.0			** (Figures are for areas with >1 meter of peat; shallower areas were not surveyed.)						* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.			

										TOTAL PEATLAND							
HUMIFIED PEAT (H4+)							PEATLAND CLASSIFICATION										
AVERAGE THICKNESS (cm)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER)	WEIGHTED AVERAGE HUMIFICATION (von Post scale)	WEIGHTED AVERAGE HEAT VALUE (cal/g)	WEIGHTED AVERAGE TASH CONTENT (%)	WEIGHTED AVERAGE LAB FIBER CONTENT (%)	WEIGHTED AVERAGE LAB PH	PERCENTAGE OF PEATLAND WITH <10% TREE COVER	BASAL DEPTH OF PEATLAND (cm thick)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	TOTAL PEATLAND STUMP CONTENT (\$)	M.N.R. ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS			
1285 (73)	5-3-2-0 (67)	4.2 (67)	5,338 (7)	3.7 (7)	55 (7)	4.0 (7)	58	0 (0/73)	OB TB OF TF cS TS OW	244 100 1 8 193 3 13	4.9 (57) 3.9 (22) - (0) - (0) 2.1 (18) - (0) - (0)	0.7	KIRKLAND LAKE/ 4E	Category A fuel peat deposit.			
1186 (46)	5-3-2-0 (46)	4.4 (46)	4,192 (4)	5.3 (4)	52 (4)	3.8 (4)	97	0 (0/46)	OB TB OF TF OPF TPF cS TS OW	108 29 28 128 33 86 189 11 3	3.3 (26) 3.4 (2) 2.5 (7) 1.5 (1) 1.8 (10) 3.1 (14) 1.3 (1) 2.2 (5) - (0)	1.5	KIRKLAND LAKE/ 4E	Category B fuel peat deposit (with some horticultural peat potential).			
48 (56)	3-2-5-0 (44)	4.0 (42)	3,920 (1)	11.5 (1)	47 (1)	6.3 (1)	24	0 (0/56)	OF TF cS TS OTHERS	163 11 368 31 847 -	1.7 (20) 2.1 (3) 2.2 (86) - (0) 1.8 (102) 1.0 (17)	3.7	KIRKLAND LAKE/ 4E	Category B fuel peat deposit.			
1127 (15)	2-3-5-0 (15)	4.1 (14)	3,937 (2)	120.2 (2)	45 (2)	6.0 (2)	0	0 (0/15)	OF TF cS TS OTHERS	2 8 712 293 -	- (0) - (0) 1.5 (138) 1.5 (48) 1.0 (51)	3.8	KIRKLAND LAKE/ 4E				
30 (34)	4-3-3-0 (16)	4.0 (18)	2,980 (1)	17.1 (1)	51 (1)	6.3 (1)	1	0 (0/34)	cS TS OTHERS	587 167 -	2.0 (111) 1.6 (33) 1.0 (34)	3.2	KIRKLAND LAKE/ 4E				
82 (62)	3-1-6-0 (49)	4.0 (50)	4,460 (4)	9.9 (4)	60 (4)	6.5 (4)	9	0 (0/62)	OF TF cS TS AGRIC.	2 5 201 260 42	- (0) - (0) 2.5 (44) 2.5 (54) - (0)	2.8	KIRKLAND LAKE/ 4E	Category A fuel peat deposit.			
57 (22)	2-0-8-0 (18)	4.0 (18)	4,731 (2)	12.8 (2)	45 (2)	6.4 (2)	5	0 (0/22)	cS TS AGRIC.	157 12 82 9	2.0 (38) 1.3 (5) 1.8 (17) - (0)	3.2	TEMAGAMI/ 4E	Category B fuel peat deposit.			

0 Based on geochemical core intervals with 1.7 - 2.0 m deep peat.

Appendix 1E: Reconnaissance survey sites.

AREA: NEW LISKEARD									
UNHUMIFIED PEAT (H1-H3) *									
RECONNAISSANCE STUDY SITE	TOTAL PEATLAND AREA	ESTIMATED AVERAGE DEPTH	ESTIMATED TOTAL VOLUME	ESTIMATED VOLUME H4+	AVERAGE THICKNESS H1-H3	AVERAGE HUMIFICATION	WEIGHTED AVERAGE PEAT TYPE		
(U.T.M. Grid Reference)	(ha)	(cm) (no. of cores)	(x10 M ³) (In situ)	(x10 M ³) (In situ)	(cm) (no. of cores)	(no. of cores)	(S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10)		
31M-5 (17 583 5530)	160	173 (4)	2.8	0.6	133 (4)	2.8 (4)	4-3-3-0	(4)	
31M-11 (17 596 0530)	199	116 (3)	2.3	1.1	63 (3)	3.0 (2)	2-3-5-0	(2)	
31M-26 (17 591 0528)	159	247 (3)	3.9	2.7	87 (3)	3.0 (3)	1-2-7-0	(3)	
31M-33 (17 603 0528)	234	130 (3)	3.0	0.6	103 (3)	2.8 (3)	3-2-5-0	(3)	
41P-19 (17 556 5532)	273	108 (4)	3.0	1.5	55 (4)	2.5 (4)	5-4-1-0	(4)	
41P-36 (17 554 5529)	77	128 (3)	1.0	0.6	48 (3)	2.7 (3)	5-3-2-0	(3)	
41P-47 (17 566 0528)	515	168 (4)	8.7	5.4	63 (4)	3.0 (4)	2-3-5-0	(4)	
41P-50 (17 566 0527)	164	90 (6)	1.5	0.7	47 (6)	2.7 (6)	3-2-5-0	(6)	
TOTAL	1,781		26.2	13.2	* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.				

HUMIFIED PEAT (H4 +)				PEATLAND CLASSIFICATION				ADMINISTRATIVE	
AVERAGE THICKNESS	AVERAGE HUMIFICATION	WEIGHTED AVERAGE PEAT TYPE	PERCENTAGE OF	BASAL OOZE	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m)	M.N.R. DISTRICT/	SITE REGION
(cm) (no. of cores)	(von Post scale) (no. of cores)	(S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PEATLAND AREA WITH <10% TREE COVER	PRESENT (P) OR ABSENT (A)					
40 (4)	4.0 (3)	2-3-5-0 (3)	44	A	OB cS	71 89	1.8 (3) 2.1 (1)	KIRKLAND/	4E
53 (3)	4.1 (3)	1-1-8-0 (3)	0	A	cS tS	86 113	1.2 (2) 1.4 (1)	KIRKLAND/	4E
167 (3)	4.1 (3)	0-3-7-0 (3)	0	A	cS tS	138 21	2.5 (3) - (0)	KIRKLAND/	4E
27 (3)	4.0 (3)	3-4-3-0 (3)	0	A	cS tS	185 49	1.4 (3) - (0)	KIRKLAND/	4E
53 (4)	4.0 (3)	2-3-5-0 (3)	7	A	OB TB cS	20 197 56	- (0) 1.2 (5) - (0)	KIRKLAND/	4E
80 (3)	4.1 (2)	2-4-4-0 (2)	-	A	TB OF TPF tS	21 2 25 29	1.8 (1) - (0) 1 (2) - (0)	KIRKLAND/	4E
105 (4)	4.0 (4)	1-2-7-0 (4)	10	A	OF cS tS	49 299 167	- (0) 1.7 (4) - (0)	KIRKLAND/	4E
43 (6)	4.0 (5)	1-1-8-0 (5)	11	A	OF TF cS	18 116 30	- (0) 1 (4) 0.7 (2)	TEMAGAMI-KIRKLAND/	4E

Appendix 2: Physical and Chemical Properties of Peat Samples from Northeastern Ontario

A. Hearst	OFR 5450
B. Foleyet	OFR 5492
C. Cochrane–Kapuskasing	OFR 5541
D. Timmins–Kirkland Lake	OFR 5540
E. New Liskeard	OFR 5486

(See Section 3.5, Laboratory Tests and Analysis of Results, for sources and context of data. For exact locations of sampling points, *see* the corresponding Open File Reports, as listed.)

Appendix 2A: Physical and chemical characteristics of peat samples from the Hearst area.

PEAT LAND NTS	NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42F	20	B1300W	68	6.2	5.3	150	30	80	.20	1.06	4.1	7.1	6.8	71.0	4232	49.4		27.4	1.8	5.6	.19	36.2	<1
42F	20	B1300W	67	6.5	5.5	39	30	83	.18	1.09	4.9	8.2			4570	52.0		19.3	2.7	5.1	.45		<1
42F	20	B1300W	67	6.2	5.6	39	30	82	.19	1.06	4.5	6.6	6.3		4633	51.0		24.3	2.1	5.2	.42	35.0	<1
42F	20	B1300W	94	6.9	5.8	36	33	77	.24	1.06	3.3	5.5	7.9	64.3	4441	46.5		23.3	2.0	5.1	.25	38.2	<1
42F	20	B1300W	86	6.6	5.7	61	34	80	.22	1.10	3.9	8.4	8.6	67.2	4574	46.6		16.4	2.8	5.5	.81	35.7	<1
42F	20	B1300W	85	6.0	5.3	29	35	83	.18	1.08	4.9	8.9	9.2	80.5	4152	48.7		44.3	1.1	5.4	.09	38.9	<1
42F	29	B885N	125	4.0	3.0	51	39	84	.17	1.09	5.3	14.7	5.0	70.1	4687	51.3		21.4	2.4	4.3	.18	38.9	<1
42F	29	B885N	89	4.8	4.0	46	32	78	.24	1.13	3.6	9.4	6.1	67.3	4847	51.2		34.1	1.5	5.0	.11	36.1	<1
42F	29	B885N	98	5.6	5.0	51	27	77	.25	1.09	3.3	8.1	4.6	68.3	4974	51.2		27.0	1.9	5.1	.32	36.9	<1
42F	29	B885N	90	5.8	5.1	38	26	78	.24	1.08	3.4	6.8	7.9	64.8	4659	52.3		32.7	1.6	5.1	.21	32.9	<1
42F	29	B885N	89	6.2	5.5	47	34	76	.25	1.06	3.1	5.8	9.6	64.4	3458	47.6		29.8	1.6	4.8	.88	35.5	<1
42F	11	B600N	76	6.4	6.0	101	33	82	.19	1.07	4.4	10.0	6.5	74.4	4060	40.0		30.8	1.3	5.2	1.8	45.2	<1
42F	11	B600N	86	5.5	5.2	41	26	81	.19	1.05	4.5	7.0	6.1	68.4	4609	48.5		20.2	2.4	5.2	.21	37.6	<1
42F	11	B600N	96	5.7	5.1	32	32	79	.22	1.05	3.7	8.6	5.9	67.5	4416	51.4		20.6	2.5	5.9	.11	34.2	<1
42F	11	B600N	115	6.2	5.3	40	34	85	.16	1.09	5.6	9.8	6.7	70.1	4672	47.6		26.4	1.8	4.8	.15	38.9	<1
42F	11	B600N	86	6.1	5.3	50	27	62	.35	1.05	2.8	4.6	6.5	66.6	4497	46.0		20.9	2.2	4.9	.16	40.2	<1
42F	11	B600N	117	6.1	5.4	40	39	84	.17	1.10	5.2	9.8	7.6	66.6	4964	44.7		21.3	2.1	5.1	.21	40.3	<1
42F	11	B600N	123	6.3	5.5	42	37	84	.16	1.05	5.2	8.4	8.5	66.3	4345	43.6		24.2	1.8	5.0	.21	40.9	<1
42F	11	B600N	124	6.4	5.5	58	24	77	.25	1.09	3.3	5.9	10.6	64.2	4732	42.5		17.7	2.4	5.1	.32	39.1	<1
42F	11	B600N	113	6.5	3.9	59	26	81	.20	1.09	4.3	7.1	11.5	67.3	4342	44.9		18.3	2.4	4.9	.34	36.0	<1
42F	46	T13	79	6.3	6.4	69	49	76	.26	1.09	3.1	9.2	6.8	72.1	4094	50.8		42.3	1.2	5.1	.06	36.0	<1
42F	46	T13	106	6.8	6.1	78	26	76	.25	1.07	3.1	6.4	11.8	63.7	3775	50.8		31.8	1.6	5.4	.09	30.4	<1
42F	46	T13	109	6.9	6.6	164	26	76	.24	1.05	3.2	6.3	11.7	65.8	3705	47.2		39.3	1.2	5.6	.12	34.2	<1
42F	46	T13	108	6.4	6.3	593	27	74	.28	1.06	2.7	5.7	15.5	59.8	3855	33.0		27.5	1.2	5.3	.24	44.8	<1
42F	54	B500N	122	6.2	6.0	68	46	83	.18	1.06	4.8	10.3	8.0	69.8	4035	49.5		38.1	1.3	5.5	.10	35.7	<1
42F	54	B500N	87	6.3	5.6	24	33	81	.20	1.06	4.2	6.4	7.5	67.2	4324	37.8		17.2	2.2	6.0	.21	46.3	<1
42F	54	B500N	92	6.3	5.8	28	29	76	.25	1.07	3.2	5.9	8.9	63.8	4371	48.1		22.9	2.1	4.4	.22	36.3	<1
42F	54	B500N	86	6.5	6.0	39	27	76	.25	1.06	3.1	6.8	8.4	65.3	4462	47.9		17.7	2.7	5.6	.15	35.3	<1
42F	54	B500N	95	6.5	6.0	48	26	77	.24	1.06	3.3	6.3	8.1	65.9	4420	51.2		19.0	2.7	5.2	.32	32.5	<1
42F	54	B500N	82	6.9	6.1	48	22	74	.28	1.09	2.9	5.9	23.9	52.2	3375	37.8		19.9	1.9	4.9	.42	31.1	<1
42F	56	B1000E	87	7.0	6.5	98	34	77	.24	1.09	3.4	6.1	8.6	70.0	4149	54.6		28.7	1.9	4.9	.53	29.4	<1
42F	56	B1000E	86	6.6	5.9	42	26	80	.21	1.09	4.1	6.9	7.8	67.6	4472	50.9		23.1	2.2	5.7	.19	33.3	<1
42F	56	B1000E	93	6.4	5.9	30	27	78	.23	1.08	3.6	6.4	6.6	65.0	4623	52.4		25.0	2.1	5.2	.07	33.7	<1
42F	56	B1000E	75	6.6	6.0	47	25	77	.24	1.08	3.3	6.4	10.1	62.8	4520	38.1		17.3	2.2	5.9	.28	43.5	<1
42F	56	B1000E	40		6.6		21	52	.53	1.11	1.0	2.9	40.2			33.8				4.7	.32		<1
42F	55	B600E	83	5.8	5.4	78	42	80	.21	1.09	4.0	8.6	5.8	72.5	4336	49.0		37.7	1.3	5.2	.20	38.5	<1
42F	55	B600E	74	5.8	5.0	29	27	82	.19	1.08	4.5	7.3	4.6	68.6	4858	43.6		17.4	2.5	5.0	.21	44.1	<1
42F	55	B600E	70	5.9	5.4	21	30	81	.20	1.07	4.1	7.0	6.0	67.2	4805	54.2		25.8	2.1	4.8	.22	32.7	<1
42F	55	B600E	84	6.3	5.8	26	32	80	.21	1.07	4.0	7.9	7.2	66.0	4688	51.1		24.3	2.1	4.3	.13	35.2	<1
42F	55	B600E	91	6.5	5.9	48	22	77	.24	1.07	3.2	5.9	10.2		4313	42.5		19.3	2.2	5.3	.21	39.6	<1
42F	55	B600E			7.0			44			.8				1782	22.6				5.0	.14		<1
42F	24	L1000E+500N	96	6.0	5.5	73	39	78	.24	1.08	3.4	7.4	10.0	67.9	4250	52.7		25.1	2.1	4.1	.20	30.9	<1
42F	24	L1000E+500N	79	5.6	5.0	23	29	80	.21	1.05	4.0	7.7	5.4	67.8	4636	55.0		22.9	2.4	5.0	.22	32.0	<1
42F	24	L1000E+500N	71	5.8	5.3	22	30	80	.22	1.10	3.8	6.3	6.2	67.5	4670	51.2		21.3	2.4	4.2	.10	35.9	<1
42F	24	L1000E+500N	105	6.0	5.5	34	30	77	.24	1.06	3.3	6.4	8.3	64.3	4457	46.9		26.1	1.8	4.3	.24	38.5	<1
42F	24	L1000E+500N	108	6.3	5.6	49	26	76	.27	1.11	3.0	5.8	9.8	64.4	4340	47.4		27.9	1.7	5.0	.14	35.9	<1
42F	24	L1000E+500N	84	6.3	5.8	51	25	75	.27	1.09	3.0	5.5	10.3	65.2	4330	48.0		22.9	2.1	5.1	.32	34.2	<1
42F	24	L1000E+500N	105	6.4	6.0	50	27	76	.26	1.08	3.1	5.8	10.7	64.1	4414	49.1		20.5	2.4	5.0	.32	32.5	<1

HG	CA	P	K	AL	FE	PB	MN	MG	CU	ZN	TOP BOT		HUM	PEAT TYPE				VEGETATION COVER					REL	T	TS	LS	G	SP	SUR	AV
											INT	INT		S	C	L	X	POS	%	%	%	%	FOR							
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PMM	PMM	(CM)	(CM)	1-9																PH	CM
.12	12411	1040	2319	1682	7913	53	1659	2098	7	55	0	30	3	3	7	0	0	1	1	60	30		3	4						
<.01	18134	515		1285	3329		208	1774	14	86	30	130	3	3	7	0	0	2	1	60	30		3	4						
<.01	22932	512		1346	4038		118	1817	18	106	130	150	4	3	6	1	0	2	1	60	30		3	4						
<.01	33179	346	384	1748	6836	13	91	1888	10	13	150	205	5	7	1	2	0	3	1	60	30		3	4						
<.01	28238	307	594	2668	6325	9	63	1894	19	9	205	280	5	3	7	0	0	4	1	60	30		3	4						
<.01	3387	355	752	859	1327	34	34	675	4	44	280	290	5	4	6	0	0	4	1	60	30		3	4						
<.01	21613	553	<10	1508	2457	6	140	1855	2	7	0	30	3	8	2	0	0	1	1	50	30		1	6						
<.01	19350	333		2556	2644		21	671	12	31	30	80	4	6	4	0	0	2	1	50	30		1	6						
.03	12045	462		2189	1387		11	431	6	7	80	100	4	5	3	2	0	3	1	50	30		1	6						
<.01	24983	333		2689	3125		23	763	10	22	100	120	5	6	3	1	0	4	1	50	30		1	6						
<.01	35273	238	773	2319	4869	12	38	1011	10	6	120	170	6	6	3	1	0	4	1	50	30		1	6						
<.01	20615	804	1789	1353	6111	33	955	2936	19	68	0	30	3	1	8	1	0	1	15	20	50		3	4						
<.01	19601	612		1908	2309		172	1961	8	38	30	70	4	1	8	1	0	1	15	20	50		3	4						
<.01	26881	390	286	1957	2476	15	87	1784	11	8	70	175	4	1	6	3	0	2	15	20	50		3	4						
<.01	25722	255	234	1346	3030	16	77	1386	59	49	175	200	5	1	6	3	0	3	15	20	50		3	4						
<.01	30654	304	531	1708	3773	25	88	1606	17	22	200	230	4	2	7	1	0	3	15	20	50		3	4						
<.01	30300	268		1129	3280		78	1490	12	6	230	250	4	2	7	1	0	3	15	20	50		3	4						
<.01	3105	310		1660	3503		88	1622	45	20	250	270	5	4	6	0	0	3	15	20	50		3	4						
<.01	38207	338		3906	4548		87	1735	30	18	270	285	4	1	9	0	0	4	15	20	50		3	4						
<.01	26305	331	1191	4640	4343	8	78	1998	15	10	285	360	5	9	1	0	0	4	15	20	50		3	4						
<.01	21839	799	1743	1960	1482	77	220	2860	8	66	0	20	2	8	1	1	0	1	20	20			3	3						
<.01	44482	807	315	1594	8807	10	196	4092	5	31	20	120	5	7	1	2	0	2	20	20			3	3						
.02	56856	657	2057	1798	5736	81	60	4754	25	30	120	140	5	3	5	2	0	4	20	20			3	3						
.04	52898	718	4673	2808	11757	178	63	4830	47	49	140	170	6	2	6	2	0	4	20	20			3	3						
<.01	30137	898	1725	1951	5366	54	705	2077	8	64	0	20	3	7	3	0	0	1	20	10	15		3	6						
<.01	32979	653	604	1940	3860	24	334	1657	6	13	20	80	3	5	3	2	0	2	20	10	15		3	6						
.06	36045	450	430	2374	6214	16	132	1813	6	6	80	125	4	5	4	1	0	3	20	10	15		3	6						
<.01	30523	375	562	2724	6251	13	99	1746	9	6	125	150	5	7	2	1	0	4	20	10	15		3	6						
<.01	32467	411		2652	6271		155	1952	16	7	150	170	5	7	2	1	0	4	20	10	15		3	6						
.04	26377	439		3902	6732		138	2425	30	159	170	180	6	7	3	0	0	4	20	10	15		3	6						
.10	26097	782	1470	1763	10569	57	431	2605	7	60	0	15	2	8	2	0	0	1	4	10	50		3	4						
<.01	32416	635	627	2006	4964	18	45	2396	5	13	15	50	4	10	0	0	0	1	4	10	50		3	4						
<.01	31843	321	291	1974	4627	17	34	2110	3	13	50	150	4	9	1	0	0	2	4	10	50		3	4						
<.01	38940	312	787	3726	7432	5	39	2227	8	14	150	215	4	6	2	1	0	4	4	10	50		3	4						
<.01	20987	443		6236	7706		71	3868	12	101	215	240						5	4	10	50		3	4						
<.01	16704	777	1985	1485	5175	51	1779	1709	5	72	10	30	3	8	2	0	0	1	15	30	10		3	3						
<.01	21344	485		1556	3075		267	1540	6	13	30	50	4	7	3	0	0	1	15	30	10		3	3						
<.01	23594	348	58	1622	4605	<2	158	1240	<1	6	50	200	4	3	7	0	0	2	15	30	10		3	3						
<.01	28719	286	353	2010	7096	4	67	1660	4	8	200	285	4	3	7	0	0	4	15	30	10		3	3						
<.01	35252	448		5101	9326		75	2206	18	22	285	300	5	2	8	0	0	4	15	30	10		3	3						
<.01											300	305						5	15	30	10		3	3						
.17	22278	1102	2025	3096	7452	48	1038	2725	8	54	0	25	3	1	9	0	0	1	2	20	40		3	6						
.04	22185	642	344	2199	1946	19	91	2023	4	23	25	50	3	1	9	0	0	1	2	20	40		3	6						
.04	26869	415	234	1731	2375	15	57	1813	4	6	50	110	4	1	9	0	0	2	2	20	40		3	6						
<.01	33027	329	307	1932	4180	9	92	1748	7	14	110	165	5	7	2	1	0	3	2	20	40		3	6						
<.01	35024	295	472	2404	5264	8	95	1764	10	5	165	190	6	8	1	1	0	3	2	20	40		3	6						
<.01	34556	305		1650	5474		97	1764	14	6	190	210	5	9	1	0	0	4	2	20	40		3	6						
<.01	30716	326		2584	5558		82	1864	20	15	210	240	6	2	8	0	0	4	2	20	40		3	6						

Appendix 2A: Hearst area (continued).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42G	470	B500S	142	6.0	5.0	73	42	85	.17	1.12	5.4	14.2	6.2	73.9	4181	50.4		31.5	1.6	5.2	.17	36.5	<1
42G	470	B500S	85	5.6	5.0	46	28	80	.20	1.04	4.1	6.8	6.8		4773	46.8				5.0	.24		<1
42G	470	B500S	87	5.7	5.0	28	29	79	.22	1.05	3.7	5.9	6.4	65.8	4490	47.9		26.6	1.8	5.4	.19	38.3	<1
42G	470	B500S	98	6.3	5.4	40	35	75	.27	1.06	2.9	6.3	8.4	62.8	4366	49.0		27.2	1.8	5.1	.11	35.6	<1
42G	470	B500S	72	6.5	5.6	38	22	77	.24	1.05	3.3	7.3	9.0	64.4	4374	52.0		27.4	1.9	4.9	.11	32.1	<1
42G	435	L500S+200W	64	5.5	4.8	73	30	80	.21	1.09	4.0	9.8	4.6	75.2	4234	49.1		35.1	1.4	5.1	.11	39.7	<1
42G	435	L500S+200W	64	5.2	4.5	33	19	84	.17	1.06	5.0	8.0	3.7		4849	52.3		22.7	2.3	5.1	.11	36.5	<1
42G	435	L500S+200W	98	5.5	3.7	26	30	84	.16	1.06	5.7	9.4	3.2	71.5	4832	49.8		22.6	2.2	5.1	.11	39.6	<1
42G	435	L500S+200W	98	5.7	5.1	35	33	84	.17	1.07	5.4	9.4	4.6	64.3	4763	49.5		22.5	2.2	5.1	.11	38.5	<1
42G	435	L500S+200W	81	6.3	5.5	49	30	77	.25	1.11	3.4	6.2	7.8	63.6	4363	46.3		23.7	2.0	5.1	.12	38.7	<1
42G	435	L500S+200W	92	6.4	5.8	62	30	76	.26	1.09	3.1	6.4	12.1	61.9	4159	43.7		18.1	2.4	5.0	.24	34.6	<1
42G	466	B700E	111	6.9	6.3	112	35	84	.17	1.07	5.2	10.2	4.2	77.1	4153	49.1		40.9	1.2	5.3	.12	40.1	<1
42G	466	B700E	107	6.3	5.5	43	30	75	.26	1.10	3.0	5.9	7.9	64.4	4390	49.9		31.2	1.6	4.5	.22	35.9	<1
42G	466	B700E	107	6.3	5.8	49	27	73	.30	1.12	2.6	5.5	9.3	62.7	4378	52.6		37.6	1.4	4.7	.34	31.7	<1
42G	446	B600N	97	4.0	3.0	38	40	83	.17	1.05	5.0	12.3	2.3	80.0	4123	53.2		76.0	.7	5.8	.16	37.8	<1
42G	446	B600N	96	3.7	3.0	<10	31	78	.23	1.05	3.4	7.8	2.3		4887	52.3		34.9	1.5	5.1	.11	38.7	<1
42G	446	B600N	71	3.9	3.3	<10	28	79	.22	1.05	3.6	8.0	2.8	70.5	5033	49.1		30.7	1.6	5.1	.11	41.3	<1
42G	446	B600N	132	4.5	3.9	26	28	82	.18	1.05	4.5	8.2	3.6	68.4	5878	50.0		35.6	1.4	4.8	.12	40.1	<1
42G	446	B600N	82	5.9	5.3	41	36	86	.15	1.05	6.1	10.4	4.1	69.9	4672	51.9		26.6	2.0	5.5	.18	36.3	<1
42G	446	B600N	75	6.3	6.0	235	42	79	.22	1.06	3.8	6.1	14.8	67.4	4033	41.8		23.2	1.8	5.1	.50	36.1	<1
42G	450	F500N	99	4.2	3.5	68	41	84	.17	1.10	5.2	11.3	3.3	79.8	4072	37.2		37.2	1.0	5.4	.29	52.8	<1
42G	450	F500N	64	5.1	4.4	35	28	81	.20	1.07	4.1	6.7	5.0		4742	45.8		22.9	2.0	5.1	.11	42.0	<1
42G	450	F500N	82	5.7	5.0	33	26	79	.22	1.06	3.8	7.1	4.4	69.0	4855	49.9		20.2	2.5	5.1	.12	38.0	<1
42G	450	F500N	82	6.3	5.5	34	30	81	.20	1.07	4.2	7.5	4.4	68.1	4727	49.0		18.4	2.7	5.3	.11	38.5	<1
42G	450	F500N	103	6.2	5.5	37	29	78	.22	1.06	3.6	6.6	5.9	66.3	4562	47.2		21.1	2.2	5.0	.19	39.5	<1
42G	450	F500N	104	6.3	5.6	53	34	80	.21	1.06	4.0	6.5	7.0	64.9	4367	51.6		27.2	1.9	4.9	.13	34.5	<1
42G	450	F500N	212	6.4	5.9	87		90	.11	1.09	8.7	16.5	20.7	56.9	3678	41.4		27.6	1.5	5.0	.42	31.0	<1
42G	439	B1000E	117	6.2	5.3	105	31	81	.20	1.07	4.3	7.6	10.0	69.0	3977	44.5		26.2	1.5	5.2	.24	38.4	<1
42G	439	B1000E	71	5.9	5.1	33	29	81	.20	1.07	4.2	8.6	4.8	69.8	4660	55.3		22.1	2.5	3.7	.11	33.6	<1
42G	439	B1000E	100	6.1	5.3	33	28	85	.16	1.08	5.6	9.1	5.0	68.3	4706	50.1		20.3	2.5	4.4	.12	37.9	<1
42G	439	B1000E	76	6.1	5.3	35	32	82	.19	1.06	4.5	7.4	5.2	69.4	4613	53.0		25.2	2.1	5.0	.12	34.6	<1
42G	439	B1000E	91	6.0	5.3	38	30	79	.22	1.08	3.7	6.3	5.6	64.7	4611	53.8		28.3	1.9	4.6	.13	33.9	<1
42G	439	B1000E	102	6.1	5.4	51	27	78	.23	1.08	3.5	5.9	9.6	65.6	4364	50.8		25.4	2.0	4.5	.41	32.7	<1
42G	439	B1000E	109	6.1	5.0	60	30	80	.21	1.09	4.0	6.5	9.3	64.0	4334	47.4		23.7	2.0	5.6	.26	35.4	<1
42G	439	B1000E	93	6.2	5.3	67	30	80	.22	1.07	3.9	7.0	7.8	64.8	4549	51.5		21.5	2.4	5.4	.31	32.6	<1
42G	439	B1000E	49	6.1	5.5	150	17	61	.41	1.07	1.5	3.2	13.8		3930	44.1		20.1	2.2	5.1	.50	34.3	<1
42G	456	B1664W	95	3.9	2.7	16	38	84	.17	1.09	5.2	12.1	2.4	80.1	4226	49.9		83.2	.6	5.6	.15	41.4	<1
42G	456	B1664W	104	4.1	2.9	23	30	84	.17	1.06	5.2	11.2	2.5		4344	55.0		42.3	1.3	5.0	.12	36.1	<1
42G	456	B1664W	92	4.2	3.2	19	26	80	.22	1.10	4.0	8.3	2.7	72.2	4916	54.2		31.9	1.7	5.3	.13	36.0	<1
42G	456	B1664W	68	5.4	4.9	36	33	83	.18	1.05	4.8	10.1	3.1	72.9	5091	51.9		20.0	2.6	6.0	.11	36.3	<1
42G	456	B1664W	66	6.7	5.8	41	32	84	.16	1.04	5.2	9.9	4.9	74.0	4589	53.2		33.3	1.6	5.3	.18	34.9	<1
42G	456	B1664W	67	7.3	6.6	164	43	82	.19	1.06	4.4	6.0	20.3	65.3	4429	52.0		16.3	3.2	5.0	.95	18.6	<1

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP	BOT	HUM 1-9	PEAT TYPE				REL POS	VEGETATION COVER					SUR WAT PH	AV D-W CM	
											INT (CM)	INT (CM)		S	C	L	X		T %	TS %	LS %	G %	SP %			FOR
<.01	18832	875	1748	1335	5238	54	1489	2741	8	67	10	30	3	10	0	0	0	1	20		40			3	4	
<.01	19269	696		2051	2388		408	2160	19	89	30	50	3	9	0	1	0	1	20		40			3	4	
<.01	26681	410	520	2176	2293	21	191	2291	8	16	50	80	4	7	0	3	0	2	20		40			3	4	
.04	35016	343	475	2457	3466	10	160	2275	6	12	80	165	5	8	0	2	0	3	20		40			3	4	
<.01	33277	329	823	2591	5317	17	123	2259	7	11	165	230	4	2	7	1	0	4	20		40			3	4	
<.01	9468	617		1192	3204		1020	2405	16	198	10	25	4	2	8	0	0	1	1		50	20			3	4
<.01	9894	769		2336	1964		122	1541	10	48	25	100	4	2	8	0	0	1	1		50	20			3	4
<.01	13030	522	244	1632	1700	9	29	1444	7	19	100	250	4	2	8	0	0	2	1		50	20			3	4
.02	18360	408	68	1828	2535	7	57	1490	15	27	250	360	4	4	5	0	0	3	1		50	20			3	4
<.01	26241	499	791	3804	4362	3	80	1723	23	3	360	435	5	7	1	2	0	4	1		50	20			3	4
<.01	27837	590	2633	7425	6008	25	97	2194	37	41	435	470	5	8	2	0	0	4	1		50	20			3	4
.04	21449	654		730	632		253	3187	7	47	0	10	2	8	1	1	0	1	15		30	10			3	4
<.01	33857	515	617	1509	2964	10	160	2905	9	8	10	130	4	7	1	2	0	2	15		30	10			3	4
.08	40514	429	391	1942	4604	17	136	3023	24	9	130	175	5	6	2	2	0	4	15		30	10			3	4
<.01	3889	493	1405	1205	1336	44	47	722	7	48	0	35	2	10	0	0	0	1	0		30				1	5
<.01	5087	495		2060	733		6	349	6	17	35	50	5	8	0	2	0	1	0		30				1	5
<.01	4737	477		2589	573		6	311	6	37	50	70	6	1	9	0	0	1	0		30				1	5
<.01	11818	265	614	1673	532	14	9	507	11	5	70	160	4	4	5	1	0	2	0		30				1	5
<.01	17634	278	24	1063	2014	8	29	822	6	13	160	245	4	1	8	1	0	3	0		30				1	5
<.01											245	290		0	0	0	10	4	0		30				1	5
<.01	4321	643	1276	853	1297	39	30	1166	5	39	0	30	2	7	3	0	0	1	15		15	40			2	5
<.01	11789	843		2069	1321		11	1874	6	17	30	50	4	6	4	0	0	1	15		15	40			2	5
<.01	14369	452	<10	2062	1843	<2	6	1895	2	3	50	160	4	3	7	0	0	2	15		15	40			2	5
.02	22292	400	168	1991	2578	<2	25	1665	2	3	160	210	4	3	7	0	0	3	15		15	40			2	5
<.01	25194	319	648	1448	4366	11	50	1840	9	11	210	305	4	3	7	0	0	4	15		15	40			2	5
<.01	33496	315	457	1638	5689	24	74	1898	15	15	305	330	4	6	4	0	0	4	15		15	40			2	5
<.01	28036	429		7599	8718		143	3577	47	269	330	340	4	6	4	0	0	4	15		15	40			2	5
.02											0	20	3	1	8	1	0	1	20		25	30			3	5
<.01	18559	571	559	1373	1570	18	77	1936	6	10	20	150	4	1	8	1	0	1	20		25	30			3	5
.02	20738	406	275	1474	2132	11	44	1700	13	12	150	350	4	2	7	1	0	2	20		25	30			3	5
<.01	21383	324	510	1359	2871	18	49	1566	14	9	350	400	5	3	7	0	0	3	20		25	30			3	5
.02	31731	317	133	1846	472	10	70	2038	23	4	400	450	6	6	2	2	0	3	20		25	30			3	5
.02	35647	382	644	3019	5595	15	79	2284	27	10	450	480	6	6	2	2	0	4	20		25	30			3	5
.01	33593	376	530	2911	5548	26	89	2332	38	9	480	530	6	7	2	1	0	4	20		25	30			3	5
<.01	27064	348	264	2346	4631	3	72	2005	24	11	530	590	6	2	8	0	0	4	20		25	30			3	5
<.01											590	600		0	0	0	10	4	20		25	30			3	5
<.01	1527	452	990	1037	969	53	32	608	4	51	10	25	2	9	1	0	0	1	10		40	20			1	5
<.01	3610	613		5826	1380		25	472	18	45	25	50	3	8	2	0	0	1	10		40	20			1	5
<.01	6001	397	163	1770	632	25	6	227	4	15	50	180	4	3	7	0	0	2	10		40	20			1	5
<.01	12738	267	66	1320	1391	14	10	242	3	9	180	310	4	4	6	0	0	3	10		40	20			1	5
<.01	16474	242		1525	2991		24	401	6	26	310	340	4	3	7	0	0	4	10		40	20			1	5
<.01											340	360						5	10		40	20			1	5

Appendix 2B: Physical and chemical characteristics of peat samples from the Foley area.

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42B	17	B1800S	124	4.2	3.3	88	91	90	.09	.97	8.7	27.4	1.5	81.4	4348	49.1	47.8	35.1	1.4	4.5	.10	43.4	.2
42B	17	B1800S	183	4.2	3.4	21	87	95	.05	1.00	18.5	36.5	1.6		4374	47.8	46.9	39.8	1.2	4.3	.16	44.9	
42B	17	B1800S	94	5.4	4.6	40	50	87	.12	.98	6.9	9.8	4.1	69.5	4772	54.8	53.7	24.9	2.2	5.6	.10	33.2	.2
42B	17	B1800S	97	6.0	5.4	47	45	88	.12	1.03	7.0	9.9	5.1	66.1	4697	56.4	55.1	29.7	1.9	5.4	.11	31.1	.3
42B	17	B1800S	112	6.2	5.7	49	51	87	.12	.97	6.8	9.3	5.9	65.3	4517	55.3	54.4	15.8	3.5	5.6	.12	29.6	.5
42B	17	B2200S	140	4.1	3.5	39	90	94	.06	1.00	14.4	32.3	1.9	79.7	4283	48.5	46.8	28.6	1.8	5.1	.11	41.2	.6
42B	17	B2200S	167	4.6	4.1	43	48	90	.10	1.02	8.8	13.9	2.1	70.9	4895	55.6	54.3				.10	36.8	<.1
42B	17	B2200S	147	5.8	5.4	51	40	89	.11	.98	7.8	11.5	5.3	67.5	4850	55.2	54.8	24.0	2.3	5.8	.15	31.2	.2
42B	28	B2000S	210	4.0	3.0	43	82	94	.05	.97	16.4	33.5	.9	80.3	4249	50.4	48.9	50.4	1.0	4.9	.10	42.7	<.1
42B	28	B2000S	114	5.9	5.4	52	54	90	.10	1.02	8.6	11.5	5.0	68.0		55.7	52.2	26.5	2.1	5.4	.12	31.7	.4
42B	28	B2000S	61	6.1	5.7	51		80	.12	1.05	4.0	6.1	5.8	65.8	4716	56.4	54.8	28.2	2.0	5.9	.12	29.8	.3
42B	28	B2000S	108	6.1	5.8	58	34	89	.11	.98	7.8	12.2	5.9	65.6	4532	54.5	52.3	17.6	3.1	5.9	.11	30.5	.6
42B	28	B2000S	104	6.1	5.8	59	50	89	.11	1.06	8.1	11.4	5.5	68.3	4700	54.6	53.1	32.1	1.7	5.9	.14	32.2	1.1
42B	28	B3200S	143	4.1	3.2	160	99	91	.08	.98	10.2	23.4	1.3	79.7	4376	49.3	48.7	44.8	1.1	4.9	.10	43.3	.2
42B	28	B3200S	84	5.2	4.7	38	42	87	.12	.99	6.8	10.8	4.5	68.1	4813	55.7	53.6	24.2	2.3	5.8	.14	31.6	.4
42B	28	B3200S	115	6.0	5.5	56	36	86	.14	.99	6.0	9.0	7.4	64.1	4553	53.4	51.4	31.4	1.7	5.5	.18	31.8	.5
42B	28	B3900S	259	3.9	3.4	67	95	96	.04	1.01	37.8	54.7	1.6	81.1	4277	47.3	44.7	36.5	1.3	4.9	.11	44.8	.2
42B	28	B3900S	127	5.0	4.4	39	48	90	.10	.98	8.5	12.6	3.4	70.8	4931	58.2	57.9	25.3	2.3	5.8	.12	30.2	.2
42B	28	B3900S	118	5.5	5.0	47	41	89	.11	.97	7.7	10.7	5.3	67.0	4773	55.8	55.3	12.1	4.6	5.2	.11	29.0	.3
42B	28	B3900S	98	5.7	5.4	51	43	90	.10	1.05	9.0	13.8	4.7	67.2	4748	54.7	53.8	23.8	2.3	5.4	.12	32.8	.2
42B	28	B3900S	100	5.8	5.4	53	54	90	.10	1.05	9.1	15.5	4.7	67.4	4712	53.6	51.1	24.4	2.2	5.2	.13	34.2	.7
42B	31	L2300N+100E	114	6.1	5.7	51	40	86	.14	1.00	6.0	8.2	7.0	65.8	4258	52.4	51.0	27.7	1.9	4.8	.14	43.8	.4
42B	31	L2300N+100E	134	5.5	5.1	42	51	88	.12	1.06	7.3	10.6	4.7	67.5	4807	54.5	54.2	27.3	2.0	5.1	.13	33.6	.4
42B	31	L2300N+100E	159	4.4	3.5	65	83	93	.08	1.30	14.1	30.1	2.1	78.9	4617	47.5	45.1	36.5	1.3	5.5	.12	33.2	.6
42B	31	L600N+100E	180	3.9	3.2	205	84	93	.06	.94	12.6	35.3	1.8	79.6	4204	50.3	48.5	41.9	1.2	5.5	.08	41.1	.2
42B	31	L600N+100E	252	4.0	3.4	21	107	95	.05	1.08	18.8	45.0	2.0		4247	50.4	49.1	45.8	1.1	5.1	.15	41.3	.5
42B	31	L600N+100E	92	4.9	4.4	34	43	89	.11	1.03	7.8	13.7	3.6	68.0	4841	53.8	53.0	25.6	2.1	5.7	.12	34.7	.3
42B	31	L600N+100E	91	5.3	4.8	40	41	87	.12	.94	6.6	9.8	4.6	66.4	4537	51.7	50.2	27.2	1.9	5.2	.12	36.5	.1
42B	31	B1100N	105	4.1	3.2	90	76	92	.07	.96	12.1	30.3	1.9	80.9	4205	47.6	45.3	39.7	1.2	4.6	.06	44.6	.1
42B	31	B1100N	80	4.2	3.4	36	76	93	.07	.94	12.3	25.9	2.5	79.1	4461	53.2	52.5	38.0	1.4	5.6	.18	37.1	.7
42B	31	B1100N	93	5.3	4.9	41	43	86	.13	1.00	6.3	7.4	6.5	66.3	4765	55.0	54.9	28.9	1.9	5.5	.13	31.0	.4
42B	31	B1100N	49	5.7	5.3	49	49	85	.15	1.07	5.8	8.7	14.7	62.2	4219	45.8	42.7	28.6	1.6	4.1	.10	33.7	.6
42B	39	B2500S	132	3.5	2.7	69	95	91	.09	1.06	9.9	29.8	.8	78.2	4357	49.9	46.9	55.4	.9	4.9	.07	43.4	.3
42B	39	B2500S	234	3.5	3.1		67	93	.07	.98	13.0	20.3	2.0	79.6	4674	52.7	52.1	37.6	1.4	5.1	.05	38.8	.1
42B	39	B2500S	100	3.9	3.5		55	92	.08	1.05	11.5	17.9	1.7	74.8	4751	53.5	53.0	35.7	1.5	5.3	.08	37.9	<.1
42B	39	B2500S	139	5.6	5.0	55	47	91	.09	.98	10.1	11.9	3.9	68.7	4857	52.0	50.1	27.4	1.9	5.5	.11	38.6	<.1
42B	39	B2500S	230	5.9	5.1	48	64	93	.07	1.00	12.5	18.9	4.0	71.0	4608	52.6	52.4	26.3	2.0	5.5	.07	35.8	.1
42B	39	B2500S	167	6.6	5.5	52	74	92	.07	.99	12.1	21.8	2.8	72.3	4767	51.7	51.1	19.9	2.6	5.6	.12	37.2	.2
42B	39	B2500S	169	6.5	5.7	62	61	92	.07	.92	12.1	18.4	3.4	74.2	4935	53.9	52.6				.18	36.7	.1
42B	39	B2500S	75	6.8	6.1	84	73	89	.11	.98	7.8	8.8	25.2	58.3	3535	39.4	20.0	15.8	2.5	4.0	.23	28.7	.3
42B	39	B700S	125	3.8	3.1	33	98	94	.05	.90	14.6	31.6	1.3	81.5	4177	46.6	45.8	58.3	.8	4.7	.07	46.5	.2
42B	39	B700S	179	4.5	3.3	37	87	93	.06	.90	14.1	29.5	2.3	77.3	4445	49.4	47.3	35.3	1.4	4.9	.20	41.8	.5
42B	39	B700S	88	6.0	5.2	53	35	87	.12	.93	6.6	9.6	14.9	63.4	4317	48.8	47.4	24.4	2.0	4.6	.12	29.6	.6
42B	39	B1700S	98	4.4	2.9	68	109	91	.07	.84	10.5	32.6	.9	81.2	4218	47.0	46.7	47.0	1.0	4.7	.07	46.3	.1
42B	39	B1700S	175	4.3	3.4	34	72	93	.06	.86	12.7	28.3	2.4	77.9	4383	48.2	47.4	37.1	1.3	4.3	.14	43.7	<.1
42B	39	B1700S	149	5.5	4.9	57	54	90	.09	.93	8.8	14.0	3.9	69.2	4740	52.6	51.9	27.7	1.9	5.3	.08	36.2	.3
42B	39	B1700S	124	6.3	5.5	54	69	92	.08	1.00	11.0	21.3	3.6	71.5	4459	51.0	50.6				.10	40.1	.1
42B	39	B1700S	60	6.5	6.2	200	83	85	.15	1.00	5.7	6.8	33.6	54.2	3491	34.8	33.7				.10	40.1	.1
42B	175	L1500S+600W	111	4.4	3.7	122	90	92	.07	.97	11.7	36.0	2.1	78.2	4199	47.3	44.5	39.8	1.2	4.5	.08	44.9	1.1
42B	175	L1500S+600W	75	4.6	3.8	41	58	88	.10	.91	7.3	11.4	5.7	54.5	4508	49.5	47.3	24.8	2.0	4.7	.20	37.9	.2
42B	175	L1500S+600W	66	5.5	4.8	48	53	86	.13	.96	6.4	8.6	4.3	68.2	4717	50.7	49.5	26.7	1.9	4.8	.13	38.2	.3
42B	175	L1500S+600W	49	5.8	5.1	50	38	86	.14	.97	6.0	7.7	4.8	65.4	4685	51.2	50.8	28.4	1.8	5.1	.10	37.0	.2
42B	175	L1500S+600W	84	6.1	5.4	56	40	88	.11	.90	7.1	11.1	4.5	65.4	4861	51.9	50.5	22.6	2.3	5.1	.18	36.0	<.1
42B	175	L1500S+600W	112	6.3	5.5	51	57	89	.12	1.11	7.9	14.4	4.4	66.4	4782	51.4	50.3	20.6	2.5	5.2	.19	36.3	.2
42B	175	L1500S+600W	96	6.2	5.6	67	49	87	.13	1.06	6.8	10.9	6.0	63.7	4691	51.6	50.8	21.5	2.4	5.3	.25	34.4	.5
42B	175	B500S	98	4.2	3.3	45	64	89	.11	1.00	8.1	17.3	3.1	72.6	4271	48.3	47.1	32.2	1.5	4.9	.15	42.0	.6
42B	175	B500S	96	4.4	3.7	28	50	88	.12	1.04	7.3	10.4	2.8	68.5	4687	51.2	50.0	23.3	2.2	5.0	.05	38.8	.2
42B	175	B500S	89	4.8	4.0	31	44	86	.14	1.03	6.4	9.8	3.8	67.6	4734	53.0	52.6				.10	37.7	.3
42B	175	B500S	122	4.9	4.1	36	38	87	.14	1.12	6.5	10.1	4.0	65.8	4736	52.8	51.9	25.1	2.1	5.2	.13	35.8	.3
42B	175	B500S	163	4.9	4.3	36	51	89	.11	1.09	8.3	14.8	3.7	69.3	4777	52.9	52.5	22.0	2.4	5.2	.14	35.7	.5
42B	175	B500S	192	5.0	4.4	38	64	91	.10	1.18	10.0	18.8	2.6	69.7	4712	52.4	52.1	25.0					

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP BOT		HUM 1-9	PEAT S-C	TYPE L-X	REL POS	VEGETATION COVER					SUR WAT PH	AV D-W CM				
											INT (CM)	INT (CM)					T %	TS %	LS %	G %	SP %			FOR	SUB		
.18	4908	1044	3417	545	1016	10	459	1045	3	63	0	20	1	10	0	0	0	4	0	25	15	85	3	4	5.3	24	
.12	6051	613	889	754	1233	25	71	960	2	64	20	70	2	9	1	0	0	1	4	0	25	15	85	3	4	5.3	24
.10	19752	467	347	1723	2072	<2	19	666	3	18	70	110	3	8	2	0	0	2	4	0	25	15	85	3	4	5.3	24
.08	25928	322	411	2222	2288	2	19	929	4	11	110	190	4	6	4	0	0	2	4	0	25	15	85	3	4	5.3	24
.07	32091	289	672	2174	3690	16	32	1102	6	16	190	300	4	8	2	0	0	4	4	0	25	15	85	3	4	5.3	24
.14	2153	735	1796	943	1206	13	82	767	4	49	0	50	2	10	0	0	0	1	1	0	11	26	95	1	3	5.2	5
.05	10352	506	64	1567	838	<2	5	382	1	20	50	130	6	8	2	0	0	2	1	0	11	26	95	1	3	5.2	5
.06	25607	309	136	2456	3358	<2	21	796	2	14	130	300	4	7	3	0	0	3	1	0	11	26	95	1	3	5.2	5
.18	2004	529	2191	716	790	20	113	640	3	57	0	15	2	10	0	0	0	0	3	0	25	20	85	1	5	5.2	18
.06	25541	380	176	2209	3641	<2	25	930	2	13	15	150	3	10	0	0	0	1	3	0	25	20	85	1	5	5.2	18
.06	19212	278	885	1829	2031	8	32	963	5	4	150	200	4	9	1	0	0	3	3	0	25	20	85	1	5	5.2	18
.07	25456	282	859	1679	2235	10	38	1023	6	4	200	250	4	6	4	0	0	3	3	0	25	20	85	1	5	5.2	18
.06	27187	280	511	1563	2720	3	41	1071	4	4	250	300	4	7	3	0	0	4	3	0	25	20	85	1	5	5.2	18
.23	4309	779	3260	644	1035	21	202	1329	2	44	0	25	2	10	0	0	0	0	15	0	38	15	95	2	5	5.2	
.08	21030	344	796	1584	1483	10	11	1257	5	4	25	120	3	7	3	0	0	2	15	0	38	15	95	2	5	5.2	
.10	31125	302	1000	2361	3819	10	48	1922	9	4	120	210	4	8	2	0	0	4	15	0	38	15	95	2	5	5.2	
.09	4052	612	1718	708	1132	29	71	908	5	60	0	70	2	10	0	0	0	1	0	0	9	13	99	1	5	4.8	
.04	15610	427	241	1869	1721	4	4	987	3	20	70	110	4	7	3	0	0	1	0	0	9	13	99	1	5	4.8	
.08	23845	347	822	1937	1966	11	15	1312	6	14	110	170	4	9	1	0	0	2	0	0	9	13	99	1	5	4.8	
.06	20738	329	129	2144	3524	<2	24	1412	3	19	170	250	4	6	4	0	0	3	0	0	9	13	99	1	5	4.8	
.18	20329	285	131	1697	3745	<2	28	1403	3	13	250	310	4	9	1	0	0	4	0	0	9	13	99	1	5	4.8	
.06	26282	351	552	3782	3516	3	39	1601	6	6	0	70	2	10	0	0	0	0	3	0	40	38	95	3	5	5.3	20
.12	23569	412	289	2254	2518	3	23	1447	6	8	70	130	3	6	0	4	0	2	3	0	40	38	95	3	5	5.3	20
.09	5247	626	2304	847	1384	24	112	1214	4	54	130	170	3	9	0	1	0	4	3	0	40	38	95	3	5	5.3	20
.15	3757	676	3024	806	1035	25	233	1291	5	46	0	20	1	10	0	0	0	0	4	0	35	15	95	3	5		
.06	6398	516	860	1169	1012	37	51	1381	3	74	20	50	2	10	0	0	0	1	4	0	35	15	95	3	5		
.08	15451	415	791	1204	681	19	5	973	9	13	50	100	4	8	2	0	0	2	4	0	35	15	95	3	5		
.08	22861	310	661	1535	1680	16	8	1231	15	13	100	240	4	9	0	1	0	3	4	0	35	15	95	3	5		
.16	4624	869	3474	638	825	22	211	1322	4	52	0	20	1	10	0	0	0	0	10	0	25	20	95	3	5	5.4	10
.14	6241	630	907	1034	849	28	51	1067	2	44	20	90	2	10	0	0	0	1	10	0	25	20	95	3	5	5.4	10
.12	18319	352	1173	2053	1952	24	42	1394	9	11	90	150	4	8	0	2	0	3	10	0	25	20	95	3	5	5.4	10
.08	22712	392	4331	7814	5731	22	89	2796	9	21	150	180	4	6	3	1	0	4	10	0	25	20	95	3	5	5.4	10
.18	1666	376	2190	562	447	40	46	582	5	32	0	20	2	10	0	0	0	0	2	0	32	18	90	1	5	4.7	18
.04	4615	442	396	1264	489	14	3	394	2	8	20	100	3	10	0	0	0	1	2	0	32	18	90	1	5	4.7	18
.04	6754	427	320	1173	544	18	2	462	2	3	100	150	3	8	2	0	0	2	2	0	32	18	90	1	5	4.7	18
.03	17089	390	342	1625	1582	5	16	737	3	6	150	250	4	9	1	0	0	3	2	0	32	18	90	1	5	4.7	18
.04	18519	418	130	1704	2056	3	24	884	3	4	250	300	3	7	3	0	0	3	2	0	32	18	90	1	5	4.7	18
.04	14080	387	494	1069	2110	12	22	713	5	10	300	350	3	10	0	0	0	4	2	0	32	18	90	1	5	4.7	18
.04	13125	442	177	1536	1984	4	23	693	2	11	350	370	3	3	7	0	0	4	2	0	32	18	90	1	5	4.7	18
.10	15672	446	6977	14166	7450	11	87	3197	9	76	370	480	5	2	0	0	0	5	2	0	32	18	90	1	5	4.7	18
.16	5219	625	2375	594	918	28	73	1106	2	41	0	20	1	10	0	0	0	0	10	0	35	20	95	3	5	5.2	24
.17	6072	570	831	1277	1105	42	19	910	5	48	20	50	3	8	2	0	0	1	10	0	35	20	95	3	5	5.2	24
.08	21504	499	3515	8877	5069	4	63	2420	9	19	50	100	3	8	2	0	0	3	10	0	35	20	95	3	5	5.2	24
.11	2423	447	2650	562	597	21	114	739	5	41	0	20	1	10	0	0	0	0	2	0	23	25	95	1	4	5.1	6
.27	7348	443	429	1227	809	23	9	606	3	37	20	70	2	10	0	0	0	1	2	0	23	25	95	1	4	5.1	6
.07	17734	484	311	1746	909	<2	5	891	3	16	70	200	5	8	2	0	0	2	2	0	23	25	95	1	4	5.1	6
.03	15290	392	417	1764	1744	2	17	791	3	24	200	300	4	2	8	0	0	4	2	0	23	25	95	1	4	5.1	6
.16	14823	424	8780	19057	13882	9	111	4775	15	139	300	370	5	2	0	0	0	5	2	0	23	25	95	1	4	5.1	6
.09	7596	357	1099	816	1117	22	59	1458	5	27	0	30	2	10	0	0	0	0	0	0	50	10	85	2	3	5.0	46
.23																											

Appendix 2C: Physical and chemical characteristics of peat samples from the Cochrane-Kapuskasing area.

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42H	82	F2200W	109	4.3	3.5	46	79	94	.06	1.03	15.9	31.8	3.5	78.9	4256	45.2	43.2	37.7	1.2	5.3	.07	44.7	<.1
42H	82	F2200W	147	4.7	3.8	21	74	89	.11	1.05	8.3	14.5	4.8	73.5	4883	48.6	46.2	23.1	2.1	5.5	.04	39.0	<.1
42H	82	F2200W	159	5.9	4.9	30	72	89	.11	1.06	8.3	14.0	5.4	68.3	4547	50.0	49.1	23.8	2.1	5.8	.01	36.7	<.1
42H	82	F2200W	251	5.2	5.1	33	56	89	.11	1.04	8.3	12.0	8.6	68.9	4852	52.4	50.8	32.8	1.6	5.1	.02	32.3	<.1
42H	82	F2200W	166	5.4	5.2	38	68	89	.12	1.04	7.9	13.4	7.5	63.2	4588	51.3	50.1	30.2	1.7	5.5	.04	34.0	<.1
42H	82	G800W+700S	178	4.4	3.2	24	93	94	.06	1.02	16.9	33.0	2.3	82.3	4349	49.2	47.4	49.2	1.0	4.6	.04	42.9	<.1
42H	82	G800W+700S	245	4.7	3.5	27	71	93	.07	1.04	13.9	24.2	3.1	80.3	4598	47.9	45.9	36.8	1.3	4.6	.03	43.1	<.1
42H	82	G800W+700S	239	5.2	4.5	29	53	90	.11	1.06	8.9	17.3	3.7	72.4	4836	54.4	52.3	24.7	2.2	5.5	.03	34.2	<.1
42H	82	G800W+700S	185	5.1	4.6	26	75	92	.08	1.05	12.0	18.3	5.5	68.2	4850	55.9	53.5	25.4	2.2	6.0	.01	30.4	<.1
42H	82	G800W+700S	113	6.1	4.5	34	81	92	.09	1.04	11.2	17.9	5.0	72.7	4855	46.9	43.9	21.3	2.2	4.8	.04	41.1	<.1
42H	82	G800W+700S	152	5.5	4.0	35	78	93	.08	1.05	12.3	18.5	5.2	66.3	4919	49.8	47.6	26.2	1.9	4.8	.08	38.2	<.1
42H	82	G800W+700S	150	5.8	5.0	39	66	90	.11	1.06	9.0	15.2	7.4	66.2	4831	51.1	50.0	23.2	2.2	5.4	.15	33.7	<.1
42H	82	B1900E	192	4.4	3.4	49	91	95	.05	1.02	18.2	38.7	2.8	79.3	4093	51.2	49.8	46.5	1.1	5.4	.04	39.5	0.1
42H	82	B1900E	180	4.6	4.6	27	61	91	.10	1.05	9.5	13.5	6.3	71.3	4935	51.6	50.1	23.5	2.2	5.2	.02	34.7	<.1
42H	82	B1900E	185	5.6	5.1	35	46	88	.12	1.07	7.6	12.0	8.4	64.8	4787	51.2	49.2	28.4	1.8	5.4	.03	33.2	0.5
42H	82	B1900E	262	5.8	5.2	41	55	87	.14	1.08	6.8	11.1	9.4	62.8	4518	47.3	45.3	39.4	1.2	4.7	.04	37.4	<.1
42H	82	L1300E+500N	123	4.4	3.5	28	80	94	.07	1.04	14.6	25.1	4.0	79.4	4425	51.4	49.6	42.8	1.2	6.0	.01	37.4	0.3
42H	82	L1300E+500N	157	5.1	3.8	24	63	91	.10	1.06	10.0	16.3	3.7	75.2	4765	56.0	54.0	29.5	1.9	5.6	.04	32.8	0.1
42H	82	L1300E+500N	221	4.8	4.1	22	65	90	.10	1.06	9.3	14.9	4.1	69.5	4826	56.9	55.8	35.6	1.6	5.4	.05	32.0	<.1
42H	82	L1300E+500N	262	5.4	4.5	41	56	87	.14	1.09	6.6	9.2	5.5	64.7	4573	56.2	54.8	46.8	1.2	5.7	.01	31.4	<.1
42H	82	L1300E+ 500N	240	5.9	5.3	46	41	85	.16	1.06	5.7	7.9	9.3	60.2	4353	50.8	48.2	46.2	1.1	5.1	.04	33.7	<.1
42H	82	L1300E+ 500N	236	6.2	5.0	48	65	89	.11	1.07	8.4	15.0	8.1	64.9	4056	54.2	51.7	54.2	1.0	5.1	.04	31.6	<.1
42H	177	B900S	248	4.2	3.4	119	78	93	.07	1.02	13.5	27.2	2.2	83.0	4335	48.0	46.1	43.6	1.1	5.0	.01	43.7	<.1
42H	177	B900S	165	5.2	3.9	34	64	90	.11	1.04	8.6	15.8	5.0	77.4	4839	52.8	50.0	22.0	2.4	5.5	.04	34.3	<.1
42H	177	B900S	191	5.8	4.7	35	57	89	.12	1.05	7.9	14.4	5.4	67.9	4149	57.0	56.2	28.5	2.0	6.1	.03	29.5	0.4
42H	177	B900S	182	6.3	5.4	48	54	86	.15	1.06	6.3	14.3	8.9	60.6	4580	51.5	51.0	46.8	1.1	5.2	.08	33.2	<.1
42H	177	F900W	238	4.3	3.0	68	104	92	.08	.98	11.3	16.5	2.3	76.7	4375	45.6	45.0	57.0	0.8	4.6	.04	46.7	<.1
42H	177	F900W	176	4.4	3.5	24	56	93	.07	1.01	12.7	23.1	5.9	76.3	4591	49.9	47.4	29.4	1.7	5.2	.05	37.2	0.2
42H	177	F900W	166	5.5	4.7	43	65	87	.14	1.08	6.5	10.7	6.5	65.4	4837	50.8	48.8	29.9	1.7	4.9	.02	36.1	0.3
42H	177	F900W	157	5.8	5.6	48	50	88	.13	1.07	7.1	11.8	7.7	62.7	4592	48.9	48.2	24.4	2.0	5.0	.01	36.4	<.1
42H	177	F900W	238	5.7	5.5	33	75	91	.09	1.05	10.1	20.9	8.6	66.2	4495	49.6	49.2	29.2	1.7	5.2	.04	34.9	<.1
42H	177	F900W	105	6.6	5.9	109	33	71			2.4		60.2			21.2	19.8			3.0	.03		
42H	280	B1400W	165	5.7	4.6	68	65	91	.10	1.06	9.5	16.2	8.9	66.6	4382	47.2	46.9	18.2	2.6	5.4	.15	35.7	<.1
42H	280	B1400W	203	5.7	4.8	38	50	85	.16	1.08	5.6	9.6	7.2	65.5	4687	52.2	52.0	24.9	2.1	5.9	.08	32.5	0.1
42H	280	B1400W	281	5.7	5.3	36	71	90	.11	1.06	8.6	14.5	5.1	68.9	4777	50.0	49.1	22.7	2.2	5.4	.01	37.3	0.8
42H	280	B1400W	275	6.2	5.2	38	66	91	.10	1.05	10.0	15.1	6.9	67.1	4654	40.6	38.8	19.3	2.1	4.5	.02	45.9	<.1
42H	280	B1400W	209	6.3	5.5	47	81	88	.12	1.07	7.6	11.0	8.7	60.0	4510	46.8	46.0	26.0	1.8	4.9	.04	37.8	0.1
42H	280	L1500W+1700N	306	4.6	3.2	64	100	93	.07	1.03	13.3	34.2	2.1	80.5	4353	47.4	45.9	67.7	0.7	4.4	.05	45.3	<.1
42H	280	L1500W+1700N	254	5.2	4.1	40	56	88	.13	1.03	7.3	11.8	6.0	65.8	4781	46.7	46.0	23.3	2.0	5.0	.02	40.3	0.7
42H	280	L1500W+1700N	231	5.8	4.6	38	52	86	.15	1.06	6.0	9.7	6.4	62.0	4717	51.1	49.2	28.4	1.8	5.2	.08	35.4	<.1
42H	280	L1500W+1700N	278	6.1	5.3	48	53	86	.15	1.07	6.1	10.3	7.8	61.0	4452	45.0	44.4	26.5	1.7	4.9	.07	40.5	<.1
42H	280	L 800W+1000N	256	4.1	3.7	191	92	92	.08	1.00	11.3	24.3	2.7	83.0	4294	45.1	44.6	56.4	0.8	5.1	.04	46.3	<.1
42H	280	L 800W+1000N	288	5.1	4.1	47	61	90	.10	1.03	9.1	19.5	5.5	71.3	4695	46.0	45.2	18.4	2.5	5.1	.01	40.9	0.2
42H	280	L 800W+1000N	262	5.5	4.9	32	52	87	.14	1.06	6.8	9.7	6.7	68.0	4735	44.3	44.0	24.6	1.8	5.1	.03	42.1	<.1
42H	280	L 800W+1000N	213	6.2	5.4	51	48	88	.13	1.05	7.1	10.5	7.8	63.7	4456	51.4	49.9	27.2	1.9	5.4	.07	33.4	<.1
42H	280	L 800W+1000N	134	6.2	5.6	46	60	89	.12	1.06	7.9	12.3	8.8	64.4	4292	51.1	50.0	25.6	2.0	5.7	.15	32.2	<.1
42H	209	G300W+ 200S	352	4.4	3.4	56	99	93	.07	1.00	13.1	28.3	2.3	76.6	4035	45.2	44.7	75.3	0.6	5.7	.04	46.2	<.1
42H	209	G300W+ 200S	375	4.7	3.8	50	57	90	.10	1.04	9.1	14.5	5.3	73.4	4759	52.0	51.4	26.0	2.0	6.1	.05	34.5	<.1
42H	209	G300W+ 200S	268	5.1	4.1	36	56	87	.14	1.05	6.8	10.8	5.7	66.1	4834	54.8	53.2	30.4	1.8	5.8	.05	31.8	<.1
42H	209	G300W+ 200S	245	5.8	5.1	44	55	85	.16	1.08	5.8	9.3	7.8	64.9	4465	52.2	50.8	29.0	1.8	5.3	.03	32.9	0.5
42H	209	G300W+ 200S	294	5.9	5.5	41	62	90	.11	1.06	8.8	14.3	7.3	67.2	4554	52.1	51.0	27.4	1.9	5.7	.08	32.9	<.1
42H	209	G300W+ 200S	245	6.4	5.3	39	68	90	.10	1.06	9.4	14.9	5.9	68.4	4736	52.2	51.7	22.7	2.3	6.2	.22	33.2	<.1
42H	209	G300W+ 200S	227	6.6	6.2	161	39	78			3.5		61.0			20.8	20.0			1.1	.35		
42H	209	B300W	269	4.3	3.8	65	90	90	.11	1.06	8.9	13.9	3.1	77.4	4121	46.8	45.6	46.8	1.0	5.6	.07	43.4	<.1
42H	209	B300W	280	5.1	4.4	32	57	90	.10	1.01	8.8	16.4	6.3	68.8	4691	50.8	49.0	23.1	2.2	5.9	.04	34.8	0.9
42H	209	B300W	326	5.8	5.0	33	41	85	.16	1.07	5.6	7.3	9.1	66.2	4519	49.6	49.0	23.6	2.1	5.0	.08	34.1	<.1
42H	209	B300W	493	6.1	3.9	46	51	86	.15	1.07	6.2	8.5	10.7	62.8	4251	49.3	48.6	32.9	1.5	4.6	.09	33.8	0.3
42H	241	B500S	382	4.4	3.2	35	99	91	.08	.98	10.6	30.5	1.3	81.4	4172	48.2	46.4	68.9	0.7	4.9	.04	44.8	0.2
42H	241	B500S	291	4.0	3.0	13	74	90	.11	1.05	8.7	17.8	2.1	73.5	4509	51.0	50.6	46.4	1.1	5.9	.01	39.9	<.1
42H	241	B500S	292	4.1	3.3																		

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP	BOT	HUM 1-9	PEAT S-C	TYPE L-X	REL POS	VEGETATION COVER					SUR WAT PH	AV D-W CM				
											INT (CM)	INT (CM)					T %	TS %	LS %	G %	SP %						
<.03	6300	510	400	1300	1400	<2	10	410	5	34	0	30	3	10	0	0	0	1	6	0	17	7	95	1	5	4.8	15
.05	11100	550	400	2400	1300	<2	15	370	2	4	30	50	4	10	0	0	0	1	6	0	17	7	95	1	5	4.8	15
<.03	19100	410	300	2400	2300	<2	5	560	1	2	50	80	5	9	1	0	0	2	6	0	17	7	95	1	5	4.8	15
.03	25500	270	600	4500	3700	<2	15	830	2	<2	80	150	4	9	0	1	0	3	6	0	17	7	95	1	5	4.8	15
<.03	31400	220	200	2200	5100	<2	30	910	<1	2	150	230	4	9	0	1	0	4	6	0	17	7	95	1	5	4.8	15
<.03	2500	470	400	700	800	<2	10	430	<1	36	0	20	2	10	0	0	0	1	6	0	18	6	95	1	5	4.8	8
<.03	4900	480	200	1100	800	6	5	320	2	30	20	40	3	10	0	0	0	1	6	0	18	6	95	1	5	4.8	8
.04	10350	470	300	2050	950	<2	5	400	1	4	40	160	4	8	2	0	0	2	6	0	18	6	95	1	5	4.8	8
<.03	17800	310	300	2500	2200	<2	10	650	<1	2	160	200	4	4	6	0	0	3	6	0	18	6	95	1	5	4.8	8
<.03	17400	230	200	1700	2300	<2	15	690	<1	4	230	300	4	2	8	0	0	4	6	0	18	6	95	1	5	4.8	8
<.03	20700	210	200	1600	2900	<2	20	850	4	4	300	320	4	3	7	0	0	4	6	0	18	6	95	1	5	4.8	8
.03	27600	290	700	3600	4100	<2	30	1340	4	10	320	350	4	0	10	0	0	4	6	0	18	6	95	1	5	4.8	8
<.03	2100	290	500	400	1000	2	25	330	<1	22	0	30	2	10	0	0	0	1	2	0	17	7	80	1	5	4.9	6
.05	21600	450	400	2700	2600	<2	15	790	<1	8	30	60	3	10	0	0	0	2	2	0	17	7	80	1	5	4.9	6
.03	24300	340	700	4700	3300	<2	20	1000	2	2	60	130	4	9	1	0	0	3	2	0	17	7	80	1	5	4.9	6
.06	40200	190	300	3400	6100	<2	55	1420	3	2	130	180	4	10	0	0	0	4	2	0	17	7	80	1	5	4.9	6
.05	5300	540	500	1000	1000	<2	20	510	<1	26	0	40	3	10	0	0	0	1	5	0	16	7	86	1	5	4.9	20
.03	8300	600	300	1700	900	2	10	410	1	6	40	60	4	10	0	0	0	1	5	0	16	7	86	1	5	4.9	20
.05	12200	430	300	1900	900	<2	<5	510	1	2	60	110	5	9	1	0	0	2	5	0	16	7	86	1	5	4.9	20
.03	24700	240	200	2300	1000	<2	<5	820	<1	2	110	150	5	8	1	1	0	3	5	0	16	7	86	1	5	4.9	20
<.03	40300	210	400	3700	2000	<2	35	1180	3	2	150	180	5	9	0	1	0	3	5	0	16	7	86	1	5	4.9	20
.04	40300	170	200	2500	2300	<2	30	1140	5	2	180	230	4	10	0	0	0	4	5	0	16	7	86	1	5	4.9	20
.05	2500	840	1800	600	900	14	55	600	24	36	0	40	2	10	0	0	0	1	6	0	10	9	95	1	5	4.8	18
.03	10900	750	400	2000	1100	2	5	520	31	6	40	50	4	10	0	0	0	1	6	0	10	9	95	1	5	4.8	18
<.03	19700	430	100	2200	2100	<2	10	780	78	6	50	100	4	2	8	0	0	2	6	0	10	9	95	1	5	4.8	18
<.03	30700	370	400	5000	4400	36	40	1240	48	<2	100	210	4	8	0	2	0	3	6	0	10	9	95	1	5	4.8	18
.04	1200	400	2800	400	300	<2	85	470	<1	26	0	20	2	10	0	0	0	1	6	0	19	4	95	1	5	4.7	22
.06	3600	560	700	2300	800	<2	10	420	1	24	20	30	3	10	0	0	0	1	6	0	19	4	95	1	5	4.7	22
.04	22700	350	300	2900	1900	<2	25	740	5	<2	30	140	4	10	0	0	0	2	6	0	19	4	95	1	5	4.7	22
.03	32800	230	100	2700	3400	<2	60	970	4	<2	140	180	4	9	0	1	0	3	6	0	19	4	95	1	5	4.7	22
<.03	25200	250	900	4200	4000	<2	55	1120	4	6	180	200	3	10	0	0	0	4	6	0	19	4	95	1	5	4.7	22
<.03	19900	570	16700	50900	22400	<2	240	10070	62	54	200	210	6	6	0	19	4	95	1	5 4.7 22							
.06	14600	1030	1000	3300	2600	8	50	2180	3	16	0	20	4	9	0	1	0	1	35	5	2	2	85	4	5	5.2	37
<.03	23100	420	400	3000	2200	<2	145	1750	4	14	20	70	4	9	0	1	0	1	35	5	2	2	85	4	5	5.2	37
.03	21300	300	100	1700	2400	<2	120	1480	2	6	70	100	4	0	10	0	0	2	35	5	2	2	85	4	5	5.2	37
.05	29200	300	200	2200	3500	<2	130	1790	4	2	100	150	4	8	2	0	0	3	35	5	2	2	85	4	5	5.2	37
.07	36000	290	400	2500	4900	<2	135	2090	2	2	150	250	4	9	0	1	0	4	35	5	2	2	85	4	5	5.2	37
.04	1200	180	900	300	300	8	20	310	3	16	0	20	2	10	0	0	0	1	5	0	35	2	95	1	5	4.2	39
.05	13900	530	500	2900	1100	<2	10	710	3	4	20	60	4	10	0	0	0	1	5	0	35	2	95	1	5	4.2	39
<.03	24300	330	300	2800	1600	<2	15	920	2	2	60	90	4	9	0	1	0	2	5	0	35	2	95	1	5	4.2	39
<.03	33700	240	400	3100	3300	<2	70	1190	2	2	90	170	4	10	0	0	0	4	5	0	35	2	95	1	5	4.2	39
<.03	4600	590	2200	800	1100	10	100	1080	4	30	0	10	2	10	0	0	0	1	11	0	26	7	95	1	5	4.8	10
.04	11400	680	500	2900	1400	<2	20	940	4	2	10	30	3	9	0	1	0	1	11	0	26	7	95	1	5	4.8	10
<.03	17300	400	600	3600	1300	<2	10	1220	3	<2	30	120	4	9	0	1	0	2	11	0	26	7	95	1	5	4.8	10
.06	34200	265	350	2600	2950	<2	50	1585	3	<2	120	200	4	8	1	1	0	3	11	0	26	7	95	1	5	4.8	10
.08	36500	290	500	2700	4500	<2	70	1630	8	6	200	260	4	9	1	0	0	4	11	0	26	7	95	1	5	4.8	10
<.03	4500	370	1500	600	700	8	70	680	3	34	0	10	2	10	0	0	0	1	7	0	30	4	95	1	5	4.8	15
.10	10600	9040	8600	2200	1000	2	145	480	2	4	10	30	3	10	0	0	0	1	7	0	30	4	95	1	5	4.8	15
.06	17700	350	400	2800	1700	<2	10	560	1	<2	30	110	4	9	0	1	0	2	7	0	30						

Appendix 2C: Cochrane-Kapuskasing area (continued).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM	
42H	239	B1300S	276	6.0	5.1	56	71	88	.13	1.06	7.4	10.4	8.8	63.4	4183	52.2	51.6	21.8	2.4	5.3	.08	31.2	<.1	
42H	239	B1300S	262	6.3	5.2	36	46	84	.17	1.08	5.3	7.5	10.3	63.9	4145	52.6	52.0	30.9	1.7	5.4	.07	29.9	.3	
42H	239	B1300S	135	6.4	5.6	42	27	74	.29	1.12	2.9	5.4	31.7	48.2	3141	39.6	38.2	33.0	1.2	4.2	.07	23.2	.1	
42H	239	B800S	125	4.4	4.3	41	94	94	.06	1.01	16.5	30.0	2.6	77.4	4093	49.1	47.6	44.6	1.1	5.1	.07	42.0	.2	
42H	239	B800S	171	5.0	3.5	37	77	93	.07	1.01	13.1	25.2	1.8	77.9	4274	51.0	50.0	36.4	1.4	5.7	.11	40.0	<.1	
42H	239	B800S	217	4.7	4.2	17	60	91	.09	1.05	10.2	18.6	3.2	70.0	4550	54.1	53.6	23.5	2.3	6.2	.03	34.2	<.1	
42H	239	B800S	186	5.8	5.3	48	41	86	.15	1.06	6.1	9.8	6.2	64.9	4620	54.3	53.1	29.4	1.9	5.3	.06	32.3	<.1	
42H	239	B800S	292	6.6	5.4	42	67	91	.09	1.05	10.4	17.0	5.5	67.4	4446	55.1	54.1	26.2	2.1	6.0	.04	31.3	<.1	
42H	239	B100S	202	5.3	3.3	69	99	94	.06	.99	15.4	37.8	2.1	77.8	4115	47.8	46.0	68.3	0.7	5.6	.05	43.8	<.1	
42H	239	B100S	216	6.0	5.1	51	74	88	.12	1.04	7.4	11.0	7.3	70.0	4671	56.0	55.0	26.7	2.1	6.1	.03	28.5	<.1	
42H	239	B100S	203	6.0	5.5	45	65	88	.12	1.04	7.6	12.4	9.0	68.6	4393	50.6	49.0	20.2	2.5	5.1	.06	32.7	<.1	
42H	239	B100S	212	6.4	5.4	53	51	88	.13	1.05	7.3	11.1	19.4	32.2	4158	47.6	46.9	28.0	1.7	4.2	.04	27.1	<.1	
42G	387	L1500N+	300E	183	6.6	6.3	151	83	92	.08	1.04	11.8	20.4	7.6	68.6	4153	50.0	49.0	35.7	1.4	5.6	.07	35.3	0.6
42G	387	L1500N+	300E	180	6.1	5.4	30	64	91	.10	1.05	9.5	14.8	5.9	69.1	4636	56.2	55.0	20.8	2.7	6.1	.03	29.1	<.1
42G	387	L1500N+	300E	144	6.2	5.7	24	69	91	.09	1.04	10.2	15.2	5.0	68.8	4821	54.8	52.4	20.3	2.7	5.9	.01	31.6	<.1
42G	387	L1500N+	300E	176	6.1	4.8	24	73	91	.09	1.04	10.2	15.8	5.7	67.0	4995	51.4	49.8	19.0	2.7	5.3	.05	34.8	0.2
42G	387	L1500N+	300E	253	6.1	5.4	32	69	92	.08	1.07	11.7	17.9	9.3	66.3	4412	54.6	54.1	28.7	1.9	5.6	.04	28.6	<.1
42G	387	L1500N+	300E	211	6.3	5.2	36	56	90	.13	1.21	8.5	11.9	8.1	61.7	4458	56.3	55.6	29.6	1.9	5.7	.08	27.9	<.1
42G	387	L1500N+	300E	147	6.7	5.5	51	66	89	.11	1.05	8.3	11.8	17.0	59.0	4253	51.4	49.2	20.6	2.5	5.5	.04	23.6	<.1
42G	387	L1500N+	300E	55	6.8	5.8	68	34	70	.32	1.06	2.4	2.5	76.2	21.4	13.8	11.8	15.3	0.9	1.9	.08	7.1	<.1	
42G	387	L2300N+	500W	175	5.8	5.2	34	64	90	.10	1.05	9.2	13.1	7.4	70.7	4528	54.1	52.1	28.5	1.9	5.0	.01	31.6	<.1
42G	387	L2300N+	500W	204	5.9	5.0	45	53	87	.14	1.07	6.9	14.6	7.9	65.8	4431	54.8	52.3	36.5	1.5	5.5	.07	30.4	.3
42G	387	L2300N+	500W	166	6.1	5.5	48	30	81	.21	1.10	4.3	5.6	21.0	55.1	3757	45.1	44.1	28.2	1.6	3.9	.07	28.3	<.1
42G	387	L2300N+	400E	149	4.5	3.7	76	91	93	.08	1.04	12.9	24.9	3.6	82.9	4506	51.0	50.0	36.4	1.4	5.0	.08	38.9	0.2
42G	387	L2300N+	400E	114	5.5	4.1	22	57	90	.10	1.05	9.0	16.0	4.3	69.4	5242	53.6	52.4	20.6	2.6	5.2	.04	34.3	<.1
42G	387	L2300N+	400E	119	5.2	4.4	21	71	90	.10	1.04	9.4	14.7	3.4	70.1	4927	51.1	49.7	18.9	2.7	5.7	.01	37.1	<.1
42G	387	L2300N+	400E	159	5.4	4.9	34	61	91	.09	1.05	10.5	17.3	4.4	70.8	4797	56.2	54.6	20.2	2.8	5.5	.04	31.2	.9
42G	387	L2300N+	400E	159	5.7	5.2	35	75	92	.08	1.04	11.3	18.7	3.8	75.1	4862	53.7	52.5	19.9	2.7	5.4	.01	34.4	<.1
42G	387	L2300N+	400E	167	5.7	5.1	39	71	91	.10	1.06	10.1	14.1	7.6	66.7	4668	55.4	54.0	27.7	2.0	5.7	.01	29.3	0.3
42G	387	L2300N+	400E	212	6.1	5.5	43	68	90	.11	1.05	8.9	11.8	13.6	61.5	4156	52.1	50.8	27.4	1.9	5.3	.02	27.1	0.2
42G	387	L2300N+	400E	168	6.0	5.6	33	71	91	.09	1.04	10.2	14.3	8.0	62.8	4354	53.2	52.2	28.0	1.9	5.4	.08	31.4	<.1
42G	316	B500E	210	5.0	3.3	47	83	93	.07	1.04	13.7	23.4	3.5	75.0	4193	49.5	48.8	45.0	1.1	4.9	.08	40.9	.3	
42G	316	B500E	251	4.7	3.8	47	52	87	.14	1.06	6.8	10.3	4.5	70.4	4666	55.6	54.0	27.8	2.0	5.5	.05	32.3	1.7	
42G	316	B500E	204	4.8	4.1	47	47	87	.14	1.05	6.5	9.4	4.9	72.7	4764	56.8	55.8	29.9	1.9	6.5	.03	29.9	<.1	
42G	316	B500E	188	5.7	4.9	52	45	85	.16	1.07	5.6	7.9	6.4	63.9	4491	56.0	55.0	37.3	1.5	6.4	.07	29.6	.3	
42G	316	B500E	180	6.5	5.5	53	56	87	.14	1.06	6.6	10.9	11.0	63.8	4195	51.2	50.2	23.3	2.2	5.5	.08	30.0	.2	
42G	316	B500E	191	6.8	5.7	78	45	84	.18	1.10	5.2	7.9	20.8	56.3	3915	45.7	44.8	20.8	2.2	5.2	.21	25.9	.7	
42G	316	B1900E	238	4.0	2.9	11	100	95	.05	1.02	18.6	40.2	2.1	80.2	4308	49.2	48.5	44.7	1.1	5.6	.07	41.9	.1	
42G	316	B1900E	188	4.1	3.1	14	52	88	.13	1.05	7.0	12.6	2.9	78.0	4637	55.8	54.3	21.5	2.6	6.2	.06	32.4	.5	
42G	316	B1900E	188	4.5	3.5	25	39	89	.12	1.04	7.8	11.1	3.3	71.0	4310	56.0	55.0	35.0	1.6	5.9	.04	33.2	.5	
42G	316	B1900E	175	5.2	4.5	35	55	90	.10	1.04	9.2	14.3	3.5	65.9	4657	56.0	55.0	29.5	1.9	5.9	.01	32.7	.5	
42G	316	B1900E	146	6.7	5.2	44	64	91	.09	1.04	10.4	17.6	3.9	75.3	4563	52.8	51.0	21.1	2.5	5.7	.04	35.1	.4	
42G	316	B1900E	143	5.9	5.4	37	85	92	.09	1.02	10.8	21.1	3.6	70.1	4481	54.1	53.2	21.6	2.5	6.2	.01	33.6	.4	
42G	316	B1900E	292	6.6	5.0	57	64	91	.09	1.04	10.4	20.2	7.5	71.1	4222	52.5	50.4	21.9	2.4	5.9	.04	31.7	.4	
42G	316	B1900E	242	6.1	5.9	263	65	84	.17	1.05	5.3	9.2	25.5	57.8	3429	40.0	38.8	14.3	2.8	4.1	.36	27.2	.4	
42G	311	B900N	335	5.2	3.3	41	88	94	.06	1.00	14.6	28.3	2.6	81.8	4039	46.2	45.1	57.8	0.8	4.4	.03	46.0	.7	
42G	311	B900N	284	5.6	4.1	38	57	89	.11	1.05	8.3	13.8	5.0	67.9	4739	52.1	50.6	23.7	2.2	5.1	.07	35.5	.2	
42G	311	B900N	206	6.0	5.2	42	48	87	.14	1.06	6.8	10.3	7.2	68.4	4644	50.6	49.0	28.1	1.8	5.4	.01	35.0	.1	
42G	311	B900N	228	6.3	5.6	47	49	86	.15	1.07	6.1	9.4	9.7	66.5	4294	47.6	45.8	26.4	1.8	4.3	.08	36.5	.3	
42G	311	B2700N	256	4.9	3.3	123	99	93	.06	.96	13.9	29.5	2.3	77.7	4273	46.7	45.2	58.4	0.8	4.2	.04	46.0	.1	
42G	311	B2700N	208	4.7	3.3	39	89	92	.08	1.03	11.7	22.8	4.2	73.5	4300	48.6	47.2	40.5	1.2	4.8	.17	41.0	<.1	
42G	311	B2700N	240	5.2	3.9	45	61	89	.12	1.06	7.8	13.0	4.4	68.6	4754	51.6	50.0	22.4	2.3	5.3	.04	36.4	.2	
42G	311	B2700N	157	5.6	5.1	52	46	86	.14	1.06	6.3	9.5	6.4	65.8	3733	52.6	50.8	29.3	1.8	5.0	.06	34.4	<.1	
42G	311	B2700N	220	5.3	5.8	62	66	88	.12	1.06	7.5	11.8	8.7	63.7	4547	53.4	52.2	25.4	2.1	5.4	.22	30.2	.3	
42G	311	B2700N	269	6.3	5.2	57	67	89	.12	1.07	7.8	12.8	7.3	63.7	4295	49.4	47.9	30.9	1.6	4.3	.06	37.3	.2	
42G	311	B2700N				28			.4				88.9	10.8		3.3	2.0	4.1	0.8	.7	.07	6.2		
42G	316	L2000E+400S	261	5.2	3.4	40	94	93	.07	1.01	13.1	20.4	1.4	75.6	4235	53.6	51.8	48.7	1.1	5.6	.06	38.2	.4	
42G	316	L2000E+400S	252	4.5	3.6	24	76	90	.11	1.05	8.8	12.8	7.4	69.0	4564	56.0	55.1	25.5	2.2	6.3	.08	28.0	<.1	
42G	316	L2000E+400S	210	5.1	4.0	33	55	91	.10	1.05	9.5	13.6	3.9	69.2	5102	54.6	53.2	24.8	2.2	5.4	.07	33.8	.5	
42G	316	L20																						

HG	CA	P	K	AL	FE	PB	MN	MG	CU	ZN	TOP	BOT	HUM	PEAT	TYPE	REL	VEGETATION COVER				SUR	AV						
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PMM	PMM	INT	INT	1-9	S	-C	-L	-X	POS	T %	TS %	LS %	G %	SP %	FOR	SUB	WAT	D-W	CM
.11	23500	590	900	4400	3300	10	290	1930	4	32	0	30	4	8	0	2	0	2	2	58	31	8	80	6	5	5.4	8	
.06	24500	280	900	5500	2600	<2	145	1720	<1	6	30	50	4	9	0	1	0	4	2	58	31	8	80	6	5	5.4	8	
.10	33600	510	7200	25200	10100	<2	215	4330	7	34	50	80	2	10	0	0	0	5	2	58	31	8	80	6	5	5.4	8	
.05	3700	500	1000	1200	1000	24	25	670	2	28	0	20	2	10	0	0	0	1	8	0	18	6	95	1	5	4.9	21	
.03	4400	440	400	1200	700	16	10	460	1	18	20	50	3	10	0	0	0	1	8	0	18	6	95	1	5	4.9	21	
<.03	10600	470	400	1900	800	6	10	680	1	<2	50	100	4	10	0	0	0	1	8	0	18	6	95	1	5	4.9	21	
.03	26200	300	400	2850	1900	<2	20	1520	1	<2	100	270	4	8	1	1	0	3	8	0	18	6	95	1	5	4.9	21	
<.03	26800	270	400	2700	2500	<2	45	1430	<1	<2	270	320	4	2	8	0	0	4	8	0	18	6	95	1	5	4.9	21	
<.03	2700	450	2700	500	500	8	55	540	3	22	0	10	2	10	0	0	0	1	2	0	16	5	95	1	5	4.5	21	
.08	27100	350	400	3200	4200	<2	30	660	<1	<2	10	120	4	10	0	0	0	2	2	0	16	5	95	1	5	4.5	21	
<.03	28500	320	800	4600	4700	<2	45	950	<1	<2	120	150	4	0	10	0	0	3										
<.03	31000	320	3600	13100	7800	<2	75	2170	4	10	150	170	4	7	2	1	0	4	2	0	16	5	95	1	5	4.5	21	
.03	31500	710	1000	1400	2400	4	920	3270	2	60	0	20	2	10	0	0	0	1	6	0	11	12	40	3	5	5.6	10	
<.03	21300	490	400	2000	1100	<2	25	2000	<1	4	20	100	3	7	3	0	0	1	6	0	11	12	40	3	5	5.6	10	
<.03	21200	350	300	1500	1400	<2	<5	1220	<1	2	100	150	4	4	6	0	0	2	6	0	11	12	40	3	5	5.6	10	
<.03	25100	320	300	1400	2300	<2	20	1220	<1	4	150	350	4	3	7	0	0	3	6	0	11	12	40	3	5	5.6	10	
.06	33800	290	600	3500	3700	<2	35	1790	9	2	350	360	4	9	1	0	0	4	6	0	11	12	40	3	5	5.6	10	
.03	38000	240	300	2300	4000	<2	45	1850	9	6	360	370	4	9	0	1	0	4	6	0	11	12	40	3	5	5.6	10	
<.03	30500	510	3200	11800	5500	<2	60	2900	7	16	370	390	4	9	1	0	0	4	6	0	11	12	40	3	5	5.6	10	
<.03	16900	710	21600	62600	25200	<2	220	11170	<1	92	390	420	4	6	0	11	12	40	3	5	5.6	10						
<.03	27400	660	400	2800	2300	<2	165	2350	4	10	0	40	4	7	0	3	0	1	25	35	29	6	70	4	5	5.3		
.04	31850	440	400	3300	3400	<2	178	2170	8	20	40	170	4	8	0	2	0	2	25	35	29	6	70	4	5	5.3		
.04	41300	710	3100	15900	9700	<2	270	3420	38	38	170	180	7	9	0	1	0	4	25	35	29	6	70	4	5	5.3		
<.03	6400	640	1100	1200	1900	24	70	950	8	10	0	30	2	10	0	0	0	1	8	1	17	4	80	3	5	5.0	14	
.03	12000	590	300	2000	1500	2	55	790	8	8	30	50	3	2	7	1	0	1	8	1	17	4	80	3	5	5.0	14	
<.03	12900	390	100	1200	800	<2	20	940	3	2	50	120	4	1	9	0	0	1	8	1	17	4	80	3	5	5.0	14	
.03	15950	370	250	1850	1300	<2	5	1040	4	4	120	210	4	2	8	0	0	2	8	1	17	4	80	3	5	5.0	14	
.05	14800	300	100	1400	1900	<2	5	780	4	2	210	270	4	3	7	0	0	3	8	1	17	4	80	3	5	5.0	14	
.07	24100	320	600	3600	4500	<2	30	1150	10	4	270	350	4	1	9	0	0	3	8	1	17	4	80	3	5	5.0	14	
<.03	36700	370	1700	8300	7800	<2	75	2200	31	8	350	420	4	2	8	0	0	4	8	1	17	4	80	3	5	5.0	14	
<.03	33200	280	200	2700	6300	<2	50	1400	31	2	420	440	4	7	2	1	0	4	8	1	17	4	80	3	5	5.0	14	
<.03	5000	590	1000	2500	1200	22	15	490	3	24	0	20	3	10	0	0	0	1	2	0	28	6	98	1	5	4.8	19	
<.03	11100	550	400	2600	900	2	5	450	<1	<2	20	50	4	10	0	0	0	1	2	0	28	6	98	1	5	4.8	19	
.06	14500	420	400	2800	1100	<2	10	510	1	<2	50	60	5	10	0	0	0	2	2	0	28	6	98	1	5	4.8	19	
<.03	25400	280	300	3400	2300	<2	25	770	2	<2	60	140	4	8	0	2	0	3	2	0	28	6	98	1	5	4.8	19	
.04	33900	300	1400	7100	6000	<2	90	1570	<1	<2	140	160	4	10	0	0	0	4	2	0	28	6	98	1	5	4.8	19	
<.03	36300	420	4300	17600	10200	<2	140	3250	14	10	160	170	4	10	0	0	0	4	2	0	28	6	98	1	5	4.8	19	
<.03	1900	500	600	1600	900	20	10	350	2	28	0	30	3	10	0	0	0	1	6	0	22	7	98	1	5	4.5	13	
<.03	3500	480	200	1600	400	2	5	160	2	2	30	100	4	10	0	0	0	1	6	0	22	7	98	1	5	4.5	13	
<.03	6700	360	200	2800	500	2	5	230	2	<2	100	170	7	10	0	0	0	2	6	0	22	7	98	1	5	4.5	13	
<.03	14100	310	200	2000	1200	<2	15	420	1	<2	170	240	4	8	1	1	0	3	6	0	22	7	98	1	5	4.5	13	
<.03	18600	370	100	2100	2400	<2	30	550	<1	<2	240	250	4	2	8	0	0	4	6	0	22	7	98	1	5	4.5	13	
<.03	16700	290	200	1400	2400	<2	30	540	<1	<2	250	300	3	6	4	0	0	4	6	0	22	7	98	1	5	4.5	13	
<.03	25200	320	800	4200	4700	<2	55	940	<1	<2	300	320	4	2	8	0	0	4	6	0	22	7	98	1	5	4.5	13	
<.03	19800	460	6100	19600	12600	<2	115	4000	5	56	320	370	5	6	0	22	7	98	1	5	4.5	13						
.04	4400	480	900	1100	1200	14	35	940	1	28	0	30	2	10	0	0	0	1	12	0	29	5	98	1	5	4.7	15	
.03	15300	520	500	2500	1300	<2	10	870	1	<2	30	70	3	10	0	0	0	2	12	0	29	5	98	1	5	4.7	15	
.08	25500	330	400	3700	2400	<2	30	1210	2	<2	70	110	4	9	0	1	0	2	12	0	29	5	98	1	5	4.7	15	
<.03	35300	300	700	5100	4600	<2	80	1540	3	<2	110	200	4	8	0	2	0	4	12	0	29	5	98	1	5	4.7	15	
<.03	2800	650	2700	900	800	8	65	860	2	28	0	10	1	10	0	0	0	0	5	0	25	5	98	1	5	4.5	29	
.04	5100	580	900	2400	1100	14	15	620	2	24	10	30	2	10	0	0	0	1	5	0	25	5	98	1	5	4.5	29	
<.03	12500	560	400	2300	900	2	5	640	1	<2	30	60	3	9	1	0	0	1	5	0	25	5	98	1	5	4.5	29	
.04	26450	315	450	2750	2850	2	30	1170	4	<2	60	190	4	8	2	0	0	2	5	0	25	5	98	1	5	4.5	29	
.03	33400	280	1000	2900	6400	<2	85	1800	2	<2	190	220	4	7	2	1	0	4	5	0	25	5	98	1	5	4.5	29	
<.03	38200	270	700	2900	5800	<2	75	1750	8	<2	220	240	4	10	0	0	0	4	5	0	25	5	98	1	5	4.5	29	
<.03	51800	600	29700	69700	32300	<2	490	28750	<1	58	240	250	6	5	0	25	5	98	1	5	4.5	29						
<.03	6100	510	700	1500	800	10	10	510	2	8	0	20	3	10	0	0	0	1	11	0	40	6	98	1	5	4.8	19	
.04	9600	660	1400	4700	1800	<2	25	1370	2	<2	20	50	4	9	1	0	0	1	11	0	40	6	98	1	5	4.8	19	
<.03	11100	470	500	2400	800	<2	5	430	3	&																		

Appendix 2D: Physical and chemical characteristics of peat samples from the Timmins-Kirkland Lake area.

PEAT LAND NTS	NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42A	24	B1500S	202	4.7	3.7	66	99	93	.07	1.02	13.9	23.9	3.1	75.8	4257	49.1	48.6	44.6	1.1	5.6	.17	40.9	<.1
42A	24	B1500S	117	5.5	4.5	38	59	92	.08	1.03	11.9	21.3	4.9	72.3	4831	50.5	50.1	30.4	1.7	5.2	.11	37.7	<.1
42A	24	B1500S	176	5.6	4.8	28	49	91	.09	1.06	10.2	13.2	5.3	67.1	4814	53.4	53.0	22.3	2.4	5.5	.01	33.4	.1
42A	24	B1500S	134	6.1	5.9	31	48	90	.11	1.08	8.9	11.7	8.7	64.1	4983	52.6	52.2	26.3	2.0	5.4	.03	31.3	<.1
42A	24	B1500S	138	6.2	5.7	34	50	92	.09	1.07	11.0	17.4	5.6	67.9	4744	53.0	52.4	23.0	2.3	5.4	.01	33.7	<.1
42A	24	B1500S	160	6.3	5.8	39	62	92	.08	1.06	12.2	14.0	11.1	60.5	4437	52.0	51.4	23.6	2.2	5.2	.10	29.4	<.1
42A	24	L2000S+100W	151	5.0	4.1	55	92	93	.07	1.02	13.1	25.9	3.7	75.0	4140	49.5	49.2	55.0	0.9	6.0	.10	39.8	<.1
42A	24	L2000S+100W	193	5.0	4.2	44	86	93	.08	1.03	12.5	22.8	3.7	77.4	4167	46.8	46.2	46.8	1.0	5.6	.05	42.8	<.1
42A	24	L2000S+100W	221	5.3	4.6	29	69	92	.09	1.07	10.9	15.3	5.5	67.7	4789	53.7	53.4	22.4	2.4	5.8	.17	32.4	.1
42A	24	L2000S+100W	212	5.6	5.0	22	51	89	.12	1.09	8.3	15.1	6.5	64.8	4702	49.2	48.9	25.9	1.9	4.7	.11	37.6	<.1
42A	24	L2000S+100W	200	6.7	5.6	42	55	89	.11	1.05	8.3	11.6	8.5	62.5	4548	51.0	50.6	28.3	1.8	5.6	.07	33.0	.6
42A	24	B500S	194	5.9	4.1	77	78	93	.07	1.01	13.3	22.2	3.8	76.1	4179	52.1	51.3	52.1	1.0	5.9	.04	37.2	.8
42A	24	B500S	141	5.2	4.4	43	83	93	.07	1.02	14.2	21.9	3.6	72.9	4161	48.4	48.1	30.3	1.6	5.0	.07	41.3	.5
42A	24	B500S	183	6.0	5.0	25	67	92	.08	1.06	11.8	17.0	4.9	70.1	4938	53.9	53.4	20.0	2.7	4.7	.10	33.7	.2
42A	24	B500S	166	6.3	5.7	35	75	91	.09	1.04	10.6	14.9	9.9	63.7	4524	48.5	48.2	19.4	2.5	5.5	.09	33.5	<.1
42A	76	B1600N	204	4.5	2.9	230	93	93	.07	.99	13.3	29.5	1.9	80.3	4262	45.8	44.8	76.3	0.6	4.6	.05	47.0	.2
42A	76	B1600N	196	4.0	3.1	<10	74	94	.06	1.03	15.1	27.3	1.5	76.5	4651	49.9	49.6	41.6	1.2	5.3	.10	42.0	<.1
42A	76	B1600N	160	5.0	4.1	19	51	92	.09	1.03	10.8	18.3	2.9	74.7	5090	55.0	54.5	27.5	2.0	5.7	.07	34.3	<.1
42A	76	B1600N	79	6.2	5.6	60	33	83	.18	1.08	4.8	6.8	10.9	62.0	4597	49.5	49.0	27.5	1.8	4.5	.08	33.2	.1
42A	76	L1100N+400E	247	4.4	3.3	94	98	95	.06	1.00	17.2	33.1	2.5	78.9	4404	46.4	46.1	51.6	0.9	4.2	.01	46.0	<.1
42A	76	L1100N+400E	238	3.9	3.0	<10	78	94	.06	1.05	16.5	23.1	2.2	79.5	4215	47.8	47.2	43.5	1.1	4.2	.12	44.6	<.1
42A	76	L1100N+400E	228	4.0	3.0	<10	69	93	.08	1.05	12.9	18.2	2.4	73.0	4764	52.4	52.0	34.9	1.5	5.6	.06	38.0	<.1
42A	76	L1100N+400E	144	4.2	3.2	10	65	92	.09	1.05	10.9	18.3	2.5	76.4	5128	55.9	55.8	28.0	2.0	5.6	.10	33.9	<.1
42A	76	L1100N+400E	180	4.4	3.6	<10	54	91	.10	1.05	10.0	15.1	3.1	70.3	5341	56.0	55.8	26.7	2.1	6.0	.11	32.7	<.1
42A	76	L1100N+400E	229	4.9	4.0	20	44	87	.14	1.07	6.8	10.9	7.6	64.7	5063	52.2	51.7	32.6	1.6	5.2	.12	33.3	.3
42A	76	L600N+100E	264	4.3	3.1	42	96	95	.05	1.01	17.5	33.3	2.3	77.5	4391	45.4	45.2	64.9	0.7	5.1	.04	46.5	<.1
42A	76	L600N+100E	175	4.5	3.0	20	93	95	.05	1.04	19.4	36.4	1.9	81.2	4390	46.0	45.9	65.7	0.7	4.7	.08	46.6	.1
42A	76	L600N+100E	127	4.5	3.4	15	66	93	.08	1.04	12.9	24.2	2.7	78.6	5009	52.4	51.3	29.6	1.8	5.4	.03	37.8	.2
42A	76	L600N+100E	241	5.3	4.5	32	45	92	.09	1.06	11.0	23.3	2.0	67.1	4931	53.2	53.0	25.3	2.1	5.9	.09	36.7	1.7
42A	76	L600N+100E	132	5.8	5.1	32	29	84	.18	1.10	5.2	7.2	25.5	55.2	3272	47.5	46.9	27.9	1.7	4.6	.01	20.7	.4
42A	42	B500N	264	4.9	3.7	73	93	93	.07	1.03	12.7	23.0	3.0	79.1	4235	47.6	47.2	59.5	0.8	4.7	.04	43.9	.7
42A	42	B500N	126	4.4	3.7	60	79	93	.07	1.04	13.7	24.8	3.9	75.9	4445	49.6	49.0	41.3	1.2	4.9	.11	40.3	.1
42A	42	B500N	133	5.4	4.7	28	53	90	.11	1.07	8.8	15.4	4.8	70.2	5152	56.0	55.3	24.3	2.3	5.5	.05	31.3	<.1
42A	42	B500N	146	6.1	5.5	35	52	88	.13	1.06	7.2	11.0	8.0	83.7	4682	54.4	53.9	28.6	1.9	5.3	.08	30.3	.6
42A	42	B500N	168	6.1	5.6	39	47	88	.13	1.07	7.1	10.6	9.2	62.4	4395	49.4	49.1	23.5	2.1	5.1	.24	34.0	<.1
42A	42	L2000N+1500W	154	4.2	3.4	88	89	92	.08	1.01	11.7	22.5	2.8	79.5	4351	49.8	49.0	49.8	1.0	4.9	.10	41.4	<.1
42A	42	L2000N+1500W	183	4.2	3.4	25	74	92	.08	1.02	11.8	21.4	3.7	76.2	4437	50.0	49.8	45.5	1.1	5.1	.18	39.9	<.1
42A	42	L2000N+1500W	153	4.5	3.7	30	48	87	.13	1.04	6.9	10.7	4.5	71.1	4992	54.9	54.1	25.0	2.2	5.3	.01	33.1	<.1
42A	42	L2000N+1500W	182	4.9	4.2	21	58	89	.11	1.05	8.4	14.7	4.1	69.1	4858	54.1	53.6	21.6	2.5	5.5	.02	33.8	.6
42A	42	L2000N+1500W	132	5.1	4.3	26	65	91	.10	1.05	9.9	16.8	3.7	78.9	4867	53.6	53.1	20.6	2.6	5.9	.06	34.1	.7
42A	42	L2000N+1500W	174	6.1	5.5	33	62	91	.09	1.05	10.6	15.4	8.1	63.9	4579	52.1	51.5	27.4	1.9	5.5	.10	32.3	<.1
42A	53	B2800S	201	4.1	3.1	59	92	93	.07	.97	13.1	27.5	2.4	79.3	4035	48.4	48.0	53.8	0.9	4.4	.06	43.8	<.1
42A	53	B2800S	148	4.7	3.8	29	70	94	.06	1.03	16.2	24.9	3.3			51.4	51.0			5.6	.04		<.1
42A	53	B2800S	206	5.9	5.1	37	62	91	.10	1.06	10.1	15.5	5.9	70.5	5145	53.6	53.4	25.5	2.1	5.6	.01	32.8	<.1
42A	53	B2800S	138	6.3	5.7	40	41	89	.12	1.06	7.8	12.7	8.1	65.6	4906	54.4	54.0	28.6	1.9	5.8	.05	29.7	.1
42A	53	B2800S	150	6.4	5.8	43	48	91	.10	1.05	9.5	13.4	6.4	65.3	4825	54.0	53.6	21.6	2.5	5.5	.10	31.5	<.1
42A	53	B2800S	115	6.6	6.0	39	56	91	.09	1.05	10.5	17.8	7.1	67.2	4632	51.6	51.2	23.5	2.2	5.2	.09	33.8	.8
42A	53	B5200S	148	4.5	3.6	98	96	92	.08	1.01	12.0	21.6	2.7	77.6	4383	47.5	46.7	52.8	0.9	4.7	.04	44.2	.5
42A	53	B5200S	194	4.6	3.7	34	61	93	.07	1.04	13.3	17.6	4.6	78.3	3922	50.8	50.5	36.3	1.4	5.3	.15	37.7	<.1
42A	53	B5200S	157	4.6	3.9	13	43	88	.13	1.08	7.1	9.3	5.4	69.1	3978	55.0	54.1	23.9	2.3	5.4	.11	31.8	<.1
42A	53	B5200S	212	5.3	4.5	24	37	87	.14	1.07	6.4	10.5	6.1	67.0	4783	54.9	54.4	30.5	1.8	5.5	.04	31.7	.5
42A	53	B5200S	158	6.0	5.3	40	53	90	.11	1.06	8.6	15.7	6.1	64.8	4727	56.3	56.0	22.5	2.5	6.1	.07	28.9	.8
42A	53	B5200S	188	6.3	5.8	40	63	91	.09	1.04	10.0	17.8	6.1	66.6	4622	52.4	52.1	25.0	2.1	5.5	.27	33.6	.3
42A	53	B4400S	229	4.5	3.6	64	100	95	.05	1.02	17.9	33.1	2.8	79.3	4115	46.5	46.1	51.7	0.9	5.0	.06	44.7	<.1
42A	53	B4400S	261	4.8	3.9	32	87	95	.05	1.03	18.2	30.7	4.3		4869	50.2	50.0			.17		<.1	
42A	53	B4400S	223	5.5	4.8	35	48	90	.10	1.06	9.4	14.9	4.9	66.8	4792	57.9	57.1	25.2	2.3	6.2	.14	28.6	<.1
42A	53	B4400S	175	6.2	5.9	47	42	89	.12	1.06	8.1	11.6	7.1	65.7	4871	55.5	54.9	30.8	1.8	5.4	.01	30.2	.1
42A	53	B4400S	166	6.3	5.8	46	44	89	.12	1.07	7.9	10.0	10.2	65.8	4559	51.2	50.9	25.6	2.0	5.0	.09	31.5	.2
42A	53	B4400S	186	6.3	5.9	58	43	87	.13	1.06	6.9	10.7	10.6	62.8	4450	51.0	50.6	25.5	2.0	5.5	.16	30.7	<.1
42A	221	B500N	200	4.3	3.7	57	98	93	.07	.97	12.3	26.7	2.2										

HG	CA	P	K	AL	FE	PB	MN	MG	CU	ZN	TOP BOT		HUM	PEAT TYPE				REL	VEGETATION COVER						SUR	AV	
											INT	INT		S	C	L	X		T	TS	LS	G	SP	FOR			SUB
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PMM	PMM	(CM)	(CM)	1-9					POS	%	%	%	%	%		PH	CM	
.06	6800	620	2200	900	1500	10	70	1420	4	38	0	10	1	8	1	1	0	0	4	0	35	18	95	2	4	5.5	29
.03	13150	430	800	2200	1200	12	13	1535	3	24	10	130	3	8	1	1	0	1	4	0	35	18	95	2	4	5.5	29
<.03	22600	330	300	2700	1900	<2	<5	1120	1	4	130	220	4	8	1	1	0	2	4	0	35	18	95	2	4	5.5	29
<.03	33700	270	400	3800	4100	<2	60	1690	<1	<2	220	270	4	9	0	1	0	3	4	0	35	18	95	2	4	5.5	29
<.03	23500	330	400	2600	3400	<2	50	1460	<1	4	270	310	3	8	2	0	0	4	4	0	35	18	95	2	4	5.5	29
.03	32900	290	1600	5600	6100	<2	90	2620	<1	6	310	360	3	9	1	0	0	4	4	0	35	18	95	2	4	5.5	29
<.03	11800	730	1600	700	1500	8	430	2040	2	30	0	10	1	8	1	1	0	0	10	0	45	15	95	3	4	6.1	28
<.03	16700	770	1000	1300	2300	14	420	2440	3	34	10	30	2	8	1	1	0	1	10	0	45	15	95	3	4	6.1	28
<.03	18400	600	400	2500	1300	4	160	1560	1	14	30	50	3	8	1	1	0	1	10	0	45	15	95	3	4	6.1	28
<.03	27000	330	300	3000	1700	2	90	1860	<1	2	50	260	4	9	0	1	0	2	10	0	45	15	95	3	4	6.1	28
<.03	34900	280	300	3200	4800	<2	100	2220	5	4	260	330	5	9	0	1	0	4	10	0	45	15	95	3	4	6.1	28
<.03	10800	640	2100	700	1600	16	455	2000	4	44	0	10	1	10	0	0	0	0	2	0	29	17	95	3	5	5.3	19
<.03	10000	560	1000	1500	1700	22	100	1580	2	46	10	20	2	10	0	0	0	1	2	0	29	17	95	3	5	5.3	19
<.03	17800	460	400	1900	2000	6	30	1130	1	6	20	120	3	8	2	0	0	1	2	0	29	17	95	3	5	5.3	19
<.03	21800	410	2100	6200	6700	<2	65	1930	<1	10	120	330	3	7	2	1	0	3	2	0	29	17	95	3	5	5.3	19
<.03	1700	380	2400	900	800	22	175	650	4	64	0	10	1	10	0	0	0	0	0	0	29	20	95	1	5	5.1	17
<.03	3000	390	300	1200	600	2	10	290	1	14	10	120	3	10	0	0	0	1	0	0	29	20	95	1	5	5.1	17
<.03	8800	510	300	1900	1200	<2	20	440	1	8	120	220	4	8	2	0	0	3	0	0	29	20	95	1	5	5.1	17
<.03	26900	710	1400	9900	5500	4	80	1400	8	4	220	280	5	9	0	1	0	4	0	0	29	20	95	1	5	5.1	17
<.03	1200	740	3500	600	600	12	110	500	3	46	0	10	1	10	0	0	0	0	10	0	45	25	95	1	5	5.2	20
.03	2500	550	900	1600	1200	<2	30	410	<1	64	10	30	2	10	0	0	0	1	10	0	45	25	95	1	5	5.2	20
.04	2300	470	400	1600	700	2	10	230	1	32	50	70	3	10	0	0	0	1	10	0	45	25	95	1	5	5.2	20
<.03	2700	520	300	2500	800	<2	10	180	2	26	70	120	4	9	1	0	0	2	10	0	45	25	95	1	5	5.2	20
<.03	4300	560	300	4300	1200	2	10	250	4	16	120	180	5	8	2	0	0	3	10	0	45	25	95	1	5	5.2	20
.08	9900	620	1300	9800	3000	4	35	830	6	10	180	210	5	9	0	1	0	4	10	0	45	25	95	1	5	5.2	20
.05	2100	580	2000	1400	1400	28	320	930	6	90	0	10	1	10	0	0	0	0	0	0	12	35	95	1	5	4.8	11
.03	1900	270	300	1300	700	22	30	410	3	46	10	70	2	10	0	0	0	1	0	0	12	35	95	1	5	4.8	11
.04	5850	490	250	2000	1200	5	10	315	2	10	70	180	3	6	4	0	0	3	0	0	12	35	95	1	5	4.8	11
.03	9000	1010	1600	10300	3000	6	30	760	9	8	180	210	6	6	4	0	0	4	0	0	12	35	95	1	5	4.8	11
<.03	18200	1230	6100	32200	9200	10	90	2260	10	16	210	230	5	0	0	0	0	5	0	0	12	35	95	1	5	4.8	11
<.03	6700	710	2000	800	1500	18	145	1110	4	42	0	10	1	10	0	0	0	0	7	0	25	10	95	3	5	5.0	20
<.03	7000	680	900	1600	1400	34	60	990	5	56	10	30	3	9	1	0	0	1	7	0	25	10	95	3	5	5.0	20
<.03	16100	430	300	2500	1400	4	15	1070	1	4	30	130	3	8	2	0	0	2	7	0	25	10	95	3	5	5.0	20
.03	30800	320	400	3900	3300	<2	55	1820	2	4	130	180	3	9	1	0	0	3	7	0	25	10	95	3	5	5.0	20
<.03	40300	350	200	3400	5400	<2	90	2160	10	2	180	260	4	10	0	0	0	4	7	0	25	10	95	3	5	5.0	20
<.03	4900	800	1900	800	1600	16	70	940	4	42	0	10	1	10	0	0	0	0	2	0	57	9	99	1	5	4.4	31
<.03	6500	560	700	1700	1100	24	30	910	3	28	10	20	4	9	1	0	0	1	2	0	57	9	99	1	5	4.4	31
<.03	9400	600	400	2700	1200	4	20	770	2	10	20	80	5	8	2	0	0	1	2	0	57	9	99	1	5	4.4	31
<.03	11200	380	400	2900	1400	2	25	850	1	6	80	110	4	10	0	0	0	2	2	0	57	9	99	1	5	4.4	31
<.03	11600	380	300	2300	1700	<2	30	870	1	8	110	240	3	9	1	0	0	3	2	0	57	9	99	1	5	4.4	31
<.03	30000	310	500	3300	4400	<2	115	2640	5	<2	240	270	3	9	1	0	0	4	2	0	57	9	99	1	5	4.4	31
<.03	2700	570	2300	800	1000	16	135	700	4	64	0	10	1	10	0	0	0	0	0	0	32	25	95	1	5	5.0	25
<.03	7400	680	400	900	700	16	10	490	2	22	10	30	2	9	1	0	0	1	0	0	32	25	95	1	5	5.0	25
.19	20100	470	300	2500	2100	<2	15	820	1	2	30	100	5	10	0	0	0	2	0	0	32	25	95	1	5	5.0	25
.13	29300	270	400	3900	4200	<2	50	1130	<1	2	100	200	5	9	0	1	0	3	0	0	32	25	95	1	5	5.0	25
.12	27400	330	300	2800	4600	<2	60	1130	<1	2	200	230	3	9	1	0	0	4	0	0	32	25	95	1	5	5.0	25
.04	25800	330	400	3000	5000	<2	60	1240	2	4	230	250	3	10	0	0	0	4	0	0	32	25	95	1	5	5.0	25
.03	6200	730	3300	600	900	16	110	920	4	28	0	10	1	9	1	0	0	0	7	0	29	14	95	3	5	5.5	23
<.03	7																										

Appendix 2D: Timmins-Kirkland Lake area (continued).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42A	131	B1600W	135	5.6	4.7	38	46	91	.10	1.05	10.0	13.4	4.3	69.3	4821	52.6	75.4	27.7	1.9	5.6	.12	35.6	.3
42A	131	B1600W	188	5.9	5.3	40	45	90	.10	1.05	9.1	13.8	6.2	66.2	4648	53.8	53.2	28.3	1.9	5.6	.11	32.4	<.1
42A	171	L2100E+600N	278	4.1	3.3	37	101	94	.06	1.02	15.9	29.3	2.0	79.0	4370	51.8	51.3	74.0	0.7	5.4	.08	40.0	<.1
42A	171	L2100E+600N	211	4.4	3.5	28	68	93	.07	1.05	13.1	20.2	3.9	72.9	4769	55.0	54.3	34.4	1.6	5.5	.07	33.9	.1
42A	171	L2100E+600N	188	5.2	4.5	37	62	91	.10	1.06	9.5	13.4	4.1	69.4	5211	58.9	58.0	34.6	1.7	5.9	.01	29.4	<.1
42A	171	L2100E+600N	214	5.9	5.3	42	51	91	.10	1.06	10.1	14.5	5.9	67.4	4995	57.7	56.6	24.0	2.4	6.1	.04	27.9	<.1
42A	171	L2100E+600N	178	6.1	5.5	39	55	92	.09	1.06	10.9	19.3	5.8	66.8	4854	57.2	56.4	24.9	2.3	6.0	.12	28.6	<.1
42A	171	L2825E+1100N	222	4.1	3.3	41	91	94	.06	1.02	16.2	28.7	2.8	78.7	4306	48.7	48.0	54.1	0.9	5.6	.07	41.9	<.1
42A	171	L2825E+1100N	190	4.1	3.3	20	73	94	.06	1.05	15.7	26.3	3.4	77.1	4513	50.0	49.7	45.5	1.1	5.0	.19	40.3	<.1
42A	171	L2825E+1100N	206	4.0	3.4	<10	54	91	.10	1.07	10.1	15.7	3.5	70.3	4828	55.8	55.3	46.5	1.2	5.6	.09	33.8	0.6
42A	171	L2825E+1100N	169	5.0	4.3	29	44	91	.10	1.04	9.8	13.4	4.6	67.5	5050	56.9	56.1	35.6	1.6	6.2	.08	30.6	<.1
42A	171	L2825E+1100N	172	5.7	5.2	40	46	89	.12	1.07	8.3	12.6	6.0	65.9	4711	57.3	57.0	38.2	1.5	6.1	.10	29.0	<.1
42A	203	B400N	175	4.3	3.2	50	100	94	.06	1.01	16.5	35.4	3.9	79.9	4435	49.8	49.1	55.3	0.9	4.3	.09	41.0	0.2
42A	203	B400N	160	4.5	3.6	41	96	95	.05	1.03	19.4	39.8	3.1	77.9	4490	52.1	51.5	47.4	1.1	4.9	.04	38.8	<.1
42A	203	B400N	264	5.3	4.4	40	53	91	.10	1.06	9.9	13.4	4.8	68.8	4861	56.8	56.1	27.0	2.1	6.0	.06	30.2	<.1
42A	203	B400N	182	5.9	5.1	33	46	88	.13	1.08	7.5	9.2	6.8	64.9	4899	54.1	53.7	33.8	1.6	6.3	.07	31.1	<.1
42A	203	B400N	235	6.3	5.6	44	31	84	.18	1.09	5.2	7.2	10.4	60.8	4554	52.8	52.0	37.7	1.4	5.5	.14	29.8	<.1
42A	203	L1000N+400E	140	4.3	3.2	66	89	94	.06	1.01	16.9	36.5	2.5	79.6	4379	54.1	53.4	38.6	1.4	5.6	.11	36.3	<.1
42A	203	L1000N+400E	157	4.1	3.4	<10	90	95	.05	1.05	19.0	29.6	2.7	85.8	4360	49.6	49.1	45.1	1.1	5.7	.08	40.8	0.5
42A	203	L1000N+400E	175	5.9	5.2	42	44	91	.10	1.07	9.6	14.0	6.2	67.6	5137	58.6	58.0	26.6	2.2	5.6	.12	27.3	<.1
42A	203	L1000N+400E	199	6.3	5.7	47	39	86	.15	1.08	6.4	9.7	9.7	63.1	4784	56.0	55.4	32.9	1.7	5.4	.11	27.1	<.1
42A	203	B1800N	188	4.1	3.4	110	93	94	.06	.98	16.5	34.2	2.1	80.1	4276	48.8	48.1	48.8	1.0	5.1	.07	42.9	<.1
42A	203	B1800N	175	4.1	3.3	14	89	96	.05	1.00	21.2	40.0	13.5	77.5	4379	52.1	50.9	47.4	1.1	5.0	.08	28.2	<.1
42A	203	B1800N	209	5.0	4.3	24	51	91	.09	1.05	10.2	14.0	4.8	69.9	4965	5.89	58.2	25.6	2.3	6.1	.04	27.9	<.1
42A	203	B1800N	198	5.7	5.2	40	40	88	.12	1.03	7.7	10.6	6.5	66.2	4784	55.0	53.1	27.3	2.0	5.5	.05	31.1	<.1
42A	133	B1600N	214	4.6	3.6	94	93	95	.05	.98	19.0	36.0	3.4	77.6	4295	52.4	52.0	52.4	1.0	6.2	.10	36.9	<.1
42A	133	B1600N	112	4.8	3.9	51	98	95	.05	1.01	18.6	32.8	4.7	75.0	4419	51.7	51.1	39.8	1.3	5.6	.16	36.5	0.3
42A	133	B1600N	163	5.6	4.9	38	39	89	.12	1.07	7.8	10.6	6.1	67.2	4936	52.0	51.5	26.0	2.0	5.4	.10	34.4	0.4
42A	133	B1600N	159	6.0	5.2	44	35	87	.14	1.07	6.7	9.0	7.5	65.1	4831	53.7	51.9	30.9	1.8	5.5	.10	31.6	<.1
42A	133	B1600N	169	6.4	5.8	58	42	87	.14	1.07	6.4	10.3	11.4	61.4	4405	54.2	54.0	30.1	1.8	5.7	.14	26.8	0.4
42A	133	B2600N	185	4.4	3.3	32	92	94	.06	1.02	16.2	26.5	2.0	79.9	4289	48.9	48.2	61.1	0.8	5.2	.04	43.1	<.1
42A	133	B2600N	178	4.3	3.3	18	98	96	.05	1.03	21.7	39.4	2.9	80.1	4253	49.5	48.8	49.5	1.0	5.6	.04	41.0	0.2
42A	133	B2600N	166	5.3	4.6	29	42	88	.12	1.07	7.6	11.0	5.7	65.9	4944	55.6	54.6	30.9	1.8	5.2	.06	31.6	<.1
42A	133	B2600N	207	6.2	5.6	49	49	90	.11	1.07	9.0	13.5	8.6	63.1	4631	51.7	51.1	27.2	1.9	5.4	.14	32.3	<.1
42A	285	B300W	213	5.4	4.6	104	99	92	.08	1.03	12.0	24.3	6.7	72.5	4273	53.0	52.1	37.9	1.4	5.5	.20	33.2	<.1
42A	285	B300W	168	5.3	4.5	44	62	92	.09	1.07	10.8	16.7	6.0	72.2	4611	53.4	53.0	29.7	1.8	5.2	.09	33.5	<.1
42A	285	B300W	182	5.4	4.6	28	56	89	.11	1.08	8.4	13.0	6.6	72.6	5067	55.7	55.3	25.3	2.2	5.7	.25	26.9	<.1
42A	285	B300W	197	5.5	4.6	24	59	91	.10	1.05	9.6	15.3	4.9	68.1	5106	57.4	57.0	27.3	2.1	6.0	.05	29.5	0.3
42A	285	B300W	177	5.4	4.7	28	56	89	.12	1.08	8.2	13.1	6.1	66.8	5086	55.0	54.4	27.5	2.0	5.8	.26	30.8	<.1
42A	285	B300W	169	5.9	4.6	28	61	90	.10	1.06	9.3	13.3	5.5	67.7	4933	55.1	53.2	25.6	2.2	5.6	.03	31.7	.1
42A	285	B300W	174	5.7	4.8	23	66	91	.09	1.07	10.6	17.3	4.5	67.9	5079	54.0	53.5	24.5	2.2	5.3	.06	33.9	<.1
42A	285	B300W	140	5.9	4.9	22	84	94	.06	1.04	15.4	26.6	3.6	69.0	5147	52.0	51.3	32.5	1.6	5.7	.08	37.0	<.1
42A	285	B300W	127	6.4	5.9	34	74	91	.09	1.05	10.1	16.8	6.5	68.9	5037	56.4	55.2	17.1	3.3	5.3	.11	28.4	<.1
42A	285	B1200W	253	4.5	3.3	77	93	94	.06	.96	15.1	33.7	3.1	80.3	4458	45.6	45.2	45.6	1.0	5.1	.06	45.1	0.1
42A	285	B1200W	160	4.6	3.8	36	68	92	.08	1.05	12.2	17.3	5.1	71.7	4697	47.0	46.0	29.4	1.6	4.5	.23	41.6	<.1
42A	285	B1200W	146	5.1	4.3	35	48	87	.14	1.07	6.7	10.1	6.0	66.8	5025	54.3	52.9	27.5	2.0	5.5	.02	32.3	<.1
42A	285	B1200W	188	5.8	5.0	26	63	91	.10	1.08	10.0	14.9	5.4	67.8	5011	55.2	54.9	30.7	1.8	5.6	.17	31.8	0.1
42A	285	B1200W	238	6.1	5.3	24	70	91	.09	1.06	10.5	17.2	5.2	68.0	5041	51.1	50.4	22.2	2.3	5.4	.09	35.9	<.1
42A	285	B1200W	262	6.1	5.2	20	76	93	.07	1.06	13.7	23.2	4.7	69.8	4733	52.0	51.4	26.0	2.0	5.7	.02	35.6	<.1
42A	285	B1200W	215	6.2	5.5	26	82	93	.08	1.05	12.7	21.5	5.0	70.0	5133	53.8	53.0	19.9	2.7	5.4	.04	33.1	0.1
42A	285	B1200W	112	6.6	5.7	31	78	90	.10	1.07	9.4	14.1	5.3	67.7	5150	52.4	52.0	17.5	3.0	5.6	.01	33.7	<.1
42A	171	L3600E+600N	231	4.0	3.4	79	95	94	.07	1.01	14.4	29.1	2.5	79.8	4356	49.3	48.8	49.3	1.0	5.3	.16	41.7	0.1
42A	171	L3600E+600N	187	4.0	3.2	20	82	94	.06	1.00	15.4	28.1	3.5	81.4	4406	47.1	46.7	47.1	1.0	5.0	.05	43.3	0.1
42A	171	L3600E+600N	209	5.2	4.4	29	58	90	.10	1.03	9.1	12.3	4.5	68.0	5208	54.3	54.0	28.6	1.9	6.0	.07	33.2	0.1
42A	171	L3600E+600N	161	5.7	5.1	36	53	92	.09	1.04	10.9	16.8	5.8	66.8	5034	48.9	48.2	24.4	2.0	4.5	.05	38.8	0.1
42A	171	L3600E+600N	225	6.1	5.5	39	54	91	.10	1.04	9.9	15.3	7.5	64.2	4750	51.8	51.4	25.9	2.0	5.5	.12	33.1	<.1
32D	57	B700W	214	4.0	3.2	51	92	91	.09	1.01	10.1	23.8	2.1	78.6	4285	51.0	50.7	51.0	1.0	5.5	.05	40.3	<.1
32D	57	B700W	206	4.2	3.2	29	94	94	.06	1.01	15.9	32.6	2.7	78.1	4275	53.0	52.6	66.3	0.8	5.9	.08	37.5	<.1
32D	57	B700W	201	3.9	3.1	<10	72	94	.07	1.03	14.6	26.6	2.2	73.5	4437	51.4	51.0	51.4	1.0	5.4	.01	40.0	<.1

HG	CA	P	K	AL	FE	PB	MN	MG	CU	ZN	TOP	BOT	HUM	PEAT	TYPE	REL	VEGETATION	COVER	SUR	AV							
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	INT	INT	1-9	S-C	-L-X	POS	T	TS	LS	G	SP	FOR	SUB	WAT	D-W		
											(CM)	(CM)					%	%	%	%	%			PH	CM		
.04	14800	380	400	2350	1200	2	15	600	2	7	70	150	5	10	0	0	2	4	0	34	15	95	1	5	4.9	24	
.04	22900	300	400	3100	2400	2	40	850	16	4	150	230	4	9	0	1	4	4	0	34	15	95	1	5	4.9	24	
.06	1600	500	1600	700	1200	12	40	650	18	166	0	10	1	10	0	0	0	3	0	25	15	95	1	5	4.5	20	
.05	4300	580	700	2400	900	6	20	550	4	24	10	50	3	9	0	1	0	1	3	0	25	15	95	1	5	4.5	20
.05	12100	410	400	2300	1000	2	10	630	2	6	50	170	7	10	0	0	0	2	3	0	25	15	95	1	5	4.5	20
.04	19600	350	400	2800	2200	<2	35	870	1	6	170	250	5	9	1	0	0	3	3	0	25	15	95	1	5	4.5	20
<.03	20900	300	400	2700	2600	<2	40	890	1	4	250	350	4	8	2	0	0	4	3	0	25	15	95	1	5	4.5	20
<.03	1400	640	1900	1100	1100	18	50	610	25	204	0	10	1	10	0	0	0	0	3	0	20	8	95	1	5	4.5	25
<.03	2400	500	500	1800	1000	16	10	360	4	50	10	30	2	9	1	0	0	1	3	0	20	8	95	1	5	4.5	25
<.03	5000	370	300	1900	700	2	5	370	3	10	30	70	4	9	1	0	0	1	3	0	20	8	95	1	5	4.5	25
<.03	11700	290	300	2400	1100	2	15	590	2	6	70	240	5	10	0	0	0	2	3	0	20	8	95	1	5	4.5	25
<.03	25200	240	200	2500	2900	2	45	1120	2	4	240	350	4	10	0	0	0	4	3	0	20	8	95	1	5	4.5	25
<.03	3000	640	1900	800	1000	6	100	990	6	58	0	10	1	10	0	0	0	0	5	0	40	3	95	1	5	4.9	21
<.03	4300	570	1000	900	1000	16	85	900	9	54	10	30	2	9	1	0	0	1	5	0	40	3	95	1	5	4.9	21
<.03	15200	480	400	2200	1800	4	40	1080	4	8	30	80	3	10	0	0	0	2	5	0	40	3	95	1	5	4.9	21
<.03	23300	370	400	4000	2600	2	50	1610	5	4	80	100	3	8	0	2	0	3	5	0	40	3	95	1	5	4.9	21
<.03	34800	320	600	6900	5200	<2	125	2300	8	4	100	160	5	9	0	1	0	4	5	0	40	3	95	1	5	4.9	21
<.03	1900	830	2600	900	1000	6	80	800	5	54	0	10	1	9	1	0	0	0	5	0	12	25	95	1	5	4.0	21
<.03	2500	490	700	900	900	<2	45	620	<1	54	10	40	3	9	1	0	0	1	5	0	12	25	95	1	5	4.0	21
<.03	21500	410	300	3000	2100	2	20	1500	2	4	40	100	4	7	2	1	0	2	5	0	12	25	95	1	5	4.0	21
<.03	30200	310	500	5300	4000	<2	60	2010	2	2	100	150	6	9	0	1	0	4	5	0	12	25	95	1	5	4.0	21
<.03	3000	750	2900	600	900	6	165	940	5	46	0	10	1	9	1	0	0	0	4	0	19	8	95	1	3	4.9	19
<.03	3400	590	800	1300	1000	12	40	820	7	70	10	30	2	9	1	0	0	1	4	0	19	8	95	1	3	4.9	19
<.03	12000	520	400	2400	1100	2	10	860	1	6	30	70	3	9	1	0	0	2	4	0	19	8	95	1	3	4.9	19
<.03	17800	285	300	2700	2300	<2	20	1100	3	2	70	170	4	8	1	1	0	3	4	0	19	8	95	1	3	4.9	19
.09	5900	560	2800	900	1600	4	200	1210	5	36	0	10	1	9	1	0	0	0	3	0	14	16	95	3	5	5.3	24
.05	11900	680	1200	1700	2000	10	125	1340	6	54	10	50	2	9	1	0	0	1	3	0	14	16	95	3	5	5.3	24
.05	28400	450	400	3800	1500	2	35	1340	5	6	50	100	4	10	0	0	0	2	3	0	14	16	95	3	5	5.3	24
<.03	37150	310	350	3600	2450	<2	58	1625	4	5	100	220	5	9	0	1	0	3	3	0	14	16	95	3	5	5.3	24
<.03	52800	290	1000	6700	5000	<2	100	2400	6	6	220	250	4	10	0	0	0	4	3	0	14	16	95	3	5	5.3	24
<.03	5800	570	1300	700	1000	8	25	660	5	36	0	10	1	10	0	0	0	0	4	0	28	8	95	1	5	4.9	33
.04	5400	600	2200	900	600	12	25	710	5	64	10	30	4	9	1	0	0	1	4	0	28	8	95	1	5	4.9	33
.03	26700	330	1400	2000	1000	<2	15	930	1	4	30	200	5	8	1	1	0	2	4	0	28	8	95	1	5	4.9	33
.03	37700	370	2900	2800	1600	2	50	1400	4	<2	200	260	4	10	0	0	0	4	4	0	28	8	95	1	5	4.9	33
<.03	23700	900	2100	1800	5400	16	1690	1450	9	54	0	10	1	8	1	1	0	0	10	0	31	12	95	3	5	5	18
<.03	21100	710	700	2100	2700	12	125	1020	4	50	10	20	3	6	2	2	0	1	10	0	31	12	95	3	5	5	18
<.03	25600	490	600	3400	2400	2	110	1080	2	10	20	40	4	7	2	1	0	1	10	0	31	12	95	3	5	5	18
.06	24100	330	300	2400	2200	<2	80	1050	1	8	40	50	4	6	4	0	0	1	10	0	31	12	95	3	5	5	18
<.03	28800	360	400	3400	2600	<2	80	1190	1	8	50	90	3	5	3	2	0	1	10	0	31	12	95	3	5	5	18
.09	20300	345	300	2250	2850	3	48	1205	3	4	90	150	3	6	2	2	0	2	10	0	31	12	95	3	5	5	18
<.03	29700	280	200	2100	2900	<2	35	1050	1	4	150	180	3	8	1	1	0	3	10	0	31	12	95	3	5	5	18
<.03	29700	190	100	700	3300	4	40	1130	3	6	180	210	2	9	1	0	0	3	10	0	31	12	95	3	5	5	18
.07	25300	280	800	3900	3700	<2	60	1000	2	14	210	280	6	4	6	0	0	4	10	0	31	12	95	3	5	5	18
.04	4300	710	2300	1200	1300	4	80	840	9	36	0	10	1	7	2	1	0	0	15	0	25	10	95	1	5	5	31
.03	13600	540	400	1900	1500	6	30	790	2	24	10	30	2	6	2	2	0	1	15	0	25	10	95	1	5	5	31
.04	17450	415	600	3300	2350	3	40	890	1	10	30	90	3	8	1	1	0	1	15	0	25	10	95	1	5	5	31
.03	91200	830	600	6800	13200	<2	120	2910	4	14	90	120	4	7	3	0	0	2	15	0	25	10	95	1	5	5	31
<.03	18200	200	200	1600	2700	<2	25	610	1	4	120	160	3	3	7	0	0	2	15	0	25	10	95	1	5	5	31
.04	27500	220	300	2000	4300	<2	35	1030	1	6	160	190	3	8	2	0	0	3	15	0	25	10	95	1	5	5	31
<.03	20500	310	700	3000	3200	<2	30	940	1	12	190	250	4	3	7	0	0	4	15	0	25	10	95	1	5	5	31
<.03	21800	290	600	3100	3300	<2	35	970	1	10	250	290	8	4	6	0	0	4	15	0	25	10	95	1	5	5	31
<.03	3000	780	1700	900	1100	6	15	490	25	244	0	10	1	10	0	0	0	0	2	0	20	15	95	1	5	4.9	24
<.03	3300	600	1100	1100	1200	10	10	440	16	142	10	40	4	9	1	0	0	1	2	0	20	15	95	1	5	4.9	24
<.03	13300	420	200	2300	1000	2	5	820	2	12	40	100	7	10	0	0	0	1	2	0	20	15	95	1	5	4.9	24
<.03	26900	330	300	3400	2300	<2	25	1020	1	10	100	220	4	10	0	0	0	3	2	0	20	15	95	1	5	4.9	24
.03	33900	310	800	4700	4200	2	50	1640	4	12	220	280	4	7	2	1	0	4	2	0	20	15	95	1	5	4.9	24
<.03	1400	440	1600	800	600	16	140	500	4	60	0	10	1	10	0	0	0	0	2	0	40	8	95	1	5	5.0	11
.03	1400	460	1100	1200	1300	34	70	490	4	58	10	30	2	10	0	0	0	1	2	0	40	8	95	1	5	5.0	11
.03	1400	260	200	1300	600	4	10	290	1	12	30	190															

Appendix 2E: Physical and chemical characteristics of peat samples from the New Liskeard area.

PEAT LAND NTS	NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
31M	18	T200N	248	6.2	5.4	110	56	86	.12	.89	6.0	9.2	10.3	65.9	4157	48.9	47.9	24.4	2.0	4.2	.27	34.3	.1
31M	18	T200N	241	6.3	5.6	60	47	89	.10	.97	8.0	11.6	11.5	64.1	3920	48.0	47.0	24.0	2.0	4.3	.32	33.9	.9
31M	18	T200N	234	6.6	6.2	61	43	84	.15	.99	5.3	9.2	42.2	47.1	2663	32.7	28.3	16.3	2.0	2.7	.26	20.1	1.1
31M	18	F600W	289	6.3	5.7	90	52	86	.13	.98	6.3	9.0	11.7	64.3	4325	49.4	48.1	23.5	2.1	4.4	.54	31.9	.1
31M	18	F600W	273	6.4	5.6	61	61	88	.11	.99	7.4	9.5	9.0	75.2	4339	49.3	48.0	27.4	1.8	5.2	.38	34.3	.6
31M	18	F600W	110	6.5	6.0	71	45	82	.19	1.04	4.4	6.8	46.4	44.4	2447	30.5	22.6	20.3	1.5	3.9	.27	17.4	1.8
31M	18	J800W	157	6.2	5.6	56	56	86	.14	.99	6.0	7.7	8.4	75.6	4386	52.1	51.8	30.6	1.7	5.1	.23	32.5	<.1
31M	18	J800W	189	6.5	5.7	42	61	88	.11	1.01	8.1	12.1	8.5	71.6	4399	49.4	48.1	24.7	2.0	4.8	.27	35.0	.4
31M	18	J800W	138	6.6	6.1	56	36	83	.17	1.05	4.9	8.2	56.8	36.4	2023	24.7	13.1	17.6	1.4	2.4	.13	14.6	.1
31M	18	D1650W+300N	292	6.0	5.2	49	60	90	.10	.97	8.6	12.0	8.2	72.4	4610	52.6	52.0	25.0	2.1	5.3	.15	31.6	.1
31M	18	D1650W+300N	248	6.3	5.5	56	56	89	.10	.93	8.1	12.6	6.8	73.9	5347	50.6	50.0	23.0	2.2	5.0	.15	35.2	<.1
31M	18	D1650W+300N	172	6.6	6.0	46	45	86	.12	.92	6.1	9.7	38.1	49.7	2134	35.9	29.0	19.9	1.8	3.8	.12	20.3	.2
31M	20	B700E	138	5.5	4.7	46	54	91	.08	.95	9.6	16.7	5.4	78.3	4908	52.5	51.7	21.0	2.5	4.1	.17	35.3	.6
31M	20	B700E	285	5.9	5.4	35	62	91	.08	.92	9.9	17.8	11.2	73.4	4602	48.0	45.8	22.9	2.1	5.5	.09	33.1	<.1
31M	20	B700E	114	6.4	5.9	31	30	84	.15	.94	5.1	8.2	55.7	35.1	2069	24.1	22.1	18.5	1.3	3.1	.09	15.7	.9
31M	20	B2400E	121	5.7	5.0	68	45	84	.15	.96	5.2	6.7	13.3	65.8	4285	46.6	44.8	23.3	2.0	4.7	.23	33.2	.4
31M	20	B2400E	131	5.5	5.0	70	47	84	.15	.93	5.2	7.6	12.5	64.5	4318	48.6	47.2	23.1	2.1	4.4	.22	32.2	.5
31M	20	B2400E	151	5.8	5.1	41	63	90	.09	.98	9.5	16.3	7.4	66.2	4603	50.8	48.0	24.2	2.1	4.7	.14	34.9	.2
31M	20	B2400E	172	5.8	5.2	54	55	87	.11	.88	6.5	11.0	10.7	64.5	4392	49.2	47.2	24.6	2.0	4.2	.15	33.7	.2
31M	20	B2400E	216	6.0	5.5	52	53	88	.11	.95	7.2	12.5	13.9	60.8	4215	49.0	46.3	24.5	2.0	4.9	.16	30.0	.2
31M	20	B2400E	54	6.9	6.3	66	34	76	.25	1.06	3.2	4.7	62.7	33.7	1588	18.7	6.4	17.0	1.1	2.1	.06	15.4	3.3
31M	20	G495W+300S	171	5.3	5.0	51	48	86	.13	.99	6.3	10.4	6.2	69.7	4770	52.0	49.6	24.8	2.1	5.6	.06	34.0	.3
31M	20	G495W+300S	116	5.6	5.3	44	66	90	.10	1.00	9.0	16.8	4.6	69.9	4741	51.6	50.0	22.4	2.3	5.5	.11	35.9	.3
31M	20	G495W+300S	130	5.9	5.6	32	56	89	.10	.99	8.3	15.0	9.8	67.9		51.9	50.9	24.7	2.1	5.2	.13	30.9	.5
31M	20	G495W+300S	147	6.4	5.5	45	44	84	.15	1.00	5.3	8.1	44.8	41.8	2554	29.1	25.0	18.2	1.6	3.4	.14	21.0	1.1
31M	20	J2200N	156	6.0	5.6	54	45	84	.15	.97	5.2	8.1	22.2		3769	41.2	38.2	24.2	1.7	3.8	.12	31.0	.6
31M	20	J2200N	117	6.1	5.5	43	38	81	.19	1.01	4.1	6.3	27.0	56.4	3612	39.8	32.7	26.5	1.5	4.0	.18	27.5	.3
31M	20	J2200N	65	6.3	5.7	59	29	75	.26	1.06	3.0	4.6	37.2	46.0	3197	35.2	33.1	17.6	2.0	3.4	.16	22.0	1.0
31M	20	M800E	151	5.9	5.3	62	51	89	.12	1.05	7.7	13.5	17.5	61.3	3989	45.9	41.4	21.9	2.1	4.7	.21	29.6	1.4
31M	20	M800E	169	6.1	5.6	60	48	87	.12	.99	6.9	12.7	34.3	50.7	3149	36.8	29.9	18.4	2.0	4.0	.18	22.7	1.0
31M	20	M800E	71	6.4	5.9	49	21	74	.25	1.00	2.8	6.0	64.6	26.1	1437	17.6	15.6	17.6	1.0	2.6	.06	14.1	.4
31M	21	F300N	164	6.3	5.7	55	66	87	.13	.98	6.6	9.6	15.3	62.7	4186	41.2	38.7	19.6	2.1	4.2	.16	37.0	.3
31M	21	F300N	161	6.1	5.6	47	62	87	.12	.93	6.8	10.7	10.6	62.2	4035	50.0	47.3	23.8	2.1	5.5	.15	31.6	.5
31M	21	F300N	333	6.2	5.9	46	52	89	.10	.95	8.3	13.3	9.7	66.1	4180	52.1	48.3	23.7	2.2	5.4	.08	30.5	.3
31M	21	F300N	100	6.5	6.2	44	34	80	.20	1.02	3.9	7.0	51.1	39.3	2051	28.0	25.7	20.0	1.4	3.0	.10	16.4	.9
31M	21	H1000N	363	6.6	6.2	35	66	92	.07	1.01	12.0	20.0	5.5	72.0	4390	51.4	49.4	19.0	2.7	5.7	.12	34.6	.3
31M	21	H1000N	364	6.3	5.8	35	51	90	.09	.98	9.1	17.6	17.1	61.8	2980	45.1	43.0	22.6	2.0	4.0	.05	31.7	.9
31M	21	H1000N	167	6.2	5.6	55	30	82	.17	1.02	4.7	7.6	51.5	39.2	2197	26.1	24.9	18.6	1.4	2.7	.03	18.3	.4
31M	21	I500N+300E	253	6.3	5.2	33	68	92	.07	.95	11.1	17.6	5.6	67.9	5032	52.0	51.0	20.0	2.6	5.3	.06	34.4	1.6
31M	21	I500N+300E	317	6.2	5.5	38	52	90	.09	.94	8.6	15.2	10.3	64.6	4224	47.6	46.1	19.8	2.4	4.8	.12	34.8	.9
31M	21	I500N+300E	118	6.9	6.1	63	29	81	.19	1.01	4.2	5.7	60.0	29.8	1773	19.6	17.2	15.1	1.3	2.9	.09	16.1	.2
31M	21	J1500E	212	5.9	5.1	35	56	86	.13	.97	6.1	8.6	7.8	67.8	4570	49.6	48.0	19.8	2.5	4.8	.14	35.2	.2
31M	21	J1500E	258	6.0	5.5	50	40	88	.14	1.16	7.0	12.6	29.2	55.1	4142	39.1	33.5	19.6	2.0	3.9	.10	25.7	.8
31M	21	J1500E	101	6.9	6.0	57	17	74	.30	1.16	2.8	4.8	75.6	20.8	2194	13.8	6.8	19.7	.7	2.0	.06	7.8	1.0
31M	27	B1000S	134	6.2	5.6	114	66	86	.13	.92	6.0	10.4	7.4		4334	50.5	47.3	25.3	2.0	5.9	.16	34.0	.6
31M	27	B1000S	210	7.0	5.5	57	57	85	.15	1.00	5.5	7.4	10.6	63.8	4240	48.1	45.5	22.9	2.1	4.4	.14	34.7	.1
31M	27	B1000S	77	6.6	5.8	51	54	87	.13	.97	6.5	9.7	9.1	64.6	4443	49.2	46.7	22.4	2.2	4.2	.17	35.1	.2
31M	27	B1000S	49	6.5	5.9	67	65	90	.10	1.01	8.5	12.3	7.3	66.4	4692	48.9	45.6	20.4	2.4	4.6	.25	36.5	.5
31M	27	B1000S	232	6.7	5.9	72	61	89	.11	.98	7.8	11.0	7.4	64.4	4298	46.5	45.0	19.4	2.4	4.5	.31	38.9	2.1
31M	27	F100N	184	5.8	5.1	60	53	87	.12	.98	6.8	9.9	5.7	68.7	5167	50.6	48.8	20.2	2.5	4.5	.09	36.6	.5
31M	27	F100N	221	6.2	5.5	45	59	88	.12	1.00	7.2	8.9	7.3	65.5	4623	49.8	47.1	24.9	2.0	4.4	.13	36.4	.1
31M	27	F100N	213	6.5	5.7	54	60	90	.10	1.10	9.4	18.6	9.0	68.5	5143	49.2	46.9	18.9	2.6	4.3	.26	34.6	.9
31M	27	F100N	197	6.7	6.0	76	51	88	.11	.95	7.5	13.0	21.5	59.0	3841	41.5	40.9	18.0	2.3	4.1	.37	30.2	3.7
31M	27	I800S+184E	164	6.7	6.0	85	53	83	.17	.99	4.8	6.6	18.2	60.8	3690	41.8	40.2	23.2	1.8	4.5	.22	33.5	.8
31M	27	I800S+184E	165	6.7	6.0	55	76	85	.14	.99	5.8	8.0	12.5	64.0	4157	48.0	45.1	28.8	1.6	4.2	.19	35.5	.4
31M	27	I800S+184E	159	6.5	5.9	76	52	83	.17	1.07	5.0	6.4	16.7	59.4	3939	42.9	40.7	26.8	1.6	4.1	.22	34.5	.9
31M	27	I800S+184E	182	6.9	6.1	88	41	87	.12	.98	6.6	10.6	11.1	63.9	4884	45.3	44.0	18.1	2.5	4.7	.29	36.1	1.4
31M	27	I800S+184E	216	6.8	6.2	77	47	89	.10	.95	8.2	13.0	10.1	66.8	4700	46.6	45.2	17.9	2.6	4.4	.24	36.1	7.9
31M	31	B200S	136	6.1	5.6	87	51	84	.16	.99	5.3	8.1	8.5	66.9	4399	47.9	45.8	29.0	1.7	5.0	.15	37.0	.2
31M	31	B200S	158	6.2	5.8	61	49	86	.13	.95	6.3	11.6	9.2	64.1	4457	47.2	46.0	26.2	1.8	4.6	.26	36.9	<.1
31M	31	B200S	160	6.6	5.9	82	57	88	.11	.93	7.4												

HG	CA	P	K	AL	FE	PB	MN	MG	CU	ZN	TOP	BOT	HUM	PEAT	TYPE	REL	VEGETATION	COVER	SUR	AV							
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PMM	PMM	INT	INT	1-9	S	C	L	X	POS	T	TS	LS	G	SP	FOR	SUB	WAT	D-W
											(CM)	(CM)							%	%	%	%	%				CM
.11	12264	240	988	1452	3033	29	120	1618	9	16	0	125	3	1	3	6	0	2	12	14	99	12	91	6	5	5.7	36
.10	12157	223	1154	1849	3074	12	79	1831	10	9	125	170	4	4	4	2	0	4	12	14	99	12	91	6	5	5.7	36
.07	11263	345	5791	7300	7721	30	123	4233	19	36	170	190						5	12	14	99	12	91	6	5	5.7	36
.14	13264	231	851	1570	3207	7	110	1666	10	15	0	75	3	1	1	8	0	1	4	5	99	15	30	3	5	6.1	22
.12	13811	160	628	1057	2591	6	89	1574	10	11	75	175	3	2	6	2	0	3	4	5	99	15	30	3	5	6.1	22
.05	11617	322	6169	8032	8316	17	142	4865	16	24	175	200						5	4	5	99	15	30	3	5	6.1	22
.07	14181	205	307	807	1435	4	56	1609	4	10	0	100	3	0	1	9	0	1	65	3	60	18	27	4	5	6.2	7
.06	14283	225	456	915	1565	5	39	1593	7	8	100	200	3	2	5	3	0	3	65	3	60	18	27	4	5	6.2	7
.07	10494	340	7299	9975	9822	21	132	5306	14	22	200	225						5	65	3	60	18	27	4	5	6.2	7
.08	10952	210	476	823	1006	8	36	1547	6	6	0	100	3	1	4	5	0	1	82	0	99	17	80	4	5	6.1	4
.06	14570	177	110	578	1253	4	43	1338	5	6	100	200	3	1	7	2	0	3	82	0	99	17	80	4	5	6.1	4
.09	11511	320	4924	7232	7834	13	113	4120	18	21	200	225	4	1	8	1	0	5	82	0	99	17	80	4	5	6.1	4
.05	6707	325	143	1042	1333	<2	42	921	5	6	0	80	3	2	3	5	0	1	55	2	80	15	67	4	5	4.5	20
.01	7046	238	1155	2005	2162	5	45	1317	4	6	80	165	3	4	5	1	0	3	55	2	80	15	67	4	5	4.5	20
.06	10206	361	8656	12988	13686	18	177	6618	17	34	165	190						5	55	2	80	15	67	4	5	4.5	20
.07	9009	456	1637	2904	3659	13	108	1514	18	16	0	25	3	1	2	7	0	1	70	1	99	35	54	4	5	5.5	32
.13	9017	438	1602	2993	3483	10	91	1605	19	13	25	70	3	1	1	8	0	2	70	1	99	35	54	4	5	5.5	32
.09	8489	301	547	1671	2749	7	59	1306	14	10	70	100	3	7	1	2	0	3	70	1	99	35	54	4	5	5.5	32
.10	12039	327	907	2328	4068	7	76	1644	17	12	100	125	4	2	2	6	0	3	70	1	99	35	54	4	5	5.5	32
.07	10725	337	1402	2972	3895	6	71	1808	17	7	125	140	3	6	2	2	0	4	70	1	99	35	54	4	5	5.5	32
.06	10837	348	9950	15457	19902	25	205	8652	20	42	140	170						6	70	1	99	35	54	4	5	5.5	32
.07	5470	206	258	572	1073	8	48	716	3	6	0	25	3	1	3	6	0	1	15	3	83	16	75	6	5	4.8	75
.04	7185	244	177	758	1462	2	51	1129	3	7	25	50	3	5	4	1	0	2	15	3	83	16	75	6	5	4.8	75
.05	8942	333	798	2204	2357	<2	72	1523	5	7	50	75	3	4	3	3	0	4	15	3	83	16	75	6	5	4.8	75
.02	10039	379	6312	10130	10090	6	153	5080	13	24	75	120						5	15	3	83	16	75	6	5	4.8	75
.17	10127	406	3363	5264	4513	7	81	2359	23	15	0	75	3	1	1	8	0	2	10	54	70	53	78	6	5	6.2	40
.16	10843	462	3568	6092	5192	7	107	2491	19	12	75	110	4	1	1	8	0	4	10	54	70	53	78	6	5	6.2	40
.15	10637	626	4223	7974	5976	7	133	2770	15	12	110	130						5	10	54	70	53	78	6	5	6.2	40
.08	8421	360	2408	3951	5103	4	217	2446	21	24	0	50	3	3	5	2	0	2	57	9	60	44	46	4	5		54
.04	8912	367	4811	7599	8764	8	174	4069	17	21	50	90						5	57	9	60	44	46	4	5		54
.10	9001	324	9499	13994	14880	15	217	6849	17	34	90	110						6	57	9	60	44	46	4	5		54
.14	15089	464	1728	3090	3866	5	76	1966	18	8	0	30	2	2	3	5	0	1	80	1	6	19	40	4	5	6.3	23
.14	14324	353	908	2086	2770	8	61	1667	16	6	30	100	3	0	1	9	0	2	80	1	6	19	40	4	5	6.3	23
.02	12574	314	649	1751	2327	75	58	1483	8	17	100	150	4	1	6	3	0	4	80	1	6	19	40	4	5	6.3	23
.06	11010	398	7064	11462	12974	21	168	6451	22	34	150	175						5	80	1	6	19	40	4	5	6.3	23
.04	9057	284	71	668	1843	16	44	1278	3	10	0	140	3	4	5	1	0	2	40	32	50	10	35	4	5		
<.01	11148	293	2067	3443	4585	11	90	2380	7	11	140	190	4	3	6	1	0	4	40	32	50	10	35	4	5		
<.01	10241	321	7493	11713	14712	28	190	6725	18	32	190	230						5	40	32	50	10	35	4	5		
.05	9206	280	291	795	1974	12	27	1355	2	8	0	90	3	1	7	2	0	2	55	4	75	15	75	4	5	5.7	
.03	11661	326	1237	2635	3930	11	57	1936	5	8	90	140	4	2	7	1	0	4	55	4	75	15	75	4	5	5.7	
.03	9739	313	8600	14993	17696	6	201	7712	20	37	140	170						5	55	4	75	15	75	4	5	5.7	
.05	12091	328	444	1042	2547	<2	45	1251	4	9	0	20	2	2	4	4	0	1	75	0	10	5	36	4	5	5.8	20
.03	7439	304	4034	6560	7131	5	89	3655	8	25	20	100						5	75	0	10	5	36	4	5	5.8	20
.10	9379	285	10531	17513	19194	12	222	8720	17	40	100	140						6	75	0	10	5	36	4	5	5.8	20
.03	15189	308	344	626	1161	4	185	2299	5	5	0	40	2	1	6	3	0	1	75	0	80	23	87	4	5	5.8	48
.09	20412	303	695	1410	1351	3	97	2749	7	3	40	110	3	0	3	7	0	1	75	0	80	23	87	4	5	5.8	48
.03	18481	196	565	1044	1275	4	54	2198	6	3	110	200	3	1	5	4	0	2	75	0	80	23	87	4	5	5.8	48
.04	15012	194	348	633	1811	5	46	1809	6	3	200	325	4	3	5	2	0	3	75	0	80	23	87	4	5	5.8	48
.04	15171	200	379	655	1850	2	47	1848	6	3	325	375	4	2	7	1	0	4	75	0	80	23	87	4	5	5.8	48
.09	10737	313	225	575	823	<2	50	1534	4	5	0	50	3	2	5	3	0	1	0	99	40	46	16	6	5	5.7	18
.06	15085	156	165	517	1538	<2	37	1583	4	2	50	150	4	1	4	5	0	2	0	99	40	46	16	6	5	5.7	18
.06	10601	179	889	1472	2183	<2	36	1615	9	5	150	250	3	4	5	1	0	3	0	99	40	46	16	6	5	5.7	18
.10	15706	351	3826	5966	7167	2	96	3924	28	17	250	310	4	4	5	1	0	4	0	99	40	46	16	6	5	5.7	18
.14	18285	305	2022	3326	5228	7	149	2471	10	10	0	40	3	0	2	8	0	1	31	16	80	43	52	4	5	6.3	25
.14	16694	226	1273	2075	3367	6	101	2088	11	9	40	110	3	0	1	9	0	2	31	16	80	43	52	4	5	6.3	25
.14	19397	228	1978	2665	3720	20	92	2519	12	13	110	170	3	2	2	6	0	3	31	16	80	43	52	4	5	6.3	25
.07	13776	243	1180	1730	3156	22	61	1863	8	11	170	210	3	1	5	4	0	4	31	16	80	43	52	4	5	6.3	25
.10	11994	231	862	1474	3192	14	55	1746	9	9	210	235	3	4	5	1	0	4	31	16	80	43	52	4	5	6.3	25
.05	27732	525	977	3274	5197	5	261	2818	13	25	0	100	3	0	2	8	0	2	27	55	45	37	71	4	5		94
.08</																											

Appendix 2E: New Liskeard area (continued).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H ₂ O PH	CACL ₂ PH	COND	FIB %	MC WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
41P	8	B3900N	131	4.1	3.4	34	54	90	.17	1.78	9.4	18.0	15.9	74.4	4705	51.0	48.6	25.5	2.0	4.7	.19	26.2	<.1
41P	8	B3900N	101	5.7	5.2	66	38	85	.15	1.01	5.7	10.1	9.0	66.5	4972	49.5	47.3	25.4	7.0	4.6	.24	34.2	<.1
41P	8	B3900N	88	5.6	5.1	50	51	89	.11	.97	7.8	14.2	6.4	66.9	5490	51.9	49.0	24.7	2.1	3.3	.24	36.1	.4
41P	8	B3900N	126	5.6	5.1	49	55	90	.10	1.01	8.7	13.7	6.2	69.4	4749	52.2	50.0	24.9	2.1	5.5	.16	33.8	.1
41P	8	B3900N	47	5.8	5.2	80	32	75	.27	1.08	3.0	7.5	56.9	33.0	1927	22.2	8.6	20.2	1.1	3.6	.21	16.0	.9
41P	8	L0000+200W	101	4.0	3.2		65	91	.08	.97	10.4	21.5	4.2	81.3	4385	46.1	46.0	30.7	1.5	2.1	.19	45.0	<.1
41P	8	L0000+200W	141	3.6	3.0		49	89	.10	.96	8.1	16.2	6.7	70.8		53.0	52.1	27.9	1.9	5.7	.05	32.6	<.1
41P	8	L0000+200W	129	4.1	3.4	9	52	91	.08	.99	10.2	15.9	2.7	70.2	5951	46.2	44.7	24.3	1.9	4.2	.06	44.9	<.1
41P	8	L0000+200W	83	4.4	3.5		74	91	.09	1.01	10.1	17.3	2.3	70.7	5524	52.0	51.4	24.8	2.1	5.9	.08	37.6	<.1
41P	8	L2335N+730E	114	3.6	3.0		56	91	.08	.98	10.0	16.6	2.6	75.8	5756	40.1	38.8	26.7	1.5	4.9	.09	50.8	<.1
41P	8	L2335N+730E	155	3.6	3.0		61	92	.08	.98	11.0	18.7	1.8	74.8	5985	44.1	42.9	29.4	1.5	4.6	.04	48.0	<.1
41P	8	L2335N+730E	107	4.1	3.4	19	56	91	.08	1.00	10.7	17.9	2.6	73.8	5116	51.7	51.7	33.5	1.6	5.0	.09	41.9	<.1
41P	8	L2335N+730E	113	4.1	3.4	11	62	92	.07	.94	11.1	22.6	1.6	74.7	5148	54.2	52.8	38.7	1.4	6.4	.08	36.3	<.1
41P	8	L2335N+730E	123	4.5	3.5	22	54	90	.09	.99	9.4	15.8	2.5	73.9	5148	55.4	54.0	27.7	2.0	5.8	.09	34.2	<.1
41P	8	L2335N+730E	85	4.6	3.6	25	69	92	.07	.95	11.8	21.4	2.1	74.6	5652	53.2	52.1	31.3	1.7	5.7	.10	37.2	<.1
41P	8	L2335N+730E	125	5.0	4.2	36	60	92	.07	.98	11.9	21.4	4.2	73.1	5338	51.1	49.4	18.9	2.7	3.7	.15	38.2	1.1
41P	9	F200W	132	3.8	2.9	4	61	93	.07	1.05	12.4	27.1	2.7	78.8	5148	49.0	47.0	37.7	1.3	4.8	.12	42.1	<.1
41P	9	F200W	191	3.6	3.2		47	92	.08	.98	10.9	19.8	3.1	72.9	5908	45.1	43.0	26.5	1.7	4.3	.11	45.7	<.1
41P	9	F200W	141	4.6	3.9	31	61	92	.08	.98	11.9	20.9	3.0	72.3	4961	51.9	49.6	26.6	7.0	6.1	.09	37.3	<.1
41P	9	F200W	205	5.2	4.9	71	48	94	.06	.99	14.4	25.0	15.3	68.4	3971	36.0	31.6	11.3	3.2	4.6	.19	40.7	.8
41P	9	F200W	68	5.3	5.2	170	44	86	.14	1.04	6.3	9.8	48.7	42.9	2837	27.2	24.9	12.4	2.2	4.3	.25	17.4	1.0
41P	9	G000+645N	134	5.0	4.4	31	57	90	.10	1.00	8.8	10.1	7.5	68.6	5124	41.2	38.8	20.6	2.0	4.7	.06	44.5	.1
41P	9	G000+645N	116	5.5	4.9	42	43	88	.12	1.00	7.3	10.3	6.7	68.0	5326	40.0	37.0	20.0	2.0	4.5	.05	46.7	<.1
41P	9	G000+645N	92	5.7	5.1	46	44	87	.13	.99	6.6	8.5	8.7	66.0	4696	47.1	46.0	27.7	1.7	4.8	.07	37.6	<.1
41P	9	G000+645N	161	5.8	5.2	51	53	86	.13	.99	6.2	9.2	8.5	64.2	5133	50.4	48.2	29.6	1.7	5.6	.12	33.7	<.1
41P	9	G600E+400N	159	3.5	2.9		59	89	.10	.98	8.4	18.8	3.5	73.5	5600	55.6	54.2	37.1	1.5	4.3	.10	35.0	<.1
41P	9	G600E+400N	125	3.6	2.9		56	89	.10	.98	8.1	15.8	1.8	71.0	5856	55.0	53.6	32.4	1.7	5.7	.04	35.8	<.1
41P	9	G600E+400N	166	3.8	3.1		48	89	.10	.98	8.1	12.9	5.5	69.3	5516	48.3	46.3	32.2	1.5	4.9	.15	39.6	.2

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PPM	ZN PPM	TOP	BOT	HUM 1-9	PEAT	S	C	L	X	REL POS	VEGETATION				COVER		SUR WAT PH	AV D-W CM	
											INT (CM)	INT (CM)								T %	TS %	LS %	G %	SP %	FOR			SUB
.10	6021	739	496	1285	1523	8	21	920	13	15	0	80	3	0	8	2	0			1	30	0	60	8	90	1	3	3.9
.11	19808	526	519	3877	8330	<3	51	1337	51	10	80	205	4	0	2	8	0			2	30	0	60	8	90	1	3	3.9
.09	16646	401	497	1854	7911	<2	48	1256	36	12	205	250	3	8	1	1	0			4	30	0	60	8	90	1	3	3.9
.07	18083	366	461	1598	8689	4	51	1309	52	8	250	300	4	6	3	1	0			4	30	0	60	8	90	1	3	3.9
.06	17893	565	13105	17842	12430	3	175	4356	37	49	300	360							5	30	0	60	8	90	1	3	3.9	
.04	3403	616	675	1264	1124	6	22	877	8	23	0	40	3	0	8	2	0			1	14	0	40	20	84	1	5	4.1
.02	2324	481	200	1287	782	<2	9	477	5	10	40	200	4	0	7	3	0			2	14	0	40	20	84	1	5	4.1
.01	3154	312	273	1468	800	<2	5	499	4	5	200	250	3	3	5	2	0			3	14	0	40	20	84	1	5	4.1
<01	3193	234	245	1245	932	<2	4	448	4	6	250	380	3	4	5	1	0			4	14	0	40	20	84	1	5	4.1
<05	1396	470	238	838	467	<2	26	279	2	20	0	40	4	1	8	1	0			1	4	0	50	30	84	1	3	3.9 29
.01	1293	368	219	733	468	<2	16	269	1	11	40	120	5	8	1	1	0			1	4	0	50	30	84	1	3	3.9 29
.06	3249	367	298	1413	878	<2	21	409	4	11	120	250	4	8	1	1	0			2	4	0	50	30	84	1	3	3.9 29
.04	2500	278	58	703	692	<2	8	271	2	6	250	300	4	7	2	1	0			3	4	0	50	30	84	1	3	3.9 29
<.01	2390	312	359	1145	740	<2	7	276	2	7	300	350	4	2	8	0	0			3	4	0	50	30	84	1	3	3.9 29
.02	3520	235	244	955	1181	<2	9	338	2	9	350	400	3	8	1	1	0			4	4	0	50	30	84	1	3	3.9 29
.01	4481	222	764	1536	2312	2	16	521	4	14	400	445	4	3	6	1	0			4	4	0	50	30	84	1	3	3.9 29
.02	2227	444	361	726	1075	27	7	324	10	34	0	30	3	7	3	0	0			1	3	0	50	18	70	2	3	5.0 19
.04	2582	449	241	1018	700	3	6	289	<1	7	30	125	4	8	2	0	0			1	3	0	50	18	70	2	3	5.0 19
.03	7065	357	225	1284	1564	2	11	502	5	9	125	280	3	9	0	1	0			4	3	0	50	18	70	2	3	5.0 19
.02	9464	331	3167	5054	4775	4	48	1467	8	45	280	320	6	9	0	1	0			4	3	0	50	18	70	2	3	5.0 19
.02	12016	452	11242	15851	12760	5	157	4180	13	165	320	340								5	3	0	50	18	70	2	3	5.0 19
.05	15909	643	831	1807	5811	16	100	1456	5	22	0	20	2	3	5	2	0			1	35	1	55	20	87	1	3	3.8 15
.04	22178	396	340	1411	4647	3	87	1691	10	14	20	50	3	1	2	7	0			1	35	1	55	20	87	1	3	3.8 15
.05	25882	297	444	1987	3968	3	80	2148	4	2	50	100	3	1	1	8	0			2	35	1	55	20	87	1	3	3.8 15
.03	21718	276	463	2097	4387	3	83	2201	18	2	100	170	4	0	1	9	0			3	35	1	55	20	87	1	3	3.8 15
.03	2428	340	567	1151	906	<2	12	366	3	5	0	100	4	0	4	6	0			1	9	0	49	10	73	1	3	3.7 30
.05	1141	316	57	871	511	2	5	147	3	7	100	225	3	0	3	7	0			3	9	0	49	10	73	1	3	3.7 30
.06	4501	255	404	1830	2396	3	14	393	5	20	225	260	3	3	3	4	0			4	9	0	49	10	73	1	3	3.7 30

Appendix 3: Keys to Wetland Classification Used in the Ontario Peatland Inventory Project

For the preparation of peatland classification mapping and the classification of vegetation types by field crews, the following keys were used on peatlands across Ontario.

The classification system is hierarchical, so that it can be used at several levels of detail, depending on the user's need or on the data available. It is modified from the initial system proposed by Zoltai et al. (1974), Jeglum et al. (1974), Jeglum and Boissonneau (1977) and Tarnocai (1979), with the addition of published and unpublished data from elsewhere in the province; e.g., Maycock (in prep.) for data from the south, and Ahti and Hepburn (1967), Riley and McKay (1980), and Riley (1981) for the extreme north. At its most detailed level, the classification includes the following:

Examples

Formation	BOG
Subformation	TREED
Physiognomic Group	Low Shrub
Dominance Type	<i>Picea mariana</i> – <i>Chamaedaphne calyculata</i> – <i>Sphagnum fuscum</i>
Site Type	<i>Picea mariana</i> ²⁶ – <i>Chamaedaphne calyculata</i> ⁴² – <i>Sphagnum fuscum</i> ⁷⁷

In this Inventory, the wetland vegetation was mapped to the level of physiognomic group; e.g., TREED Low-Shrub BOG. The classification keys include abbreviations for all units in order to simplify mapping. Abbreviations are always presented in this order: Subformation (where applicable)–Physiognomic Group–Formation. Other modifiers reflecting site history may also be added; e.g., (P) for post-fire succession.

The dominance type or site type is not mapped but is recorded by field crews; superscripts refer to percentage cover values of particular species. Where suitable data are available, similar superscripts are applied to mapping units at the physiognomic level; e.g., TREED(26%) Low-Shrub(42%) BOG, abbreviated as T²⁶ls⁴²B.

The following keys are presented in this order:

- Key to Formations
- Key to Subformations
 - Bog, Fen, Palsa/Peat Plateau
 - Maritime Shorelines
- Key to Physiognomic Groups
 - Swamp
 - Bog, Fen or Palsa/Peat Plateau
 - Marsh and Meadow Marsh
- Other Modifiers
- Keys or Catalogues of Dominance Types
- Abbreviations of Subformations and Physiognomic Groups as Applied to Wetland Formations in Ontario
- Common Names of Plant Species Frequent in Ontario Peatlands/Wetlands
- Key to Peatlands by Geomorphological Types

KEY TO FORMATIONS

Well-drained hilltops, steep to moderate slopes, sand flats, levees, beach ridges, permafrost tundra, bedrock outcrop, littoral banks, etc. Stands normally dominated by dry-land species of trees, shrubs and/or herbaceous ground vegetation. *Or*, large expanses of open standing or flowing water deeper than 2 m and/or more than 10 ha in size.

....NON-WETLANDS (MINERAL/SOIL UPLAND and DEEP WATER)

Basins, depressions, adjacent low slopes, areas with restricted drainage, drainways, floodplains, littoral terraces, and seasonally or tidally flooded areas. Water table at, near, or above the land surface for part of the year, or saturated long enough to promote wetland or aquatic processes such as hydric or organic soils, or hydrophilic vegetation. Some wetlands may have seasonally variable water levels, ranging from flooded spring conditions to summer drought conditions with water tables 50 cm or more below the average land or peat surface.

....WETLANDS

- 1a. Well-defined aquatic basins or shoreline zones transitional to deep-water areas; inorganic or organic substrates. Vegetation of submergent, floating or emergent species in standing water less than 2 m deep, or on exposed substrate during water-drawdown periods such as low tides or summer drought. Periodically or permanently flooded by silt- or nutrient-enriched lake or river waters. In exposed wave or water-current situations, may be on mineral soil, whereas muck and/or peat may accumulate in less disturbed sites, sometimes to depths of more than 40 cm; i.e., organic soils, which are those having more than 17% organic carbon (C), with more than 30% organic matter by weight.
- 2a. Basins or basin margins covered at least 75% by permanently open water, usually less than 2 m deep and associated with flowing or standing lakes, rivers or ponds. Usually with sparse floating, submergent or partly emergent vegetation (less than 25% cover by emergents).

....SHALLOW WATER (W)

- 2b. Unconsolidated open, flat, or depressed surface, dominated by herbaceous emergent sedges, grasses, cattails and reeds (more than 25% cover), or low shrubs; interspersed in standing water (or emergent at low water levels). With occasional small pools and channels, and with exposed patches of mineral or organic soils during seasonal (or tidal) water drawdowns. Often associated with and periodically flooded by the mineral-enriched ground waters of open streams or rivers, flowing lakes, glacial depressions, or marine terraces or flats. Can be contiguous to or grade into Thicket SWAMP with a shrub element up to 25% cover.

....MARSH (M)

MARSH is distinguished from the semi-terrestrial Meadow MARSH (mM) by the ordinary presence of standing water and its more closed vegetation. Both MARSH and Meadow MARSH may occur on sedge peat, muck or mineral soils. The distinction between these is difficult in tidal and broad littoral, mineral soil sites where water drawdown or incursion varies seasonally or daily, such as in spring floods or tidal or storm situations. For these wet meadow-like types, and other sites with more-or-less variable standing water (such as beaver meadows), the term Meadow MARSH (mM) has been used by Jeglum and Boissonneau (1977) and Riley and McKay (1980).

- 1b. Less well-defined basins in which open standing water is absent or restricted to scattered small pools, often of a seasonal nature; substrates of saturated (or seasonally dry) peat deeper than 40 cm.
- 3a. Predominantly ombrotrophic or weakly minerotrophic peatlands, developed on acidic peat (pH of water 10 cm below water table usually less than 5.2, unless water has been significantly drawn down by summer drought). Accumulation of peat more than 40 cm dominated surficially by poorly

decomposed sphagnum peat; isolated from mineral-soil water movement. The ground water pH of strictly ombrotrophic peatlands is usually less than 4.2 (to <4.4), with calcium levels under 2 ppm.

- 4a. Forming a level, gradually raised (domed) or sloping surface with a (usually) hummock–hollow topography, usually with a continuous carpet of mosses dominated by *Sphagnum* spp. (particularly *S. fuscum* in the hummock phase). Usually with a ground cover of graminoids or of mostly ericaceous shrubs, without trees or with short trees (less than 10 m in height) with more-or-less open canopy (usually less than 25%, *Picea mariana*, or *Larix laricina* in transitional sites). Lacking species indicative of minerotrophy (see Key to Physiognomic Groups). With or without subsurface discontinuous permafrost or seasonal frost; occasionally with incipient palsa formation north of about 51°N.

....BOG (B)

- 4b. Forming an erratic topography of (perennial) permafrost eruptions (palsas) or coalesced palsa fields (peat plateaus) rising more than 1.5 m above ambient landform level, with more-or-less continuous frozen peat cores and often with patterning of interstitial bog/fen drainways at the ambient landform level. Surface vegetation dominated by lichens, ericaceous shrubs, with or without tree cover (*Picea mariana* up to about 25%).

....PALSA/PEAT PLATEAU (PP)

- 3b. Predominantly minerotrophic wetland, developed on graminoid, woody or “brown moss” peat, or, if with abundant sphagnum at the surface, not usually underlain by a continuous horizon of pure sphagnum peat of thickness more than 30 cm; sites variably influenced by lateral or groundwater input of mineral soil water.

- 5a. Minerotrophic wetlands, heavily wooded or with shrub thickets over 2 m tall, and more than 25% tree or tall-shrub cover. Usually with hummocky surface broken by wet interstitial hollows, or relatively flat with many spring-flooded pools. Substrate of mixtures of transported mineral and organic sediments, or peat (usually woody or with sphagnum surface) deposited *in situ*. Often seasonally flooded or flooded by beaver dams, or with interstitial hollows of standing water and hummocks restricted to deadfall or tree/shrub bases; flooding can decrease tree density to less than 25% by dieback.

....SWAMP (S)

Distinguished from the rarer High-Density TREED BOG by its location on the wetter edges of peatlands, or by the occurrence of an understorey of *Alnus rugosa* or *Salix* spp., or surficial substrate of sphagnum peat less than 30 cm thick, or by the more vigorous growth of trees, often those over 10 cm DBH (diameter, breast height) greater than 25% cover.

Occasionally, some heavily treed conifer peatlands keying out as SWAMP differ from typical swamps in that they occur on deep, more-or-less dry peats, and have such dense canopy closure that almost no shrub or ground cover persists. *Larix laricina* and *Picea mariana* have been noted as the dominant species on such sites in both northern and southern Ontario. Because of the density of tree growth and the dryness of the peat, they may be better classified as PEAT FOREST (FP).

- 5b. Open or sparsely wooded minerotrophic wetlands with level or depressional surfaces, except for low hummocks or ridges; dominated by sedges, grasses and/or (mostly) non-ericaceous shrubs. Tree cover may reach 25% in FENS (*Larix laricina*, *Thuja occidentalis*), but is usually less than 10 m in height and has an understorey of low shrubs and/or graminoids rather than tall alder or willow shrubs; pools of open water or drainage tracks may be present.
- 6a. Open or sparsely wooded, with a relatively uniform and consolidated surface, north of 50°N, often with subparallel ridges or elevated

islands, linear drainage features and small dispersed pools; more homogeneous physiognomically in the south, and often with clumped cedar surface. Vegetation consists of short sedges and grasses, and a variable layer of (mostly) non-ericaceous shrubs and trees. Often associated with the so-called “brown mosses” (*Campylopus stellatus*, *Aulacomnium palustre*, *Drepanocladus revolvens*, *Tomenthypnum nitens*, *Scorpidium scorpioides*, *Palludella squarrosa*, *Calliergon giganteum*), where pH is higher than 5.5; with *Sphagnum* spp., where pH is 5.0 to 6.0; or “marl peats”, where pH is over 7.0.

May be contiguous to open water or open drainage systems, in which case the trophic level of the peatland may reflect the water chemistry of the adjacent body of water. For instance, in infilling “kettle” depressions, fen margins and floating mats around acidic kettle lakes may be only weakly minerotrophic, and thus bog-like in varying degrees (Schwintzer 1978, 1980; Vitt and Slack 1975). Root or stump hummocks are common, and hollows may or may not have shallow water present over the peat.

....FEN (F)

- 6b. In many FENS, conditions are only weakly minerotrophic, and both BOG and FEN indicator species exist. Often, sphagnum and black spruce are dominant, particularly in the “hummock” phase, but a scattering of fen associates make the site appear to be transitional in terms of succession from FEN to BOG. Such formations may be termed OPEN or TREED Poor FEN (OPF or TPF).

....Poor FEN (PF)

Because this classification unit is more nutrient-related than physiognomic, it should probably not be considered as a formation of equivalent importance to the others. It should be used only as a “last resort” by workers experienced with the full range of peatland nutrient conditions. It does, however, provide a descriptive means of characterizing some extensive peatlands in the James Bay Lowland and the Northern Clay Belt. Interpretation of Poor FEN solely on the basis of airphotos is probably unreliable.

KEY TO SUBFORMATIONS

BOG, FEN, PALSA/PEAT PLATEAU

- 1a. Cover by tree species taller than 150 cm, less than 10%.

....OPEN (O^x)

(Abbreviated to O^x if a superscript annotation of canopy cover percentage is available; for example, 8% canopy cover would be designated as O⁸.)

- 1b. Cover by tree species taller than 150 cm, more than 10% (rarely to 50%); trees greater than 10 cm DBH, less than 25% cover.

....TREED (T^x)

(Abbreviated to T^x if a superscript annotation of canopy cover percentage is available; for example, 26% cover becomes T²⁶.)

- 2a. Cover by tree species taller than 150 cm, 10% to 15%.

....Low-Density TREED (T(ld))

- 2b. Cover by tree species taller than 150 cm, 15% to 25%; on occasion, more than 25% cover.

....Medium-Density TREED (T(md))

Where cover by tree species taller than 150 cm is more than 30%, and trees over 10 cm DBH greater than 25% cover, the stand may usually be considered to be SWAMP. High-Density TREED BOG (T(hd)B; canopy more than 25%) is a much less frequent type of site in Ontario, occurring in the central (or raised) areas of well-developed

bogs, where there is less vigorous tree growth than in Conifer SWAMP. It is not associated with *Alnus rugosa* or *Salix* spp., which occupy more minerotrophic and wetter areas of peatland edges and drains. High-Density TREED BOG is usually dominated by *Ledum groenlandicum* in the shrub storey, and is transitional to the *L. groenlandicum* type of *Picea mariana* SWAMP. This distinction may be difficult to judge on airphotos of much of northern Ontario.

MARITIME SHORELINES

In maritime Ontario, two other modifying terms are used at the subformation level, both referring to MARSH and Meadow MARSH, and the latter to Thicket SWAMP as well. These refer to wetlands other than peatlands. They are physiographic rather than formational modifiers, but relate strongly to the floristic composition of dominance types within otherwise similar physiognomic units.

- 1a. Formations within the marine (saline) influence of James and Hudson Bay.
....COASTAL (C)
- 1b. Formations subject to tidal effects ameliorated by the freshwater influence of major rivers.
....ESTUARINE (E)

KEY TO PHYSIOGNOMIC GROUPS

SWAMP

- 1a. Tree species dominant.
 - 2a. Conifers dominant (*Picea mariana*, *Larix laricina*, *Thuja occidentalis*).
....Conifer (c)
 Conifer swamp on peatlands or organic soils vary considerably in their nutrient status and dominance types. In this physiognomic classification, that variation is not recognized. However, a more detailed nutrient-related classification may be required by workers. In such cases, reference is made to Forest Ecosystem Operational Groups 11 to 13 (Jones et al. 1983) for more detailed mapping units useful across most of northern Ontario: OG11, *Picea mariana*–*Ledum groenlandicum*; OG12, *Picea mariana*–*Alnus rugosa*–herb-poor; OG13, *Picea mariana* (*Larix laricina*, *Thuja occidentalis*)–*Alnus rugosa*–herb-rich.
 - 2b. Deciduous (hardwood) trees dominant (*Fraxinus nigra*, *F. pennsylvanica*, *Populus* spp., *Acer saccharinum*, *A. rubrum*, *Ulmus americana*, *Salix nigra*, *Carya* spp., *Quercus macrocarpa*, *Q. palustris*, *Nyssa sylvatica*, etc.)
....Deciduous (h)
 Note that Mixed SWAMPS may be classified as follows: conifer (subdominant)–deciduous (dominant) SWAMP as chS; deciduous (subdominant)–conifer (dominant) SWAMP as hcS. Superscripts may be used to indicate respective cover percentages; e.g., h¹⁵c³⁵S. The same procedure may be used with mixed thicket–deciduous SWAMP: thS or htS. Alternatively, a simple Mixed SWAMP category (mS) may be considered appropriate.
....Mixed (m)
- 1b. Tree species less than 25% cover and shrub species over 2 m tall, more than 25% (*Alnus rugosa*, *Salix petiolaris*, other *Salix* spp., *Betula pumila* var. *glandulifera*, *Cornus stolonifera*, *C. racemosa*, *Rhus vernix*, *Cephalanthus occidentalis*, *Ilex verticillata*, etc.). Grades into Shrub-Rich MARSH in southern Ontario, from which it can be distinguished by its firm, more-or-less consolidated peat surface, its relative lack of open drainways and streams, and its denser and taller shrub cover.
....Thicket (t)

BOG, FEN OR PALSA/PEAT PLATEAU

1a. Shrubs present, as low or dwarf shrubs less than 150 cm, more than 25% cover, or tall shrubs 10% to 30% (rarely, to 40%) cover. Where the height of shrub cover is not discernible from airphoto interpretation or when field data are unavailable, the generic physiognomic group Shrub-Rich (sr) can be used, and understood to include both tall-shrub and low-shrub groups. In very few cases should more than a single physiognomic modifier be applied; where more than one may be considered applicable, the shrub storey takes precedence over the graminoid/herb and sphagnum layers, the graminoid/herb layer takes precedence over sphagnum, and the latter is used only where neither shrub nor graminoid/herb layer is considered significant according to the definitions used below.

2a. Shrubs over 150 cm tall, 10% to 30% (rarely, to 40%) cover. In northern Ontario, shrub species include *Chamaedaphne calyculata* (B, F), *Kalmia angustifolia* (B), *Thuja occidentalis* (F, as scrub cedar), *Betula pumila* var. *glandulifera* (F), *Salix pedicellaris* (F), *Myrica gale* (F). In southern Ontario, they include the above species and *Aronia melanocarpa* (B, F), *Nemopanthus mucronata* (B), *Vaccinium corymbosum* (B). (B and F indicate general BOG or FEN tendencies.)

....Tall Shrub (ts)

2b. Shrubs, where present, mostly 20 to 150 cm tall (or with less than 10% cover by shrubs greater than 150 cm); low candelabra or layered black spruce less than 135 cm would be included in percentage estimates of shrub cover; shrubs less than 135 cm tall, greater than 25% cover (10% in the Hudson Bay Lowland), form the main visual impact, but sites may also have a significant graminoid component; includes most of the shrub species listed for Tall-Shrub sites, with the addition of dwarfed candelabra *Picea mariana* (B), *Ledum groenlandicum* (B, F), *Andromeda glaucophylla* (B, F), *A. polifolia* (F), *Vaccinium myrtilloides* (B), *Rhamnus alnifolia* (F), *Potentilla fruticosa* (F), *Gaylussacia baccata* (B). (B and F refer to general BOG or FEN tendencies.) "Semi-shrubs" such as *Vaccinium oxycoccus*, *V. macrocarpon*, *Rubus pubescens*, *R. chamaemorus*, *R. acaulis* or *Gaultheria hispidula* should not be included in shrub cover values.

....Low Shrub (ls)

2c. On PALSA, PEAT PLATEAU, and some BOG and FEN sites in extreme northern Ontario, shrubs may be very low (less than 20 cm tall) and over 10% cover; these represent extremes of climatic exposure or ombrotrophy and the physiognomic group Dwarf Shrub (ds) should be used. As with Low-Shrub types, "semi-shrubs" should not be considered in this distinction.

....Dwarf Shrub (ds)

In extreme northern Ontario, OPEN and TREED BOG and PALSA/PEAT PLATEAU can have a conspicuous lichen cover (*Cladina* spp.) of over 45% to 50%, and should be indicated as Lichen-Rich (lr) formations.

....Lichen-Rich (lr)

1b. Shrubs either not present or present at cover values less than indicated above.

3a. Firm peatland above water most of the year.

4a. Conspicuous graminoid layer (sedges, grasses, reeds) more than (8% to) 10% cover; graminoid cover exceeds shrub cover percentage: characteristic species are *Carex aquatilis* (F), *C. chordorrhiza* (F), *C. diandra* (F), *C. interior* (F), *C. lasiocarpa* (F), *C. limosa* (B, F), *C. livida* (F), *C. oligosperma* (B), *C. microglochin* (B), *C. pauciflora* (B), *C. pauperculua* (B), *C. rostrata* (F), *C. stricta* (F), *Equisetum fluviatile* (F), *Eriophorum spissum* (B), *E. viridicarinarum* (F), *Scirpus cespitosus* (F, B), *S. hudsonianus* (F), *Triglochin maritimum* (F). (B and F refer to general BOG and FEN tendencies.) Included in this layer are peatland forbs and "semi-shrubs" such as *Vaccinium oxycoccus* (B, F), *Rubus chamaemorus* (B), *R. acaulis* (F, ?B) and *Gaultheria hispidula* (B, F).

....Graminoid (g)

- 4b. Sphagnum moss dominant at surface; shrubs, herbs and graminoids less than 10% cover.

....Sphagnum (sp)

- 3b. Small water-bodies occurring within the peatland, often with a patterned distribution; usually contiguous with Open BOG or FEN; rare except in the Hudson Bay Lowland.

....Pool (p)

MARSH AND MEADOW MARSH

- 1a. Closed graminoid and herb (rarely, low-shrub) vegetation behind zones of coastal or shoreline emergent vegetation, and on wet floodplains, terraces or supertidal areas adjacent to open water systems; some of the more common dominant species are indicated in couplet 2, below. Usually seasonally flooded, flooded in the recent past (e.g., due to beavers), or subject to storm or neap tide floods; graminoid cover is characteristic, so that no physiognomic modifier (e.g., g) is required.

....Meadow (m)

Low-Shrub Meadow (lsm)

In supertidal, coastal sites, low-shrub cover (less than 25% cover, mostly *Salix* spp.) may be dominant and can be indicated as Low Shrub Meadow MARSH (lsmM), often grading into Thicket SWAMP (tS).

- 1b. Emergent vegetation in or adjacent to open shallow water, pools or channels; commonly interspersed or dominated by clumps of vegetation (rooted, or unconsolidated and floating) with open water channels between, or with open water beneath the canopy of sedges, grasses, reeds or cattails; cover by emergents or shrubs greater than 25%. Where ground data are unavailable for referencing wetland types, a generic term such as Emergent MARSH (eM) should be used.

....Emergent (e)

In airphoto interpretation, the following classes of MARSH may not be readily distinguishable.

- 2a. Sedges, grasses, reeds or cattails dominant. Dominant marsh species vary a great deal across Ontario; dominant herbaceous species may include *Calamagrostis canadensis*, *Typha latifolia*, *Phalaris arundinacea*, *Carex aquatilis*, *C. diandra*, *C. lacustris*, *C. pseudo-cyperus*, *C. stricta*, *Bidens* spp., *Polygonum natans*, *Utricularia vulgaris*, *Lythrum salicaria*, *Thelypteris palustris*, and many others. May occur on mineral, muck, well-decomposed graminoid peat, or layering of these substrate types.

- 3a. Canopy cover 25% to 75%; standing water and/or muck/mud flats beneath canopy or between clumps; characterized by extreme variation in water levels, ranging from water levels at the surface (e.g., after summer water drawdown, or in consolidated cattail MARSH) to standing water up to 2 m deep (e.g., *Scirpus* spp.).

....Deep (d)

- 3b. Canopy 75% to 100%; standing water and/or muck/mud flats beneath canopy or between clumps. Characterized by more-or-less continuous stands of tall emergents (Meadow MARSH would tend to have dominant graminoids of lower stature); with surface water up to 1 m (floodstages), but usually less during much of the summer months.

....Shallow (s)

- 2b. Sedges, grasses, reeds or cattails present but dominated by shrub species (e.g., *Spiraea alba*, *Cornus stolonifera*, *Ilex verticillata*, *Myrica gale*, *Decodon verticillatus*, *Cephalanthus occidentalis*); usually the more-or-less unconsolidated edges of Thicket or MARSH. A minor physiognomic unit, most common in southern Ontario, grading into Thicket SWAMP in many areas; for example, in extreme southwestern Ontario, where *Cephalanthus occidentalis* grows much larger.

....Shrub-Rich (sr)

MARSH and Meadow MARSH vary considerably in their dominant species in relation to their proximity to the maritime coast, where they cover extensive areas (see Riley and McKay 1980, for James Bay dominance types).

- 1a. MARSH subject to spring and other exceptional tides and consequent marine ice scouring; consistently Meadow MARSH, grading further away from coastal areas into freshwater MARSH and Meadow MARSH; often broken by supertidal pools with considerably elevated salinity and frequency of halophytic plant species.

....Supertidal (Sup)

- 1b. MARSH subject to regular tidal influence; grading into Supertidal Meadow MARSH, but usually with emergent beach-ridge deposits or deposits of tidal debris forming some boundary between "regular" versus "exceptional" tidal activity; halophytic plant species dominate, except in Estuarine areas ameliorated by freshwater input.

....Intertidal (Int)

OTHER MODIFIERS

Modifiers reflecting site history can add significantly to the meaning of mapped or reported physiognomic groups; modifiers should be placed in brackets after the abbreviation of the physiognomic group.

Flooded by beaver, roadway or other; e.g., dS(F)	(F)
Cutover and/or recent secondary succession	(C)
Post-fire succession	(P)
Grazed	(G)
Drained, or affected by drains through the area	(D)
Agricultural use	(A)

KEYS OR CATALOGUES OF DOMINANCE TYPES

Dominance types have strongly regional characteristics, dependent on the distribution of particular plant species across Ontario. These dominance types have been categorized for the Northern Clay Belt (Jeglum et al. 1974) and for the James/Hudson Bay Lowland (Riley 1981), but for southern Ontario are available only in Maycock (in prep.).

ABBREVIATIONS OF SUBFORMATIONS AND PHYSIOGNOMIC GROUPS AS APPLIED TO WETLAND FORMATIONS IN ONTARIO

SWAMP	S
BOG	B
FEN	F
PALSA/PEAT PLATEAU	PP
MARSH	M
SHALLOW WATER	W
Poor FEN	PF

SWAMP

Dominant Species	Abbreviation	SWAMP Designation
Conifer	c	cS
Deciduous	h	hS
Mixed	m or ch, hc, th (etc.)	mS or chS, hcS, thS (etc.)
Thicket	t	tS

BOG, FEN, PALSA/PEAT PLATEAU

	Abbreviation	OPEN (O)	TREED (T)
Shrub-rich	sr	OsrB OsrF	TsrB TsrF
Low Shrub	ls	OlsB OlsF OlsPP	TlsB TlsF TlsPP
Tall Shrub	ts	OtsB OtsF	TtsB TtsF
Dwarf Shrub	ds	OdsB OdsPP	
Graminoid	g	OgB OgF	TgB TgF
Sphagnum	sp	OspB	TspF
Pool	p	OpB OpF	
Lichen-Rich	lr	Olrb OlrlsB, OlrdsB OlrlsPP, OlrdsPP OlrbPP	TlrlsB TlrlsPP

MARSH

		Fresh- Water (M)	Coastal (C)	Estuarine (E)
Meadow	m	mM	CmM	EmM
Low Shrub	ls		ClsmM	ElsmM
Emergent	e	eM		
Deep	d	dM		
Shallow	s	sM		
Shrub-Rich	sr	srM		
Supertidal	Sup		CSupmM	ESupmM
Intertidal	Int		CIntM	EIntM

**COMMON NAMES OF PLANT SPECIES FREQUENTLY
FOUND IN ONTARIO PEATLANDS/WETLANDS****TREE SPECIES**

<i>Abies balsamea</i>	Balsam fir
<i>Acer rubrum</i>	Red maple
<i>Acer saccharinum</i>	Silver maple
<i>Betula papyrifera</i>	White birch
<i>Carya</i> spp.	Hickory species
<i>Fraxinus nigra</i>	Black ash
<i>Fraxinus pennsylvanica</i>	Red ash
<i>Larix laricina</i>	Tamarack
<i>Nyssa sylvatica</i>	Black gum
<i>Picea glauca</i>	White spruce
<i>Picea mariana</i>	Black spruce
<i>Pinus strobus</i>	White pine
<i>Populus balsamifera</i>	Balsam poplar
<i>Populus</i> spp.	Poplar, aspen species
<i>Quercus macrocarpa</i>	Bur oak
<i>Quercus palustris</i>	Pin oak

Salix nigra
Thuja occidentalis
Ulmus americana

Black willow
 White cedar
 American elm

SHRUB SPECIES

Alnus rugosa
Andromeda glaucophylla
Andromeda polifolia
Aronia melanocarpa
Betula pumila var. *glandulifera*
Cephalanthus occidentalis
Chamaedaphne calyculata
Cornus racemosa
Cornus stolonifera
Decodon verticillatus
Gaylussacia baccata
Ilex verticillata
Kalmia angustifolia
Kalmia polifolia
Ledum groenlandicum
Lonicera oblongifolia
Lonicera villosa
Myrica gale
Nemopanthus mucronata
Potentilla fruticosa
Rhamnus alnifolia
Rhamnus frangula
Rhus radicans
Rhus vernix
Salix bebbiana
Salix discolor
Salix pedicellaris
Salix petiolaris
Salix planifolia
Salix pyrifolia
Salix serissima
Salix spp.
Spiraea alba
Spiraea tomentosa
Vaccinium angustifolium
Vaccinium corymbosum
Vaccinium myrtilloides
Viburnum cassinoides

Speckled alder
 Bog rosemary
 Northern rosemary
 Chokeberry
 Dwarf birch
 Button bush
 Leatherleaf
 Racemose dogwood
 Red osier
 Water willow
 Black huckleberry
 Winterberry
 Sheep laurel
 Bog laurel
 Labrador tea
 Swamp-fly honeysuckle
 Northern honeysuckle
 Sweet gale
 Mountain holly
 Shrubby cinquefoil
 Alder-leaf buckthorn
 Alder buckthorn
 Poison ivy
 Poison sumac
 Long-beaked willow
 Pussy willow
 Fen willow
 Willow
 Flat-leaf willow
 Balsam willow
 Autumn willow
 Willow
 White meadowsweet
 Hardtack
 Low sweet blueberry
 High-bush blueberry
 Velvet-leaf blueberry
 Witherod

HERB, GRAMINOID AND SUB-SHRUB SPECIES

Bidens spp.
Boehmeria cylindrica
Calamagrostis canadensis
Calla palustris
Carex aquatilis
Carex canescens
Carex chordorrhiza
Carex comosa
Carex diandra
Carex exilis
Carex flava
Carex interior
Carex lacustris
Carex lasiocarpa

Beggar's-ticks species
 Bog hemp
 Blue-joint grass
 Wild calla
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge
 Sedge

<i>Carex leptalea</i>	Sedge
<i>Carex limosa</i>	Sedge
<i>Carex livida</i>	Sedge
<i>Carex michauxiana</i>	Sedge
<i>Carex microglochin</i>	Sedge
<i>Carex oligosperma</i>	Sedge
<i>Carex pauciflora</i>	Sedge
<i>Carex paupercula</i>	Sedge
<i>Carex pseudo-cyperus</i>	Sedge
<i>Carex rostrata</i>	Sedge
<i>Carex trisperma</i>	Sedge
<i>Carex vesicaria</i>	Sedge
<i>Cladium mariscoides</i>	Twig rush
<i>Drosera anglica</i>	Northern sundew
<i>Drosera rotundifolia</i>	Round-leaved sundew
<i>Dulichium arundinaceum</i>	Tree-way sedge
<i>Eleocharis elliptica</i>	Spike rush
<i>Eleocharis palustris</i>	Spike rush
<i>Equisetum fluviatile</i>	Water horsetail
<i>Eriophorum spissum</i>	Hare's-tail cottongrass
<i>Eriophorum virginicum</i>	Tawny cottongrass
<i>Eriophorum viridicarinatum</i>	Cottongrass
<i>Eupatorium maculatum</i>	Joe Pye weed
<i>Galium trifidum</i>	Bedstraw
<i>Gaultheria hispidula</i>	Creeping snowberry
<i>Glyceria borealis</i>	Manna grass
<i>Hydrocharis morus-ranae</i>	Frog's-bit
<i>Impatiens capensis</i>	Spotted touch-me-not
<i>Iris versicolor</i>	Blue flag
<i>Laportea canadensis</i>	Wood nettle
<i>Leersia oryzoides</i>	Cut-grass
<i>Lemna minor</i>	Duckweed
<i>Lycopodium inundatum</i>	Bog clubmoss
<i>Lycopus uniflorus</i>	Water horehound
<i>Lythrum salicaria</i>	Spiked loosestrife
<i>Matteuccia struthiopteris</i>	Ostrich fern
<i>Menyanthes trifoliata</i>	Buckbean
<i>Muhlenbergia glomerata</i>	Muhly grass
<i>Onoclea sensibilis</i>	Sensitive fern
<i>Osmunda regalis</i>	Royal fern
<i>Phalaris arundinacea</i>	Reed canary grass
<i>Phragmites australis</i>	Reed
<i>Platanthera hyperborea</i>	Northern green orchis
<i>Polygonum natans</i>	Water smartweed
<i>Pontederia cordata</i>	Pickernelweed
<i>Potentilla palustris</i>	Marsh cinquefoil
<i>Rhynchospora alba</i>	Beak-rush
<i>Rubus acaulis</i>	Stemless raspberry
<i>Rubus chamaemorus</i>	Baked appleberry
<i>Rubus pubescens</i>	Dwarf raspberry
<i>Sagittaria latifolia</i>	Water plantain
<i>Sarracenia purpurea</i>	Pitcher plant
<i>Scheuchzeria palustris</i>	Scheuchzeria
<i>Scirpus acutus</i>	Bulrush
<i>Scirpus cespitosus</i>	Bulrush
<i>Scirpus cyperinus</i>	Bulrush
<i>Scirpus hudsonianus</i>	Bulrush
<i>Scirpus rubrotinctus</i>	Bulrush

Scirpus validus
Smilacina trifolia
Solanum dulcamara
Solidago uliginosa
Thelypteris palustris
Triglochin maritimum
Typha latifolia
Utricularia cornuta
Utricularia vulgaris
Vaccinium macrocarpon
Vaccinium oxycoccus
Woodwardia virginica
Xyris difformis
Xyris montana
Zizania aquatica

MOSS AND LICHEN SPECIES

Aulacomnium palustre
Bryum pseudotriquetrum
Calliergon giganteum
Calliergonella cuspidata
Campylium stellatum
Cladina spp.
Climacium dendroides
Dicranum undulatum
Drepanocladus exannulatus
Drepanocladus revolvens
Hylocomium splendens
Hypnum lindbergii
Paludella squarrosa
Pleurozium schreberi
Polytrichum spp.
Scorpidium scorpioides
Sphagnum spp.
Tomenthypnum nitens

Bulrush
False solomon's seal
Nightshade
Fen goldenrod
Marsh fern
Arrow-grass
Cattail
Bladderwort
Bladderwort
Large cranberry
Small cranberry
Chain fern
Yellow-eyed grass
Yellow-eyed grass
Wild rice

Brown moss
Brown moss
Brown moss
Brown moss
Brown moss
Lichen
Brown moss
Brown moss
Brown moss
Brown moss
Brown moss
Brown moss
Feather moss
Hair-cap moss species
Brown moss
Sphagnum species
Brown moss

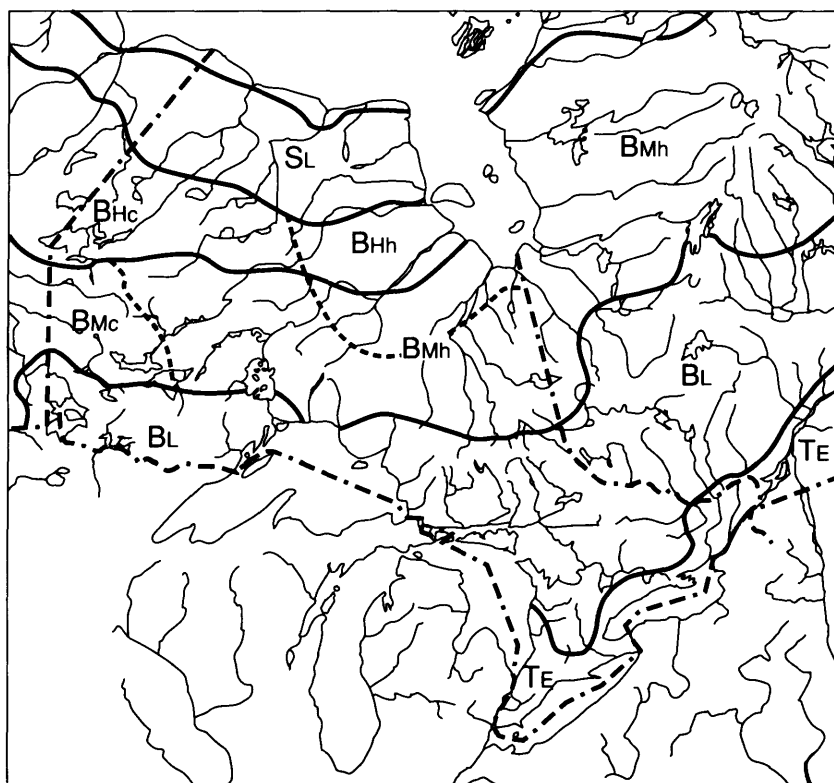
KEY TO PEATLANDS BY GEOMORPHOLOGICAL TYPES (LEVEL 2)

These are general geomorphological types of peatlands. Most peatlands are at least partly (if not highly) complexed between types, so that characterizations of peatlands as single types will not be entirely accurate. However, this level of classification does apply some general hydrological and patterning criteria to peatland system classification.

The keys are modified from Zoltai et al. (1974) and Tarnocai (1979). The annotations for Ontario are preliminary.

For references to the frequency (characteristic, common, frequent, rare, restricted) of geomorphological types in particular wetland regions, refer to the regions outlined by the Canada Committee on Ecological Land Classification (1981) and Riley (1982):

- TE — EASTERN TEMPERATE Wetland Region
- BL — LOW BOREAL Wetland Region
- BMc — CONTINENTAL MID-BOREAL Wetland Region
- BHh — HUMID HIGH-BOREAL Wetland Region (the Hudson Bay Lowland at that latitude)
- BHc — CONTINENTAL HIGH-BOREAL Wetland Region
- SL — LOW SUBARCTIC Wetland Region
- SH — HIGH SUBARCTIC Wetland Region



Key to Bog Geomorphological Types

Ontario Status

- | | | |
|--|--|--|
| 1a. Surface raised above the surrounding terrain. | | |
| 2a. Surface convex. | | |
| 3a. Core frozen; abruptly domed. | | |
| 4a. Over 1 m high, diameter up to 100 m | Palsa Bog | Characteristic of SL; rare southward in James Bay Lowland. |
| 4b. Less than 1 m high, diameter up to 3 m | Peat Mound Bog | Frequent in BH and northern BM; rare, elsewhere. |
| 3b. Core not frozen. | | |
| 5a. Convex surface, small (1–3 m diameter); occurring in fens | Mound Bog | Minor element of extensive fen systems. |
| 5b. Convex surface, often extensive; not occurring in fens | Domed Bog
(incl. Raised Bog) | Rare and minor element in Ontario; restricted to Lower Ottawa Valley, Rainy River, eastern Clay Belt. |
| 2b. Surface flat to irregular. | | |
| 6a. Core perennially frozen. | | |
| 7a. Surface with network of polygonal fissures, surface even. | Polygonal Peat Plateau | Rare; restricted to Cape Henrietta Maria area. |
| 7b. Surface without polygonal fissures, often appearing as coalesced palsa fields. | | |
| 8a. Surface about 1 m above the surrounding fen, without large thaw pockets of open water. | Peat Plateau | Characteristic, major element of SL and SH, not southward. |
| 8b. With large thaw pockets of open water. | Thermokarst Peat Plateau | Frequent in SH and northern SL; not southward. |
| 6b. Core not frozen; bogs generally teardrop-shaped. | Northern Plateau Bog | Frequent element of peatland systems in BM and BH. |
| 1b. Surface not raised above surrounding terrain, surface relatively level. | | |
| 9a. Adjacent to water bodies. | | |
| 10a. Floating. | Floating Bog | Common; characteristic of Canadian Shield and glaciofluvial ice-contact depressions. |
| 10b. Not floating | Shore Bog | Common; characteristic of Canadian Shield and glaciofluvial ice-contact depressions. |
| 9b. Not adjacent to water bodies. | | |
| 11a. Surface flat; topographically confined. | | |
| 12a. Basin deposit; depth greatest in centre. | Basin Bog | Common in BL and BM. |
| 12b. Flat deposit; depth generally uniform | Flat Bog
(incl. Karst Sinkhole Bog) | Characteristic and major element of northern Ontario. (Sinkholes are rare, restricted to lower Attawapiskat River area.) |
| 11b. Surface flat to undulating, often appreciably sloping and unconfined; surface pattern of reticulate ridges and pools distinct, distributed over large areas | Net Bog
(incl. String Bog) | Characteristic and major element of BH, SL. |
| 9c. Adjacent to small water bodies or completely infilling small, sharply defined catch basin(s) in elevated topographic positions on moraines | Kettle Bog | Characteristic element of glaciofluvial, moraine and ice-contact depressions in TE, BL, BM and BH. |

Key to Swamp Geomorphological Types

		Ontario Status
1a. Adjacent to water body.		
2a. Located along banks of continuously flowing or semipermanent streams	Stream swamp (Alluvial Swamp)	Common in Ontario north to BH.
2b. Located along shores of semipermanent or permanent lakes	Shore Swamp (Lakeside Swamp)	Common in Ontario north to BH.
1b. Not adjacent to permanent water body.		
3a. In topographically well-defined basins.		
4a. On perimeter of peatlands	Peat Margin Swamp	Common in Ontario north to BH.
4b. Basin deposit; depth greatest in centre	Basin Swamp	Common in Ontario north to BH.
3b. Not in topographically well-defined basins.		
5a. Flat deposit; depth generally uniform	Flat Swamp	Characteristic of lowlands and clay belts north to BH and south of the Shield.
5b. Poorly drained area; associated with floodplains	Floodplain Swamp	Characteristic and major element of TE, southern BL; frequent but less major element of BM.
5c. Discharge or spring catchment area; surface irregular	Spring Swamp	Common but minor element throughout Ontario north to BM.

Key to Fen Geomorphological Types

Ontario Status

- | | | |
|--|----------------------------------|--|
| 1a. Surface not raised above surrounding terrain except in low hummocks and ridges. | | |
| 2a. Surface pattern of ridges and depressions. | | |
| 3a. Sub-parallel pattern of ridges and furrows. | | |
| 4a. Broad pattern; often very extensive; lowland drainage; peat deep | Ribbed Fen
(incl. String Fen) | CH and major element of BM, BH, SL; infrequent in BL. |
| 4b. Narrow ladder-like pattern; along bog flanks | Ladder Fen | Characteristic of BM, BH and SL; infrequent in BL. Characteristic of SL and BH in Hudson Bay Lowland. |
| 3b. Reticulate pattern of ridges | Net Fen | |
| 2b. Without pronounced surface pattern. | | |
| 5a. Featureless, adjacent to water bodies. | | |
| 6a. Floating | Floating Fen | Frequent to rare; occurs mostly in glaciofluvial, ice-contact depressions. |
| 6b. Not floating; located in main channel or along banks of continuously flowing or semipermanent streams | Stream Fen | Frequent but minor element throughout Canadian Shield. |
| 6c. Not floating; located along shores of semi-permanent or permanent lakes | Shore Fen | Common throughout Ontario except south of Canadian Shield. |
| 5b. More or less featureless, not adjacent to water bodies. | | |
| 7a. Core not frozen. | | |
| 8a. With surface water or filled depressions; depressed thaw hollows in peat plateau or thaw hollows formed by meltdowns of palsas or peat plateau islands | Collapse Fen | Frequent but minor element of permafrost regions BH, SL. |
| 8b. Features not related to depressions or meltdowns; featureless, unpatterned peatlands more-or-less without surface water. | | |
| 9a. Extensive, patternless peatlands at surface level | Horizontal Fen | Characteristic and major element in southern James Bay Lowland; frequent in BM, BHc; probably rare in BL except on Bruce Peninsula. |
| 9b. Restricted, patternless peatlands occupying glacial meltwater spillways, intermittent drainage courses or open-ended channels | Channel Fen
(incl. Draw Fen) | Common but minor element throughout Ontario except south of Canadian Shield and in Hudson Bay Lowland. |
| 7b. Core perennially frozen; patterned surface network of polygonal fissures | Lowland Polygon Fen | Rare; restricted to Cape Henrietta Maria area. |
| 7c. Core perennially frozen; extensive unpatterned surface; wet active layer without drainways | Lowland Plateau Fen | Rare; restricted to Hudson Bay Lowland north of Sultan Ridges. |
| 1b. Surface raised or appreciably sloping. | | |
| 10a. Mounds with frozen core in patterned or coastal fens | Palsa Fen | Frequent in shallow coastal peats of James/ Hudson Bay Lowland. |
| 10b. Without frozen core; surface regular but sloping. | Slope Fen
(incl. Spring Fen) | Characteristic of Sutton Ridges area and probably northernmost Shield in BHc; rare to infrequent elsewhere in Ontario; in southern Ontario, most inland fens are on slopes downstream from groundwater discharge points. |

Key to Marsh Geomorphological Types

Ontario Status

- | | |
|---|---|
| <p>1a. Influenced by marine tidal water; coastal marshes.</p> <p>2a. In river estuaries or connecting bays where tidal flats, channels and pools are periodically inundated by water of varying salinity.</p> <p>3a. Located above mean high-water levels; inundated only at highest tides and/or storm surges</p> <p>3b. Located below mean high-water levels; frequently inundated</p> <p>2b. On marine terraces, flats, embayments or lagoons behind barrier beaches, remote from estuaries, where there is periodic inundation by tidal brackish or salt water, including salt spray.</p> <p>4a. Located above mean high-tide levels; inundated only at flood tides</p> <p>4b. Located below mean high-tide levels</p> <p>1b. Occupying valleys, gullies, channels, streams, floodplains and deltas; fluvial marshes.</p> <p>5a. Adjacent to, or flooded by, flowing water.</p> <p>6a. Located on active fluvial floodplains adjacent to channels</p> <p>6b. Occupying shorelines, bars, streambeds or islands in continuously flowing watercourses</p> <p>6c. Occupying abandoned glacial meltwater spillways, intermittent drainage courses, open-ended channels, or lost meanders</p> <p>5b. Occupying deltas with open drainage or water circulation due to unrestricted connections to active river channels and/or lakes.</p> <p>1c. Occupying topographically defined catch basins, fed by local runoff or ground water; catchment marshes.</p> <p>7a. Shallow, gently sloping, flat or concave depressions that occur as natural swales, as catchment basins for ground-water discharge or as intervening areas between ridges on low-relief landforms</p> <p>7b. Sharply defined catch basin, usually located in high or intermediate topographic positions on moderate- to high-relief hummocky moraine, glaciolacustrine or glaciofluvial landforms (see Kettle Bog)</p> <p>1d. Not in topographically defined catch basins.</p> <p>8a. Occupying groundwater discharge sites, usually on or at the base of slopes</p> <p>8b. Occupying the shores of semipermanent or permanent lakes</p> | <p>Estuarine Supertidal Marsh</p> <p>Estuarine Intertidal Marsh</p> <p>Coastal Supertidal Marsh</p> <p>Coastal Intertidal Marsh</p> <p>Floodplain Marsh</p> <p>Stream Marsh</p> <p>Channel Marsh</p> <p>Delta Marsh</p> <p>Basin Marsh</p> <p>Kettle Marsh</p> <p>Seepage Marsh</p> <p>Shore Marsh (Lentic Marsh)</p> |
| <p>Characteristic and major element of James Bay coast; less frequent on Hudson Bay coast.</p> <p>Characteristic and major element of James Bay coast; less frequent on Hudson Bay coast.</p> <p>Characteristic and major element of James Bay coast; less frequent on Hudson Bay coast.</p> <p>Characteristic and major element of James Bay coast; less frequent on Hudson Bay coast.</p> <p>Common throughout Ontario, decreasing in frequency northward.</p> <p>Common throughout Ontario, decreasing in frequency northward.</p> <p>Common throughout Ontario, decreasing in frequency northward.</p> <p>Minor element in Ontario.</p> <p>Common throughout Ontario.</p> <p>Characteristic of glaciofluvial ice-contact depressions.</p> <p>Common throughout Ontario north to SL.</p> <p>Common throughout Ontario.</p> | |

SITE DATA RECORD

Location sketches, calculations, remarks on drainage, etc.

Peatland

Data Sheet No.

Day Mo Yr

Investigator

1	2	3		6				11					+			22	
S	1	NTS				Peatland No.		Site Line		Sample-Point Location							
		23		27		31	33	34		40		44	47	50			
		Latitude		Longitude		Surf. Wetness		Hummock Depth-to-Water (cm)		% Hummocks		Ht. (cm)	Avg. Depth-to-Water (cm)	Surface-Water pH	0-1 1-2 Tot Stumps		
53	55		.	60	63	66	69	70	72	75	79	80					
Basal Sediment		Elevation (m)		Total Peat Depth (cm)	Total Depth Humified Peat (cm)	Total Depth Unhumified Peat (cm)	Phys. Samp.	Zone	East UTM Grid Reference (to 1000 m)		North						

PEATLAND CLASSIFICATION

[illegible]

(Tree species >10%; shrub species >20%; graminoid/herbaceous species >8%; moss/lichen species >30% cover.)

73	78	80
Radforth Cover Type	Av. Tree Canopy Ht. (m)	Calc Flag

PEAT STRATIGRAPHY

		Depth (cm)		Peat Type			Other Type	H 1-10	B 1-5	F 0-3	Rel Dep	Interval Remarks (minor types, seeds, charcoal, etc.)
		from	to	Subdom. %	Subdom. %	Domin. %						
1	2	23	26	29	32	35	38	41	42	43	44	45
C	1											
C	2											
C	3											
C	4											
C	5											
C	6											
C	7											
C	8											
C	9											
C	0											
D	1											
D	2											
D	3											
D	4											
D	5											
D	6											
D	7											
D	8											
D	9											
D	0											
E	1											
E	2											

Peatland Classification		Peat Types		CODES		Radforth Cover Classes	
Formations: Swamp		S	Mosses	S		A. Woody; 5 m, tree form	
Bog		B	Sphagnum	Ss		B. Woody; 1.5 to 5 m, trees or shrubs	
Fen		F	Brown moss	Sb		C. Non-woody; 0.5 to 1.5 m, graminoid/herbaceous	
Palsa/Peat Plateau		PP	Sedge/graminoid	C		D. Woody; 0.5 to 1.5 m, shrubs or dwarf trees	
Marsh		M	Wood	L		E. Woody; 0.5 m, low shrubs	
Open Water		W	Shrub	Ln		F. Non-woody, 0.5 m, gram/herbs clumped or matted	
(Poor Fen)		PF)	Tree	LI		G. Non-woody, 0.5 m, gram/herbs singly or loose	
Subformations: Open		O	Minor types—refer			H. Non-woody, 0.1 m, lichens	
Treed		T	to guidelines			I. Non-woody, 0.1 m, mosses	
Physiognomic Groups:			Ooze	OZ			
B, F, PF, PP			Marl	MA			
Tall shrub		ts					
Low shrub		ls					
Dwarf shrub		ds					
Graminoid		g					
Sphagnum		sp					
Pool		p					
Lichen-rich		lr					
S							
Conifer		c					
Deciduous		h					
Thicket		t					
M							
Meadow		m					
Low shrub		ls					
Emergent		e					
Deep		d					
Shallow		s					
Shrub-rich		sr					
(U							
Upland)							

Appendix 4: Index Maps for Study Areas in Northeastern Ontario

These maps are in the back pocket.

- A. Hearst
- B. Foleyet
- C. Cochrane–Kapuskasing
- D. Timmins–Kirkland Lake
- E. New Liskeard

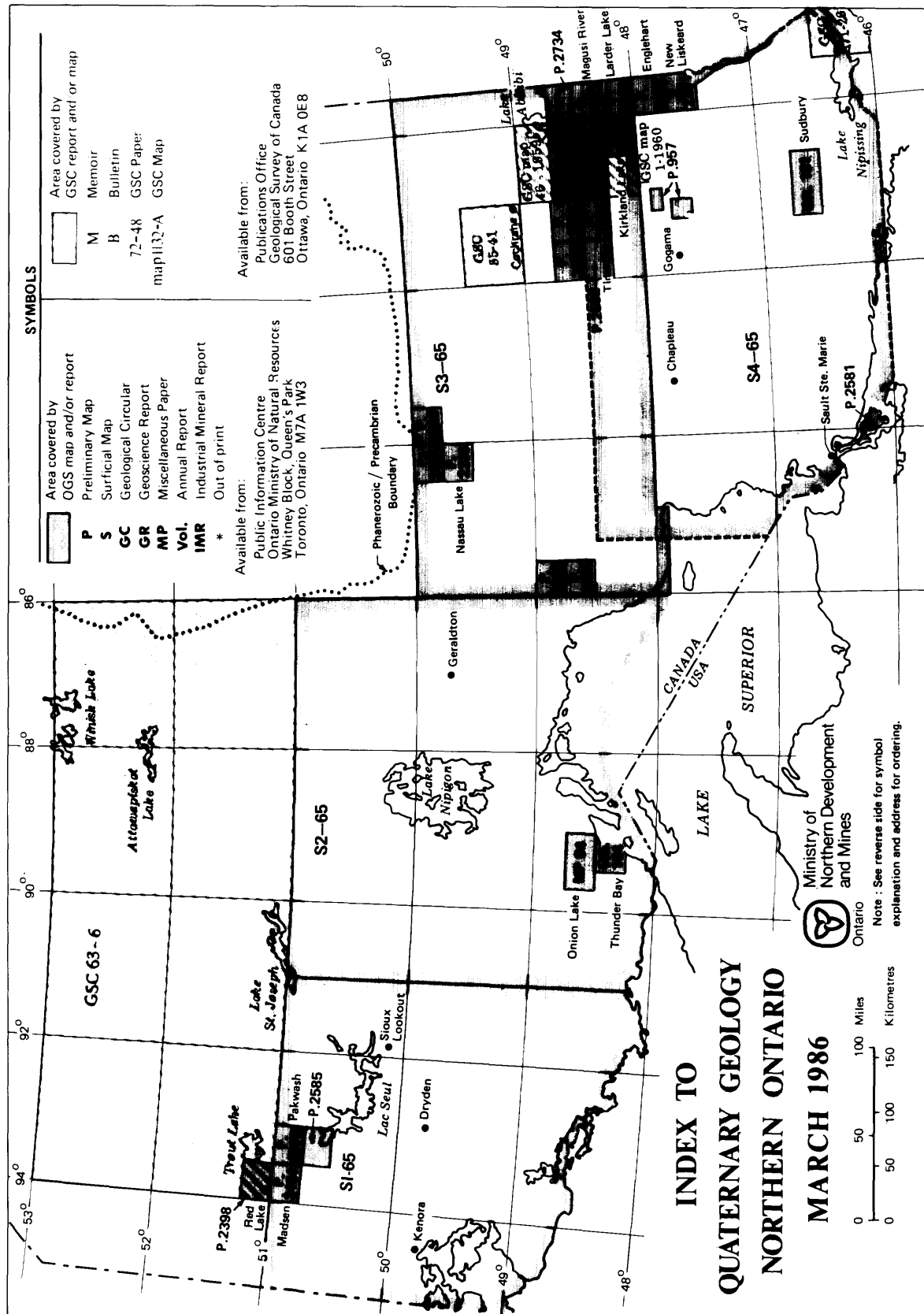
Appendix 5: Species Composition of Peatland Vegetation Types, Northeastern Ontario

These are in the back pocket.

Unbracketed figures are mean percentage cover values, gauged as light interception; figures in parentheses are percentage frequencies of occurrence. Cover values of less than 0.5% are indicated by plus signs (+). Species having cover values less than 0.5% and frequencies of 20% or less (or species reported at a single site only) are not presented.

Codings of peatland types are as follows:

tS	thicket swamp
cS	conifer swamp
OpF	open fen pools
OgF	open graminoid fen
OlsF	open low-shrub fen
OPF	open poor fen
TPF	treed poor fen
TgF	treed graminoid fen
TsrF	treed low-shrub and tall-shrub fen
OpB	open bog pools
OgB	open graminoid bog
OdsB	open dwarf-shrub bog
OlsB	open low-shrub bog
TgB	treed graminoid bog
TlsB	treed low-shrub bog



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Conversion Factors for Measurements in Ontario Geological Survey Publications

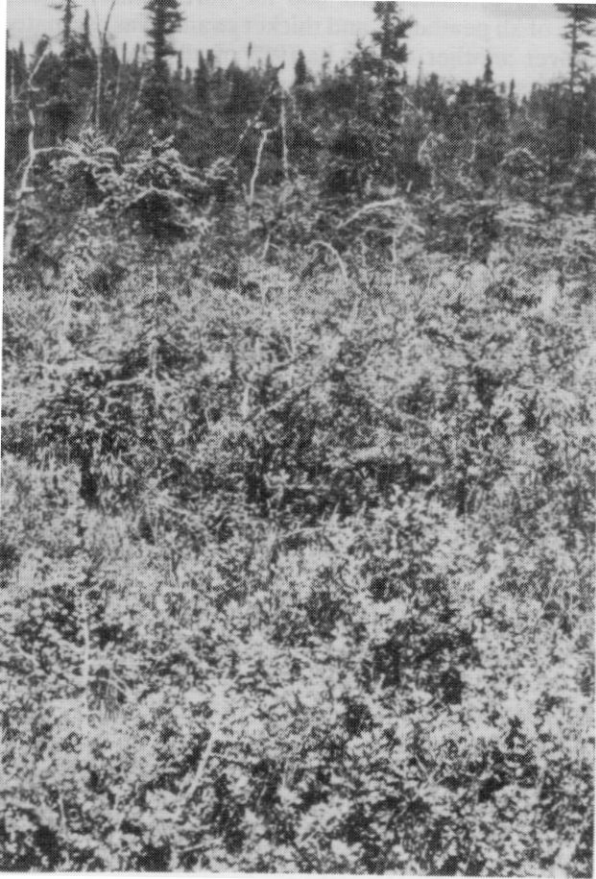
Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	Multiplied by	Gives	Imperial Unit	Multiplied by	Gives
LENGTH					
1 mm	0.039 37	inches	1 inch	25.4	mm
1 cm	0.393 70	inches	1 inch	2.54	cm
1 m	3.280 84	feet	1 foot	0.304 8	m
1 m	0.049 709 7	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	1.609 344	km
AREA					
1 cm ²	0.155 0	square inches	1 square inch	6.451 6	cm ²
1 m ²	10.763 9	square feet	1 square foot	0.092 903 04	m ²
1 km ²	0.386 10	square miles	1 square mile	2.589 988	km ²
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
VOLUME					
1 cm ³	0.061 02	cubic inches	1 cubic inch	16.387 064	cm ³
1 m ³	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m ³
1 m ³	1.308 0	cubic yards	1 cubic yard	0.764 555	m ³
CAPACITY					
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	4.546 090	L
MASS					
1 g	0.035 273 96	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 75	ounces (troy)	1 ounce (troy)	31.103 476 8	g
1 kg	2.204 62	pounds (avdp)	1 pound (avdp)	0.453 592 37	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	907.184 74	kg
1 t	1.102 311	tons (short)	1 ton (short)	0.907 184 74	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	1016.046 908 8	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	1.016 046 908 8	t
CONCENTRATION					
1 g/t	0.029 166 6	ounces (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

Multiplied by		
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.







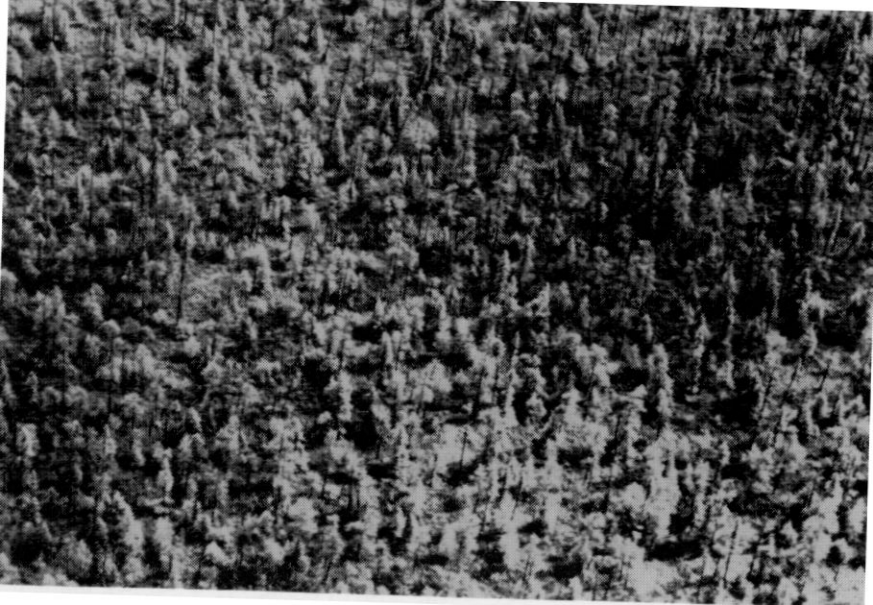






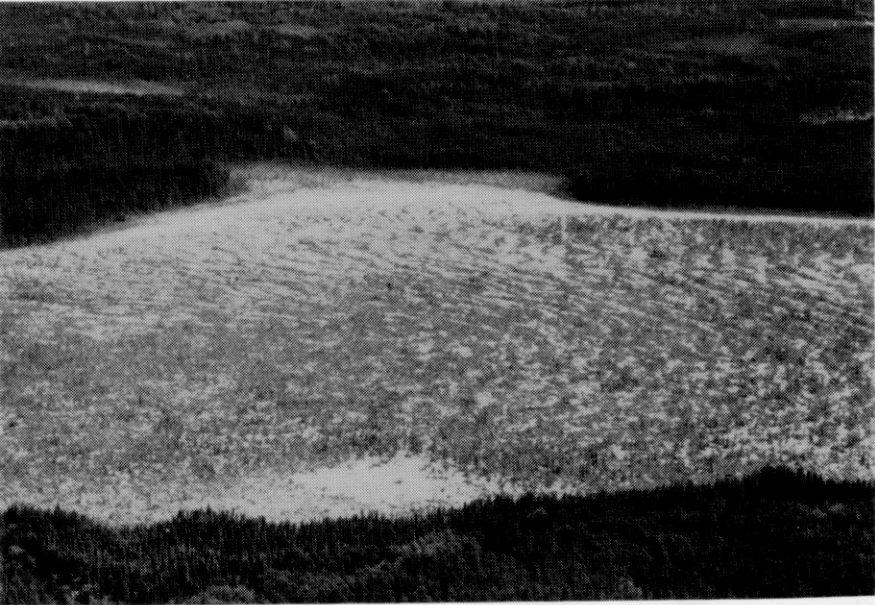


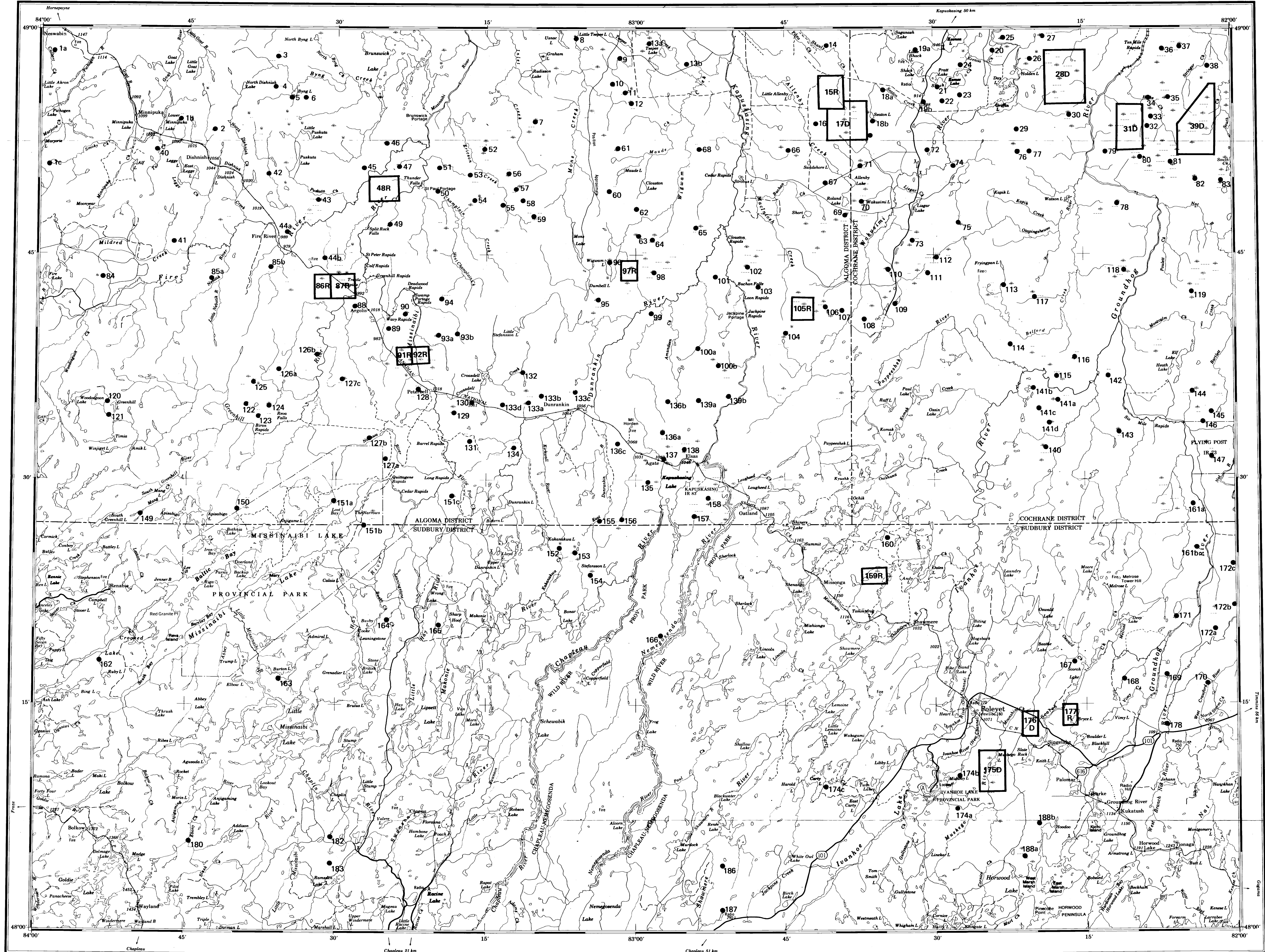








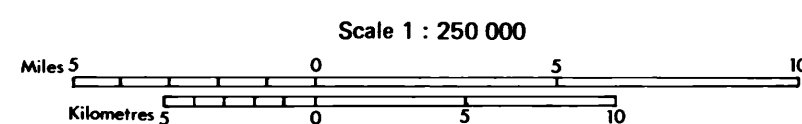




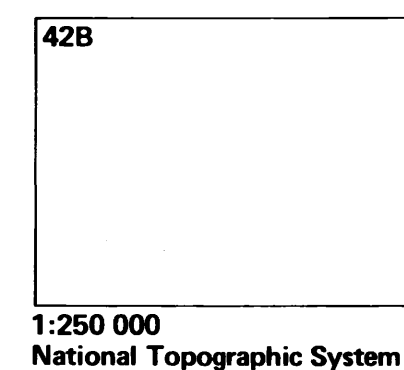
- LEGEND**
- 27D Detailed Peatland Study Site
 - 35R Reconnaissance Peatland Study Site
 - 66 Other Peatlands

Complete peatland index number consists of the 1:250 000 N. T. S. map sheet number and the peatland number; eg. 52G-27

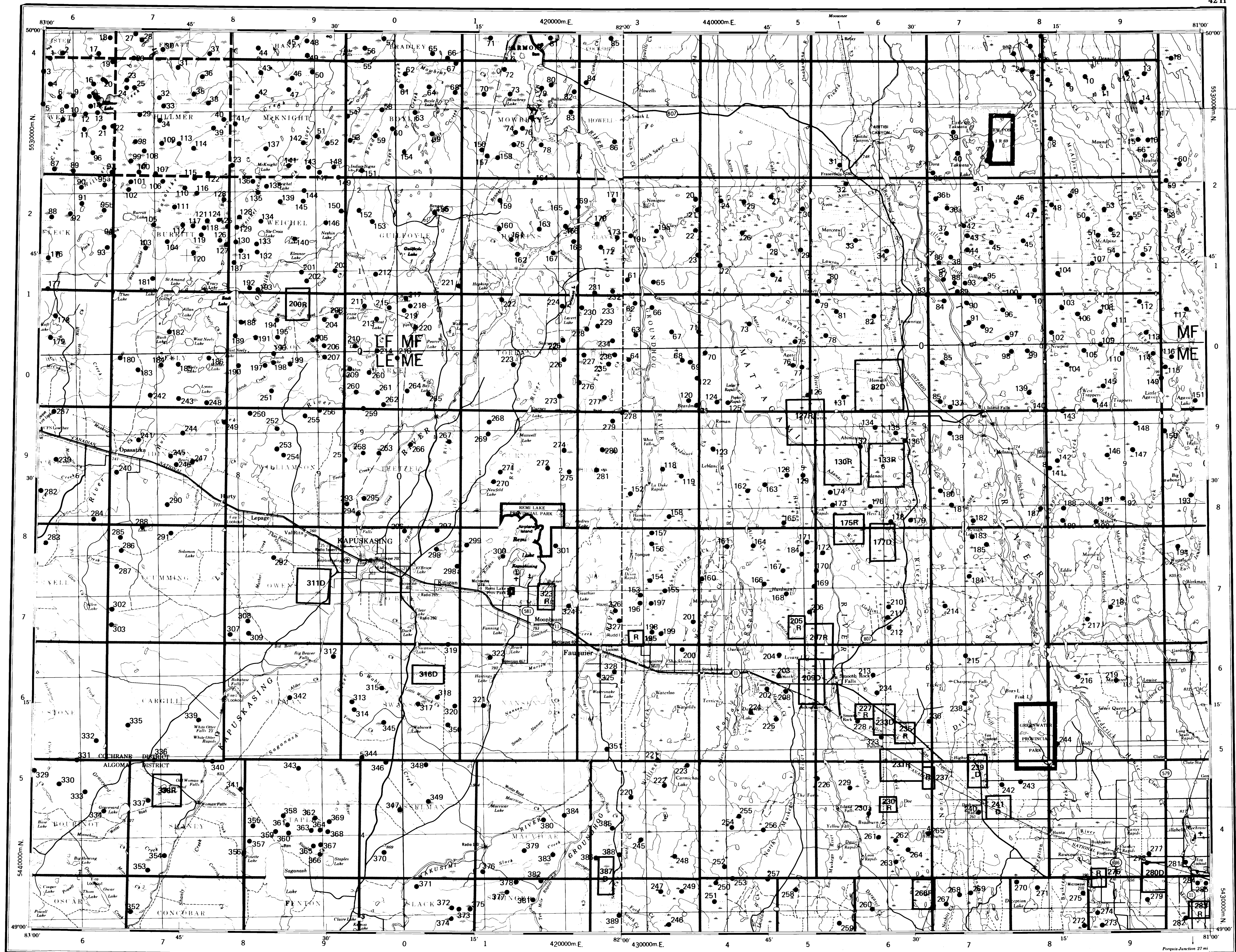
**PEATLAND INVENTORY PROJECT
ONTARIO GEOLOGICAL SURVEY
INDEX MAP
FOLEYET AREA**



Locations of study sites provided by: Dendron Resource Surveys Ltd.
Locations of other peatlands over 200 ha from LANDSAT feature imagery
by the Ontario Centre for remote Remote Sensing.
Mapped by J. L. Riley, Ontario Geological Survey.
December 1983



The Peatland Inventory Project is a component of the Hydrocarbon Energy Resources Program (HERP), of the Ontario Geological Survey.



Ministry of
Northern Development
and Mines
Ontario

René Fontaine
Minister
George Tough
Deputy Minister

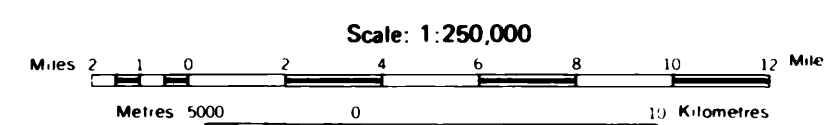
LEGEND

- 69D Detailed Peatland Study Site
- 73R Reconnaissance Peatland Study Site
- 27 Other Peatlands

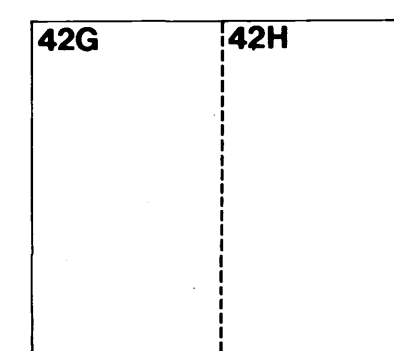
Complete peatland index number consists of the 1:250 000
N.T.S. map sheet number and the peatland number; eg. 52G-27.

The Peatland Inventory Project is a component of the Hydrocarbon Energy Resources
Program (HERP), of the Ontario Geological Survey.

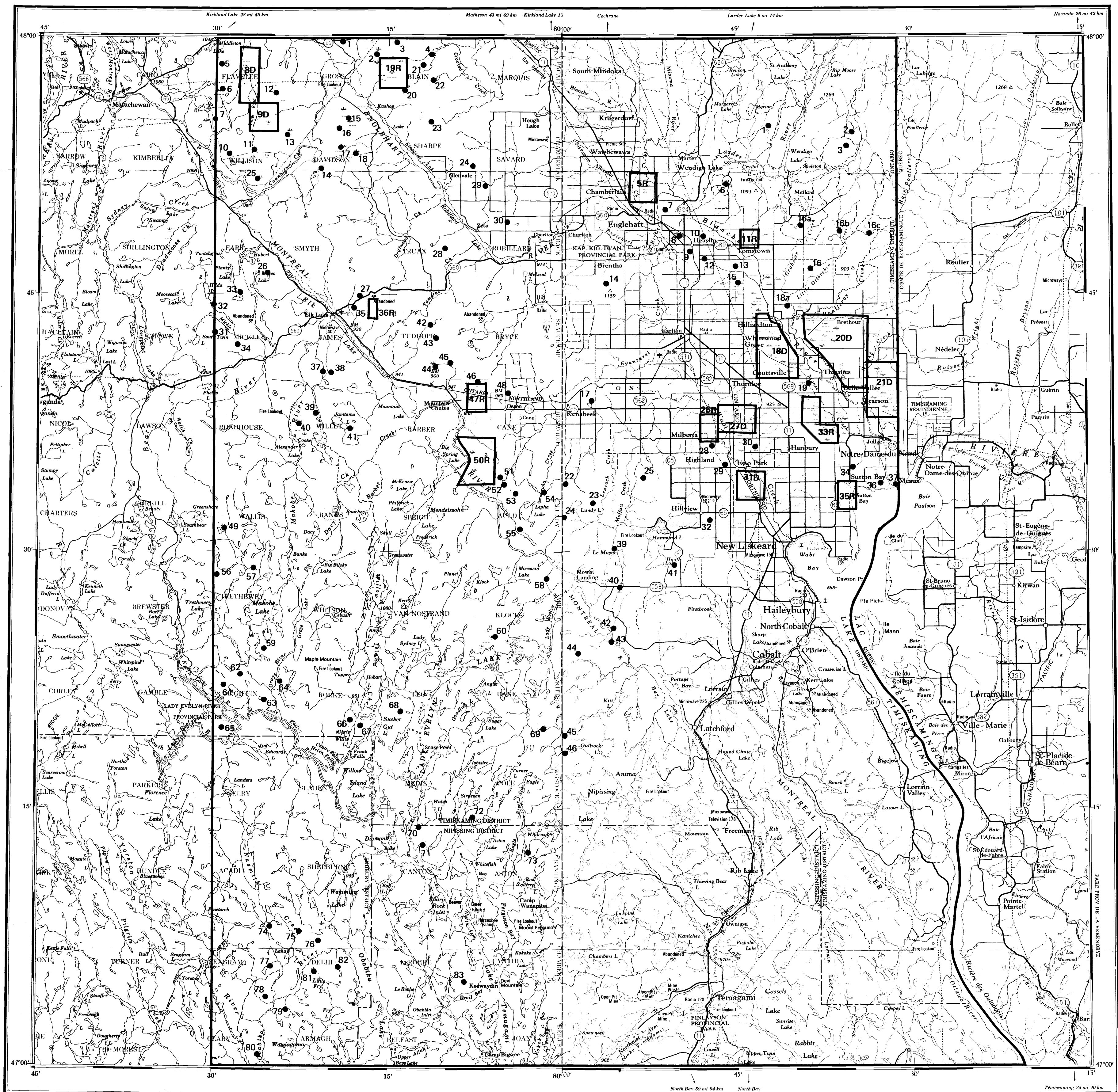
**PEATLAND INVENTORY PROJECT
ONTARIO GEOLOGICAL SURVEY
INDEX MAP
COCHRANE-KAPUSKASING AREA**



Location of study sites provided by: Geo-analysis (1981) Ltd.
Location of other peatlands over 100 ha from LANDSAT feature imagery
by the Ontario Centre for Remote Sensing.
Mapped by J.L. Riley, Ontario Geological Survey.
December 1984.



1:250 000
National Topographic System



LEGEND

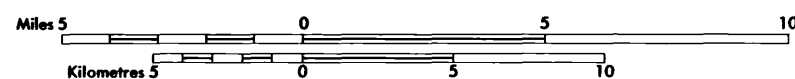
- 27D Detailed Peatland Study Site
- 35R Reconnaissance Peatland Study Site
- 66 Other Peatlands

Complete peatland index number consists of the 1:250 000 N. T. S. map sheet number and the peatland number; eg. 52G-27.

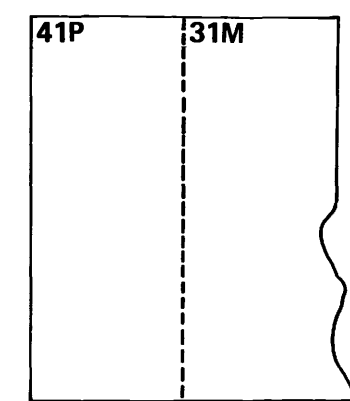
PEATLAND INVENTORY PROJECT ONTARIO GEOLOGICAL SURVEY

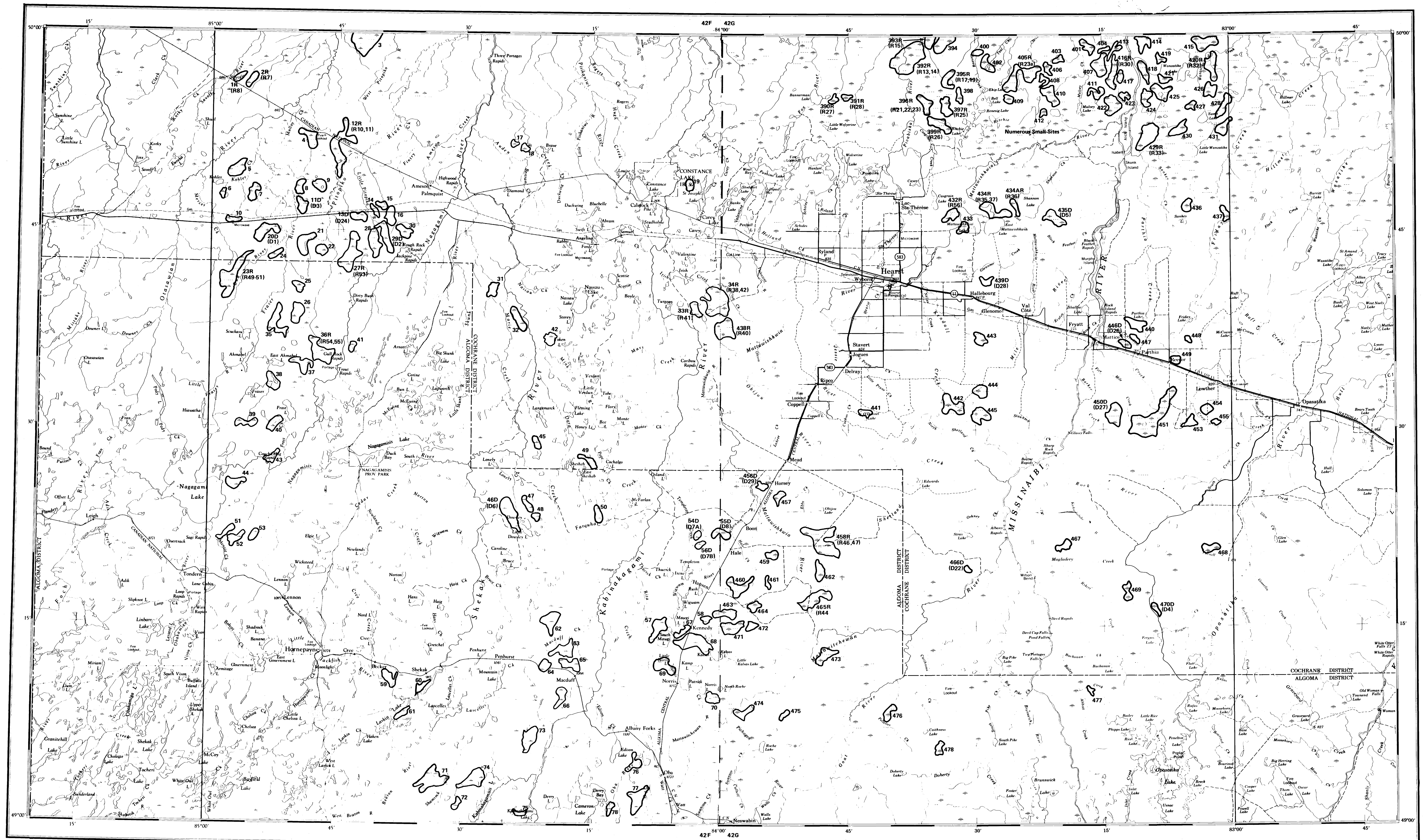
INDEX MAP NEW LISKEARD AREA

Scale 1:250 000



Locations of study sites provided by: Hunter and Associates Ltd.
Locations of other peatlands over 200 ha from LANDSAT feature imagery
by the Ontario Centre for Remote Sensing.
Mapped by J. L. Riley, Ontario Geological Survey.
December 1983





René Fontaine
Minister
George Tough
Deputy Minister

LEGEND

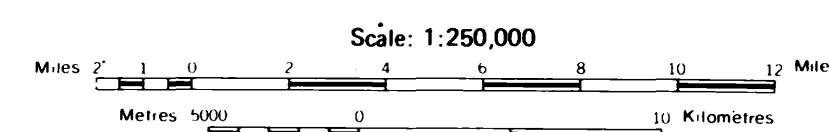
- 46D Detailed Peatland Study Site
- 79R Reconnaissance Peatland Study Site
- 57 Other Peatlands

Complete peatland index number consists of the 1:250 000 N.T.S. map sheet number and the peatland number; eg. 52G-27.

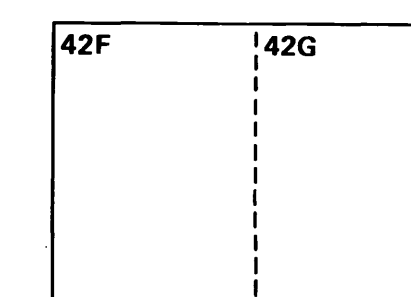
The Peatland Inventory Project is a component of the Hydrocarbon Energy Resources Program (HERP), of the Ontario Geological Survey.

PEATLAND INVENTORY PROJECT ONTARIO GEOLOGICAL SURVEY

INDEX MAP HEARST AREA



Location of study sites provided by: Dendron Resource Surveys Ltd.
Location of other peatlands over 100 ha from LANDSAT feature imagery
by the Ontario Centre for Remote Sensing, and mapping by Dendron Resource Surveys Ltd.
Mapped by J.L. Riley, Ontario Geological Survey.
December 1985.



1:250 000
National Topographic System

Figures are mean percentage cover values (light interception), and bracketed figures are percentage frequencies of occurrence. Cover values less than 0.5% are indicated by plus (+) signs; for species with cover values less than 0.5%, frequencies of 20% or less (or only reflecting single site occurrences) are not presented.

Codings of peatland types:

TS - thicket swamp
CS - conifer swamp
OpF - open fen pools
OgF - open graminoid fen
OlsF - open low shrub fen

OPF - open poor fen
TPF - treed poor fen
TgF - treed graminoid fen
TsrF - treed low shrub and tall shrub fen
OgB - open bog pools

OgB - open graminoid bog
OdsB - open dwarf shrub bog
OlsB - open low shrub bog
TgB - treed graminoid bog
TlsB - treed low shrub

PEATLAND TYPES	Marsh		Swamp		FEN							BOG						
	M 5	TS 12	CS 13	OpF 3	OgF 11	OlsF 11	OPF 7	TPF 3	TgF 4	TsrF 11	OpB 1	OgB 15	OdsB 6	OlsB 9	TgB 2	TlsB 15		
No. of Sample Sites																		
TREE SPECIES																		
Abies balsamea		+																
Betula papyrifera		2(58)	6(85)		4(100)	2(100)	3(100)	6(100)	8(100)	11(100)		1(93)	+ (33)	+ (67)	+	1(60)		
Larix laricina	+	3(67)	33(100)		3(82)	5(91)	8(100)	9(100)	7(100)	5(100)		6(100)	10(100)	12(89)	14(100)	21(100)		
Picea mariana																		
Pinus banksiana																		
Thuja occidentalis		+	2(8)			+ (27)												
SHRUB SPECIES																		
Alnus rugosa	+ (40)	36(100)	7(77)		+	+ (46)	+		+	2(55)								
Andromeda glaucophylla	1(40)	1(25)	+	+ (67)	2(82)	7(91)	2(86)	2(100)	3(100)	2(73)	+	1(73)	1(67)	+ (44)	+ (100)	1(73)		
Betula pumila var. glandulifera		5(58)	3(77)		3(100)	8(100)	4(100)	3(100)	9(100)	16(100)		+		+	+ (100)	+ (40)		
Chamaedaphne calyculata	1(60)	4(75)	3(61)	+	2(91)	6(82)	5(100)	6(100)	2(50)	7(100)	2	5(100)	14(100)	19(100)	6(100)	12(100)		
Cornus rugosa		+																
C. stolonifera			+ (39)			1(18)				+								
Ilex verticillata										+								
Juniperus communis										+								
Juniperus horizontalis						+				+								
Kalmia angustifolia		+	1(31)		+ (36)	+ (27)	1(43)	+		+ (27)		+ (47)	1(67)	1(56)	1(50)	1(67)		
K. polifolia	1(20)	1(33)	+ (39)		+ (55)	2(73)	2(100)	1(100)	+ (75)	1(55)		2(95)	7(100)	4(100)	2(100)	3(93)		
Ledum groenlandicum		5(50)	6(100)		+ (36)	3(82)	3(100)	3(33)	3(100)	5(82)		2(73)	2(83)	6(100)	6(100)	8(100)		
Lonicera hirsuta			+															
L. oblongifolia			+															
L. villosa		+ (33)	+		+ (27)	1(46)	+		+	+ (55)								
Myrica gale			+			2(18)												
Nemopanthus mucronatus			+															
Potentilla fruticosa						3(27)												
Rhamnus alnifolia		+	+			1(27)				+ (18)								
Rosa acicularis						+												
Rubus strigosus		+								+								
Salix babingtoniana		1(8)																
S. candida			+			+ (27)				+								
S. discolor		2(25)				+												
S. humilis		2(17)	1(8)															
S. lucida		+																
S. pedicularis	+	2(33)	+ (31)		1(82)	1(64)	2(57)	+	2(75)	4(91)						+		
S. pellita						+												
S. petiolaris	+	1(17)		+	+													
S. planifolia	1(20)	2(17)																
S. pyralifolia		1(25)	1(15)															
S. serotima	+									+								
Sorbus americana		+								+								
S. decora																		
Vaccinium angustifolium						+							1(50)	+		1(20)		
V. myrtilloides		+ (50)	+ (31)			+	+ (29)						+	+	+	1(73)		
Viburnum cassinoides			+															
HERB, GRAMINOID, SUB-SHRUB SPECIES																		
Achillea millefolium		+																
Acorus calamus			+															
Anemone quinquefolia										+ (27)								
Aralia nudicaulis			+							+								
Arctostaphylos uva-ursi					+													
Aster borealis										+								
A. modestus		+																
A. puniceus		+																
A. radula					+	+												
A. umbellatus		+			+	+												
Brasenia schreberi				+														
Calamagrostis canadensis	19(40)	4(50)	+ (31)		+	+ (27)			1(25)	1(55)								
Calla palustris	+	+	+					+										
Callitriche palustris		+								+ (55)								
Campanula uliginosa					+													
Carex aquatilis	+	2(17)	1(8)			1(36)	1(14)		+							+		
C. canescens	+	+																
C. chordeorrhiza	1(60)			1(33)	1(46)	+	1(29)		1(75)	1(55)						+		
C. diandra																		
C. disperma		+ (25)	+ (39)															
C. exilis					3(46)	+	1(14)	3(33)	+			3(33)		+	+	1(33)		
C. gynocrates																		
C. interior		+	+		+	+ (46)			1(25)	+ (46)								
C. lasiocarpa	9(40)			13(100)	5(73)	2(27)	1(43)	2(33)	3(25)	3(64)								
C. leptalea		+ (25)	+ (23)		+ (36)	+ (36)	+		+	+ (46)								
C. limosa	8(60)			3(100)	3(64)	1(27)	2(71)	4(100)	5(75)	1(36)	12	2(60)		+	3(50)	+ (20)		
C. livida	+			1(67)	1(64)	+												
C. michauxiana																		
C. oligosperma					+ (27)	+ (27)	+ (43)	+ (67)	+			11(80)	3(100)	5(78)	5(100)	1(40)		
C. pauciflora		+			+ (36)	+ (27)	+		+ (50)	+ (36)		1(80)	+ (67)	+ (44)	1(100)	+ (73)		
C. pauciflora	+	+ (50)	+ (62)	+	+ (27)	1(46)	+ (43)	1(67)	+ (100)	1(73)		+ (27)	+	+ (22)	+	1(33)		
C. prairie																		
C. rostrata	6(100)	1(8)		2(100)	+ (27)				+									
C. stricta							1(29)			1(9)								
C. tenuiflora		+								+ (27)								
C. trisperma		1(33)	1(62)													+		
C. vaginata																		
Chelone glabra										+								
Cicuta bulbifera		+																
Clinanthus borealis			+															
Comandra livida			+ (23)			+ (46)	+		+				+ (33)			+ (40)		
Coptis groenlandica		+ (33)	+ (31)						+	+ (27)								
Cornus canadensis		1(33)	+ (46)															
Cypripedium reginae																		