Agriculture Canada

SOILS OF MADAWASKA COUNTY NEW BRUNSWICK

Eighth Report of the New Brunswick Soil Survey

SOILS OF MADAWASKA COUNTY NEW BRUNSWICK

K. K. Langmaid
Research Station
Fredericton, N. B.

J. K. MacMillan and J. G. Losier
New Brunswick Department of Agriculture
and Rural Development
Fredericton, N. B.

Research Branch
Agriculture Canada and
New Brunswick Department of Agriculture
and Rural Development

Eighth Report of the New Brunswick Soil Survey

Report and maps published by
Agriculture Canada
1980

This publication is available from
New Brunswick Department of Agriculture
and Rural Development, Box 6000,
Fredericton, N. B. E3B 5H1

Cat. No. A 57-177E

ISBN 0-662-11166-4

CONTENTS

TABLES

FIGURES

ACKNOWLEDGMENTS

The soil survey of Madawaska County was a joint project of the New Brunswick departments of Agriculture and Economic Growth and Agriculture Canada. Those assisting in the field mapping were Dr. J. F. G. Millette and Dr. P. C. Colinvaux, S. W. Reeder, W. Holland, G. MacAuley, and Geldart Levesque. Those assisting in the laboratory were Dr. G. R. Saini, Hector Cormier, Carol Williams, Esther Ann Charland, Barbara Marks, and Carole Dilworth. R. Ross and G. Walker, ARDA staff, assisted in the drafting of the soil maps.

The authors are indebted to the Department of Geology of the University of New Brunswick and the Mines Branch of the New Brunswick Department of Natural Resources for supplying data on the geology of the County. The Forest Inventory Section of the New Brunswick Department of Natural Resources cooperated by making available the data of their permanent plots and by giving advice on the productivity of soils for forestry. The Photogrammetry Section of the New Brunswick Department of Natural Resources supplied the aerial photographs and the index maps for the County. The authors wish to thank the personnel of Forestry District 5, who supplied facilities and information and made their work more effective and enjoyable. The personnel of the Soil Testing Laboratory of the New Brunswick Department of Highways supplied the engineering data on the soils given in this report.

John Nowland of the Land Resource Research Institute reviewed the report. His advice and help is much appreciated. The authors wish to offer special thanks to those who typed the various drafts and sections of the report and assisted in the preparation of the various figures.

The soil map was prepared by the Cartography Section of the Land Resource Research Institute, Agriculture Canada, Ottawa, Ontario.

PREFACE

This report is an inventory of the soil resources of Madawaska County, New Brunswick.

The accompanying soil map shows the distribution of the various soils. The soils of the settled sections are mapped in greater detail than those of the forested areas. The map does not show pockets of soil on individual farms different from the soils mapped.

The report is useful not only to farmers and agronomists but also to those interested in land use planning, forest and wildlife management, conservation, highway construction, geography, surface geology, and hydrology.

The soils were classified according to the system set forth in The System of Soil Classification for Canada (1978).

GENERAL DESCRIPTION OF THE COUNTY

Location and Extent

The surveyed area includes all of Madawaska County, the most northwesterly county of New Brunswick. It is bounded on the south by the Saint John River and the United States of America, on the west by the province of Quebec and the Saint-Francois River, on the northeast by Restigouche County, and on the east by Victoria County. It has a total area of 362 666 ha and a population of 35 000.

Principal Towns and Industries

The city of Edmundston is situated at the junction of the Saint John and Madawaska rivers and, with a population of about 12 365 (1971), is the largest community in the area. It is the site of Fraser Companies Limited pulp mill.

Grand Falls lies partly in Madawaska County and has a population of about 4500. It has an important potato-processing industry and is a major potato-shipping point. It also has a small lumbering and shoe last industry. It serves as a service center for the surrounding agricultural area.

The other towns and villages serve as local service centers. St. Francois has a furniture-manufacturing plant that produces institutional furniture, and a poultry industry.

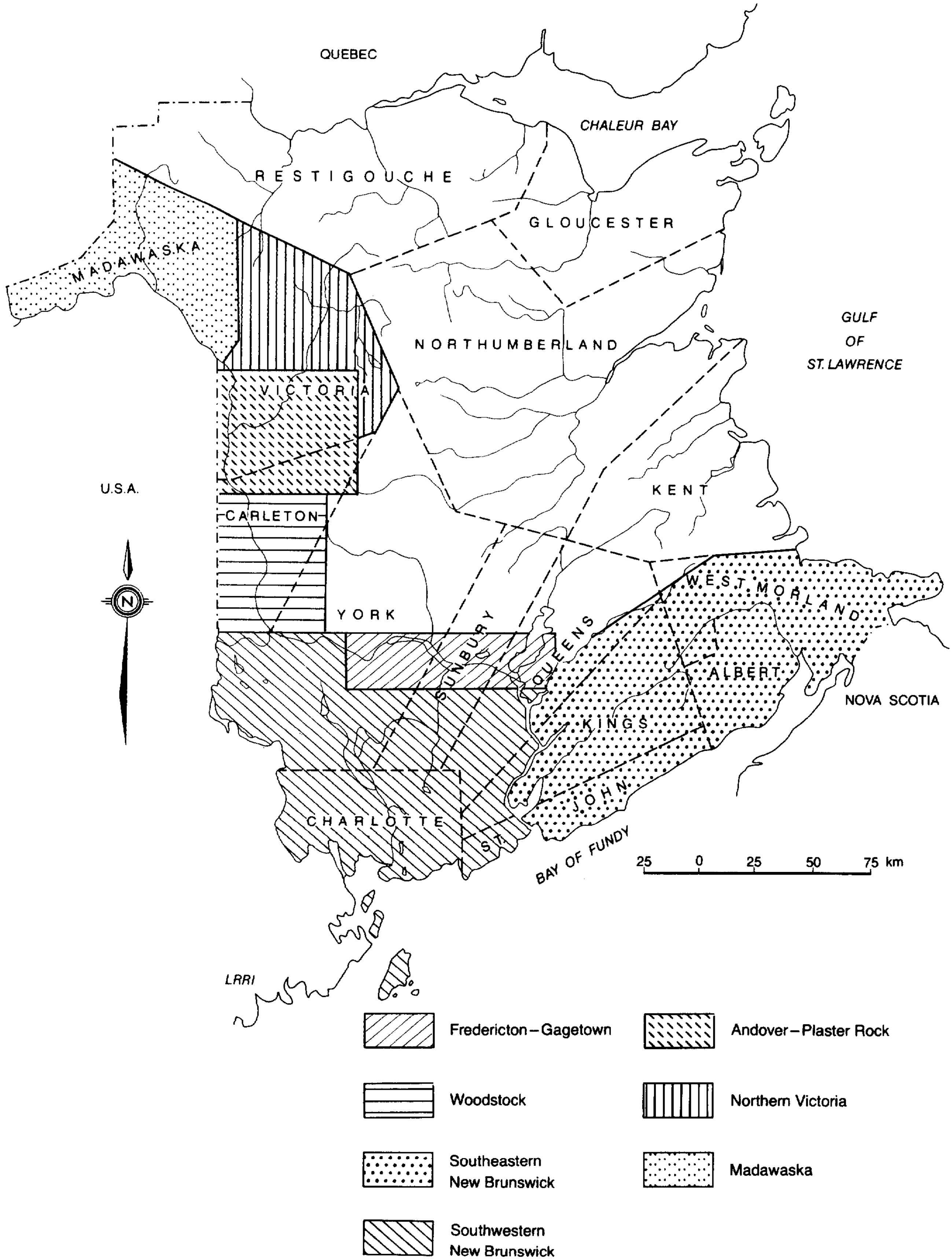


FIGURE 1 Areas of New Brunswick for which soil surveys have been published.

The J. D. Irving Company has a modern sawmill complex at Veneer Siding, and a number of small sawmills are located throughout the County. There is a hydro-generating plant at Grand Falls and small ones on the Green River at Second Falls and Edmundston. A small French language liberal arts university, the University of St. Louis, is situated at Edmundston.

Transportation and Markets

The Saint John Valley has a good road network. The Trans Canada Highway follows the Saint John Valley to Edmundston, and then follows up the Madawaska River into Quebec. Another main road enters the County from Quebec at Baker Lake, and there are ports of entry into the state of Maine at St. Leonard, Edmundston and Clair. Route 17 from St. Leonard to Tide Head crosses the eastern part of the County. The rest of the County is served by the private roads of Fraser Companies Limited and J. D. Irving Company.

The Canadian Pacific Railway Valley Line runs from Edmundston to McAdam, where it joins the main line. The Canadian National Railways has a main freight line entering the County at Grand Falls and leaving at Baker Lake. Two branch lines run north and south through the County: one from St. Leonard to Campbellton, and the other from Edmundston to Rivière du Loup.

There is an airport at Edmundston with no regular service at present. Small landing strips are located at St. Leonard and Grand Falls.

FACTORS IN SOIL FORMATION

Soil formation and development are influenced by parent material, climate, vegetation, drainage, topography, and time. These factors are discussed in their relation to soil development in the County.

Parent Material

Madawaska County has been heavily glaciated and much of its area is covered with glacial material. Most of the glacial material appears to have been moved over short distances and is greatly influenced by the underlying bedrock. Carbon dating indicates that the ice receded about 10 000 years ago (Lee 1959).

Glacial Lake Madawaska, which covered much of the lower valley along with some local ponding, is responsible for considerable areas of lacustrine material.

All the valleys of the County show extensive valley trains and outwash deposits. Many of the valleys have what appear to be reworked till or "dirty" gravel deposits occurring on their sides. The bottoms of the valleys have the better-sorted gravels.

Two distinct types of moraine cover much of the County: ground and ablation moraines. The material which makes up these tills is closely governed by the nature of the bedrock. Each main type of bedrock produces material for four types of parent material: ground moraine, ablation moraine, reworked material, and gravels and sands. The tills have highly varied textures ranging from sandy loams to stony clay loams, and produce soil parent materials that range from acid to highly calcareous.

The lower terraces, which flood during the spring freshet, are composed of silt and fine sand. At higher elevations, similar deposits that have not flooded for long periods have developed podzol profiles.

Topography and Drainage

Topography and drainage are responsible for the differences in the soils formed from the same parent material. Topography and parent material also determine the amount of water that percolates through the soil.

The eastern part of the County, extending from the County line to the Restigouche River and along a line just west of the Grand River, is a plateau with gently rolling and undulating topography. The elevation is about 300 m. North and west of this area, topography becomes much more rolling and abrupt. The elevations are about 510 m. The valley bottom of the Saint John River at Edmundston is about 180 m. Slopes are quite abrupt and broken.

The County is drained by the Saint John River and its tributaries: the Saint Francois, which is the western boundary of the area; the Madawaska, which drains Lake Temiscouata in Quebec, flows through the County and joins the Saint John River at Edmundston; and the Green River and its many tributaries, which head in Quebec and flow into the County in the north. A few smaller streams such as the Quisibis, Siegas, Grand, and Little rivers flow into the Saint John and form the main drainage pattern. The Restigouche River has its source in Madawaska County and flows along its northern boundary. The northern area is drained by streams flowing into the Restigouche and Gounamitz rivers.

Climate

Madawaska County has a cool continental climate. During the long winters most of the precipitation is in the form of snow. There is a distinct difference in climate between the Saint John and Madawaska valleys and the interior upland region. The soils of the valleys have a moderately

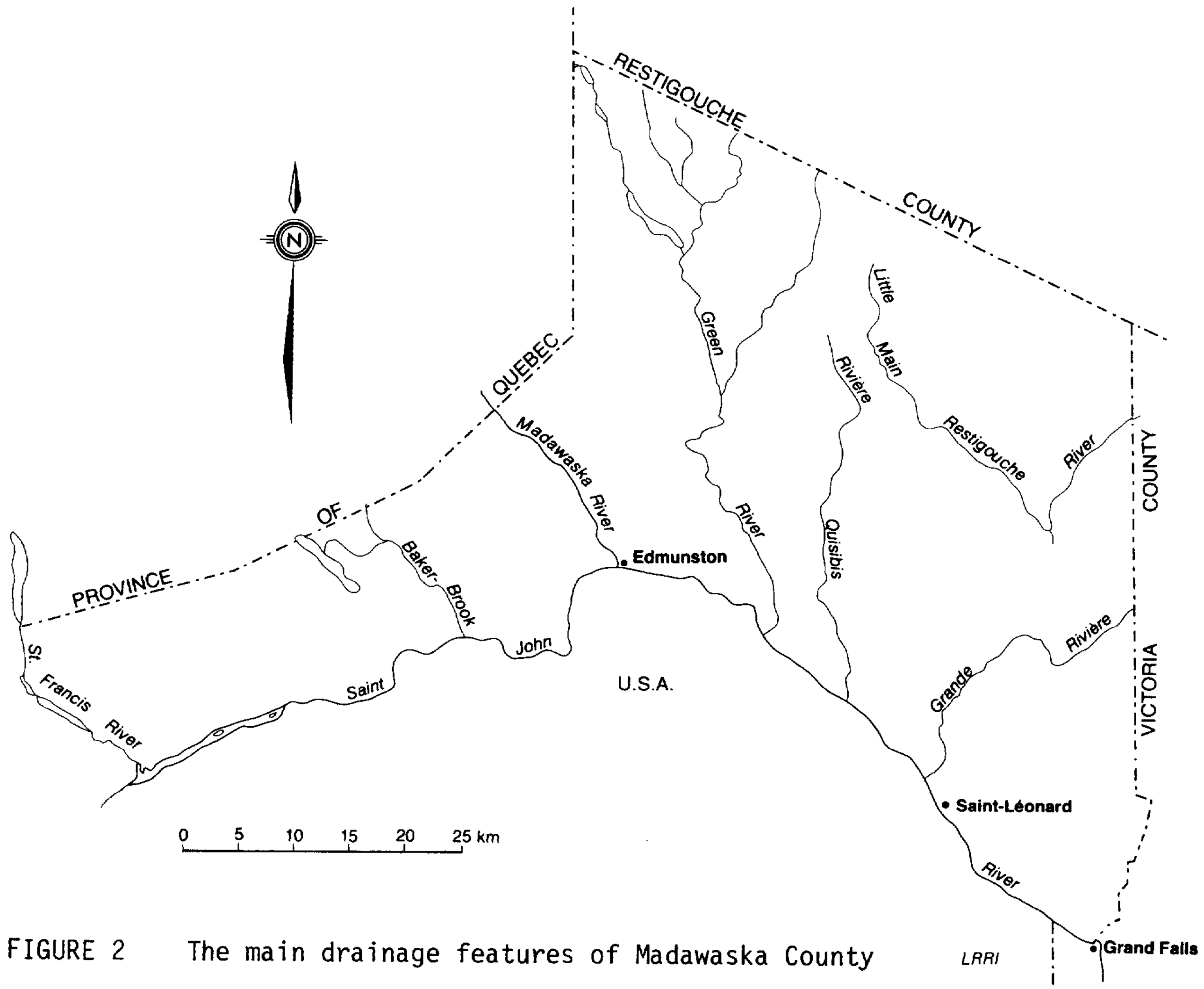


FIGURE 2 The main drainage features of Madawaska County

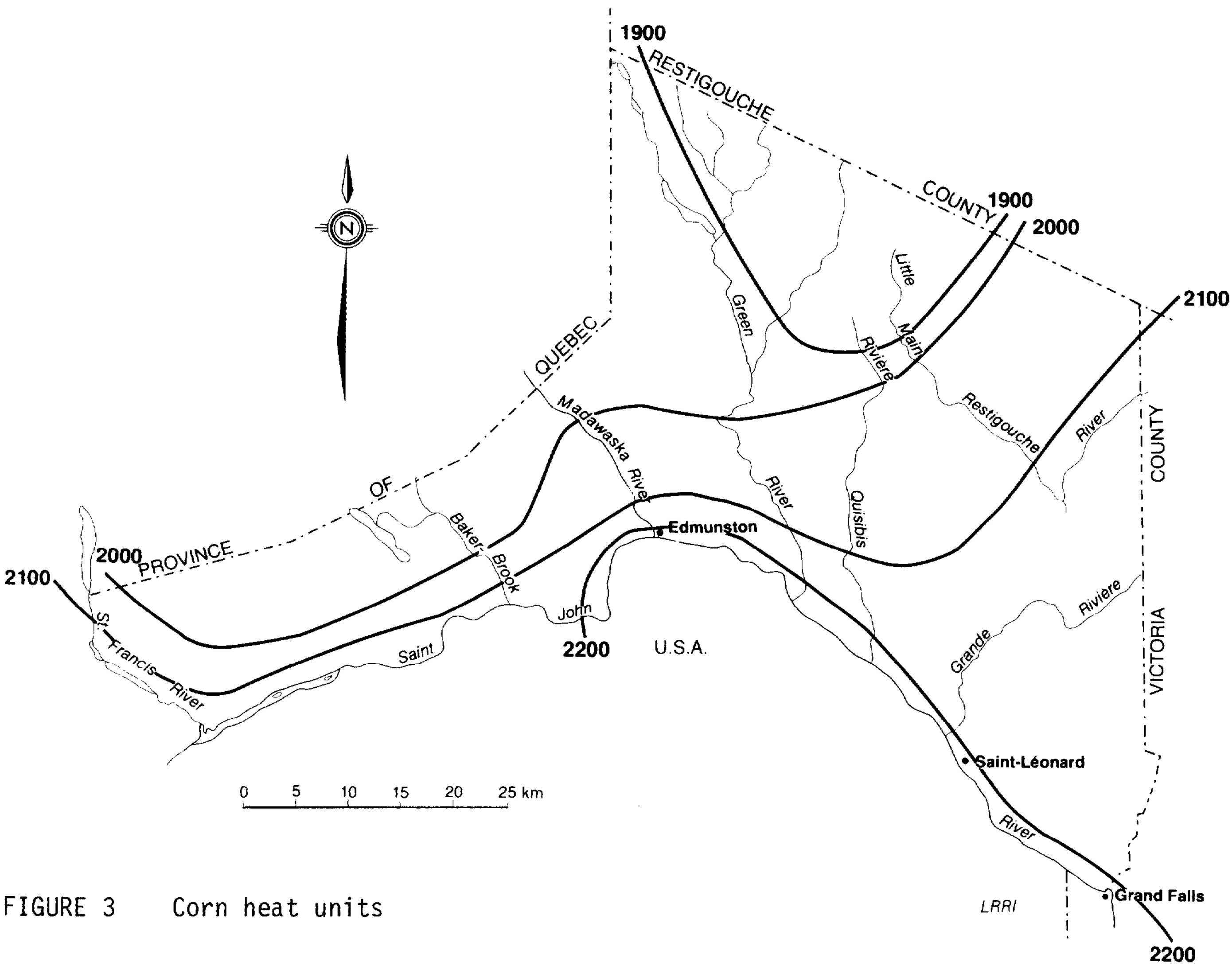


FIGURE 3 Corn heat units

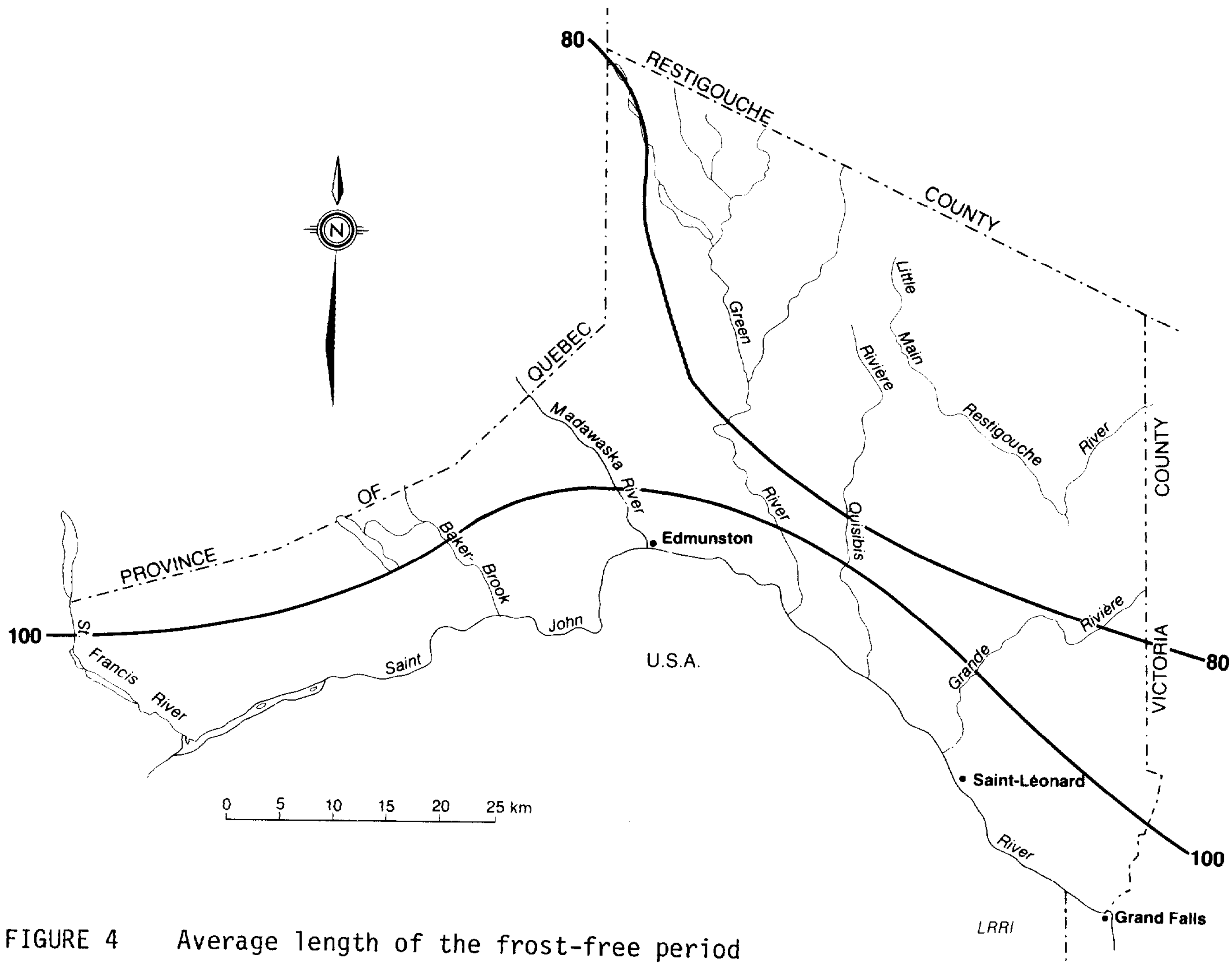


FIGURE 4 Average length of the frost-free period

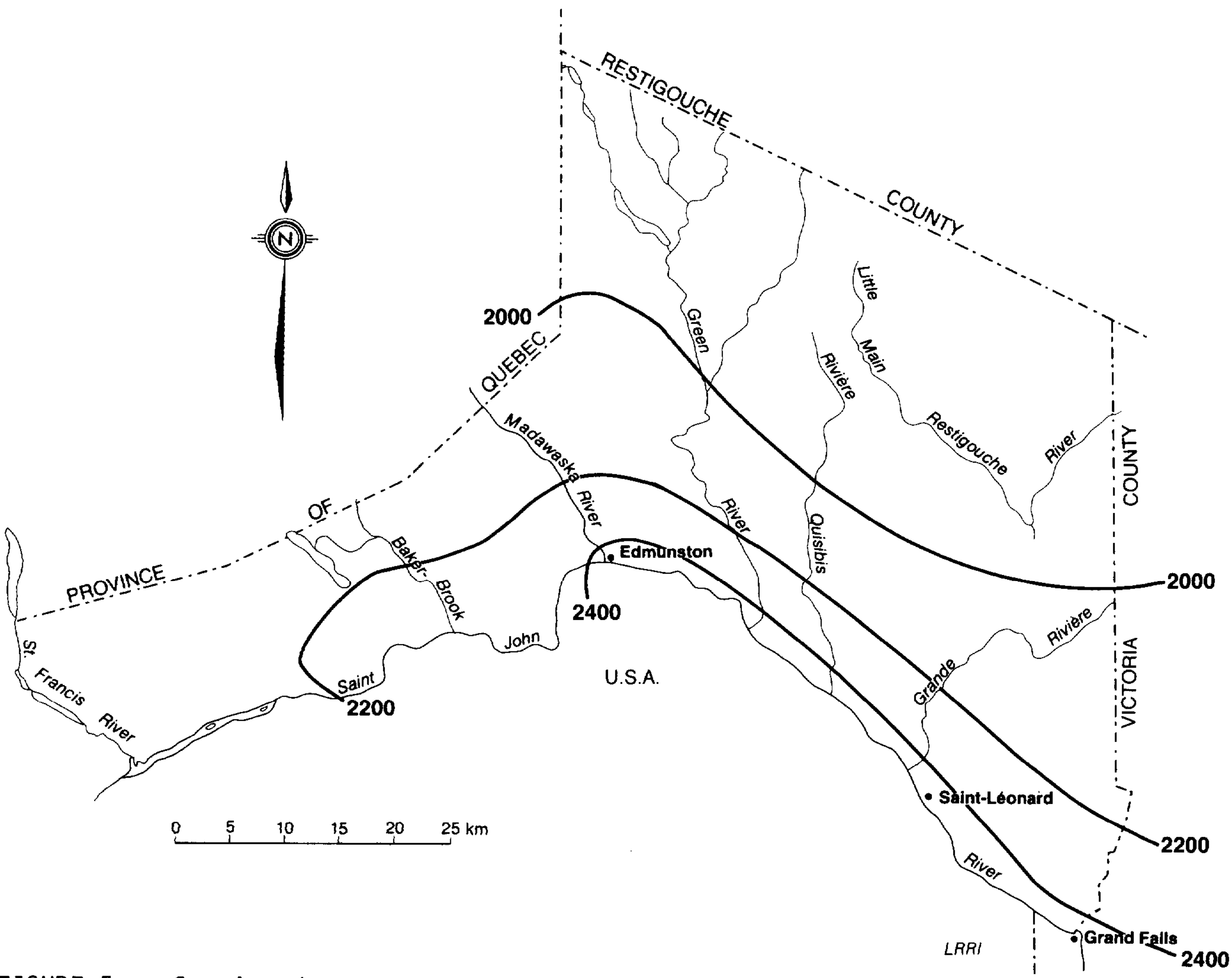


FIGURE 5 Growing degree-days above 6°C

Table 1. Temperature data recorded at various stations within or near Madawaska County

	Grand Falls Elev. 150 m 31 years	Edmundston Elev. 150 m 24 years	Summit Depot Elev. 400 m 19 years	St. Leonard	Fort Kent, Me.
		Monthly mean (°C)			
January	-11.9	-11.8	-13.1		
February	-10.6	-10.6	-12.2		
March	- 4.8	- 4.7	- 7.2		
April	2.8	2.9	0.7		
May	10.2	9.6	7.2		
June	15.2	15.5	13.2		
July	18.3	18.3	15.9		
August	16.9	16.7	14.4		
September	12.7	12.3	10.1		
October	6.6	6.7	4.4		
November	0.0	- 0.2	- 2.8		
December	8.9	- 8.4	-10.1		
Yearly mean	4.0	4.0	1.8		
Frost-free period (days)	117	114	85	101	112
Extreme maximum	36.7	36.1	33.3		
Extreme minimum	-43.3	-38.3	-40.0		

Table 2. Mean monthly precipitation (millimetres) recorded at selected stations in or near the County

Month	47°03'N 67°44'W Grand Falls 31 years	47°22'N 68°20'W Edmundston 19 years	47°28'N 68°14'W Green River 19 years	47°47'N 68°20'W Summit Depot 19 years
December	71 (54)*	70 (53)	81 (59)	85 (68)
January	86 (68)	74 (67)	72 (64)	79 (76)
February	69 (55)	76 (72)	76 (70)	74 (66)
Total for Period	226 (177)	220 (206)	229 (192)	238 (210)
March	64 (40)	65 (56)	68 (54)	65 (56)
April	69 (20)	72 (26)	60 (13)	60 (16)
May	66 (1)	82 (0.3)	65 (1)	78 (4)
Total for period	198 (60)	219 (82)	192 (69)	229 (76)
June	91	107	97	104
July	94	98	100	120
August	74	90	87	111
Total for period	259	294	284	335
September	81 (5)	82	81	105
October	91 (21)	82 (6)	80 (4)	93 (12)
November	76 (26)	90 (37)	87 (33)	105 (46)
Total for period	249 (52)	255 (42)	248 (37)	304 (58)
Total for year	932 (289)	988 (318)	952 (298)	1081 (344)
Total, May-Sept.	406 (6)	458 (0)	429 (1)	519 (4)

*Figures in parenthesés indicate snowfall in centimetres.

Table 3. Number of years in which various amounts of rain fell at Edmundston in each week from May to September, 1949-1961

Week	Millimetres					
	0.00	0.3-5	6-12	13-24	25-49	≥50
May 1-7	1	5	4	2	0	0
8-14	0	1	1	5	4	1
15-21	1	3	3	4	1	0
22-28	3	2	1	2	1	3
29-June 4	1	0	4	7	0	0
June 5-11	0	2	3	3	1	3
12-18	2	2	1	4	2	1
19-25	0	1	1	3	7	0
26-July 2	1	2	1	4	3	2
July 3-9	1	0	1	6	4	1
10-16	0	0	4	5	4	0
17-23	0	0	1	7	5	0
24-30	0	3	2	6	2	0
31-Aug. 6	0	7	1	0	3	2
Aug. 7-13	0	1	4	3	2	3
14-20	0	2	2	3	4	2
21-27	1	1	4	3	2	2
28-Sep. 3	1	2	2	4	2	2
Sep. 4-10	0	3	7	2	1	0
11-17	0	2	2	2	4	3
18-24	0	2	3	4	1	3
25-Oct. 1	0	5	5	0	2	1

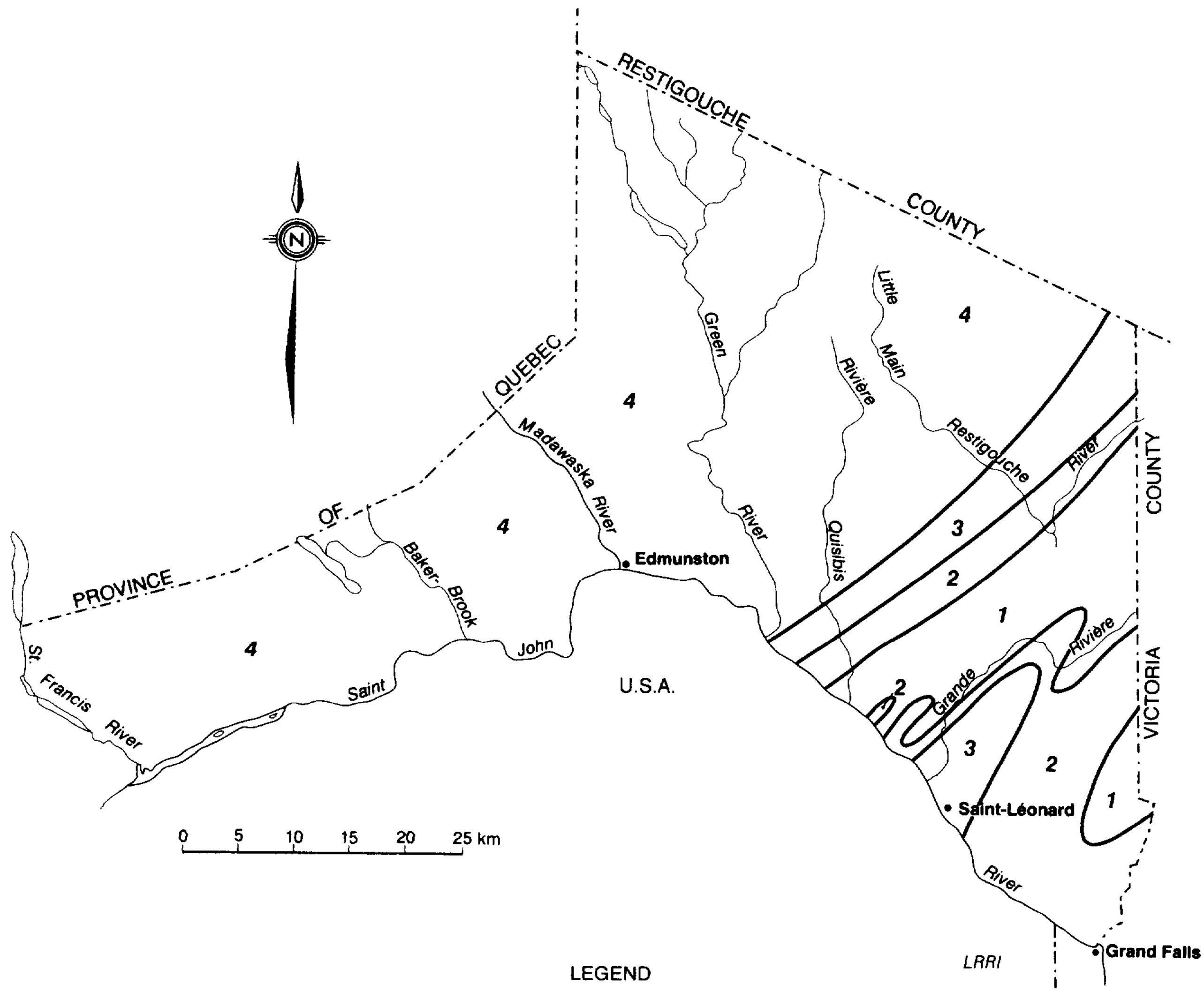
Table 4. Number of years in which various amounts of rain fell at Green River in each week from May to September, 1947-1959

Week	Millimetres					
	0.00	0.3-5	6-12	13-24	25-49	≥50
May 1-7	4	4	3	1	0	1
8-14	1	3	4	2	3	0
15-21	1	3	3	3	2	1
22-28	1	3	1	3	5	0
29-June 4	1	2	2	2	6	0
June 5-11	3	0	3	6	1	0
12-18	4	1	1	2	5	0
19-25	0	1	3	5	4	0
26-July 2	0	0	4	1	7	1
July 3-9	1	2	3	4	1	1
10-16	4	0	3	0	5	0
17-23	0	1	2	5	4	0
24-30	0	3	2	4	2	1
31-Aug. 6	3	2	3	1	1	2
Aug. 7-13	1	1	2	3	1	3
14-20	3	1	0	4	2	1
21-27	2	1	1	2	5	0
28-Sep. 3	3	0	3	5	1	0
Sep. 4-10	5	3	2	2	1	0
11-17	1	0	1	8	2	1
18-24	0	1	2	5	3	2
25-Oct. 1	5	1	4	2	1	0

August 1948 and 1949 and July 1949 missing.

Table 5. Number of years in which various amounts of rain fell at Summit Depot in each week from May to September, 1948-1961

Week	Millimetres					
	0.00	0.3-5	6-12	13-24	25-49	≥50
May 1-7	1	7	4	1	0	0
8-14	0	2	4	4	3	0
15-21	1	3	4	2	3	0
22-28	3	0	2	5	2	1
29-June 4	1	1	0	6	5	1
June 5-11	0	4	2	3	2	3
12-18	3	2	1	4	3	1
19-25	0	0	2	3	6	3
26-July 2	0	2	3	3	3	3
July 3-9	0	3	2	4	4	1
10-16	0	0	3	5	5	1
17-23	0	1	3	5	2	3
24-30	0	2	2	5	5	0
31-Aug. 6	0	3	3	3	4	1
Aug. 7-13	0	0	2	5	5	2
14-20	0	3	0	5	5	1
21-27	0	1	4	5	4	0
28-Sep. 3	2	0	4	4	3	1
Sep. 4-10	0	4	2	4	1	0
11-17	0	0	1	4	4	2
18-24	0	1	1	3	4	2
25-Oct. 1	3	2	3	2	1	0



LEGEND

1 ORDOVICIAN
Grog Brook Group
Slate, sandstone, greywacke, conglomerate.

2 ORDOVICIAN TO SILURIAN
Matapedia Group
Argillaceous limestone, arenaceous limestone, calcareous shale.

3 SILURIAN
Perham Formation
Green and red slate, sandstone, lithic wacke, and limestone.

4 LOWER DEVONIAN
Temiscouata Formation
Slate, siltstone, sandstone, greywacke, conglomerate.

FIGURE 6 The geology of the County

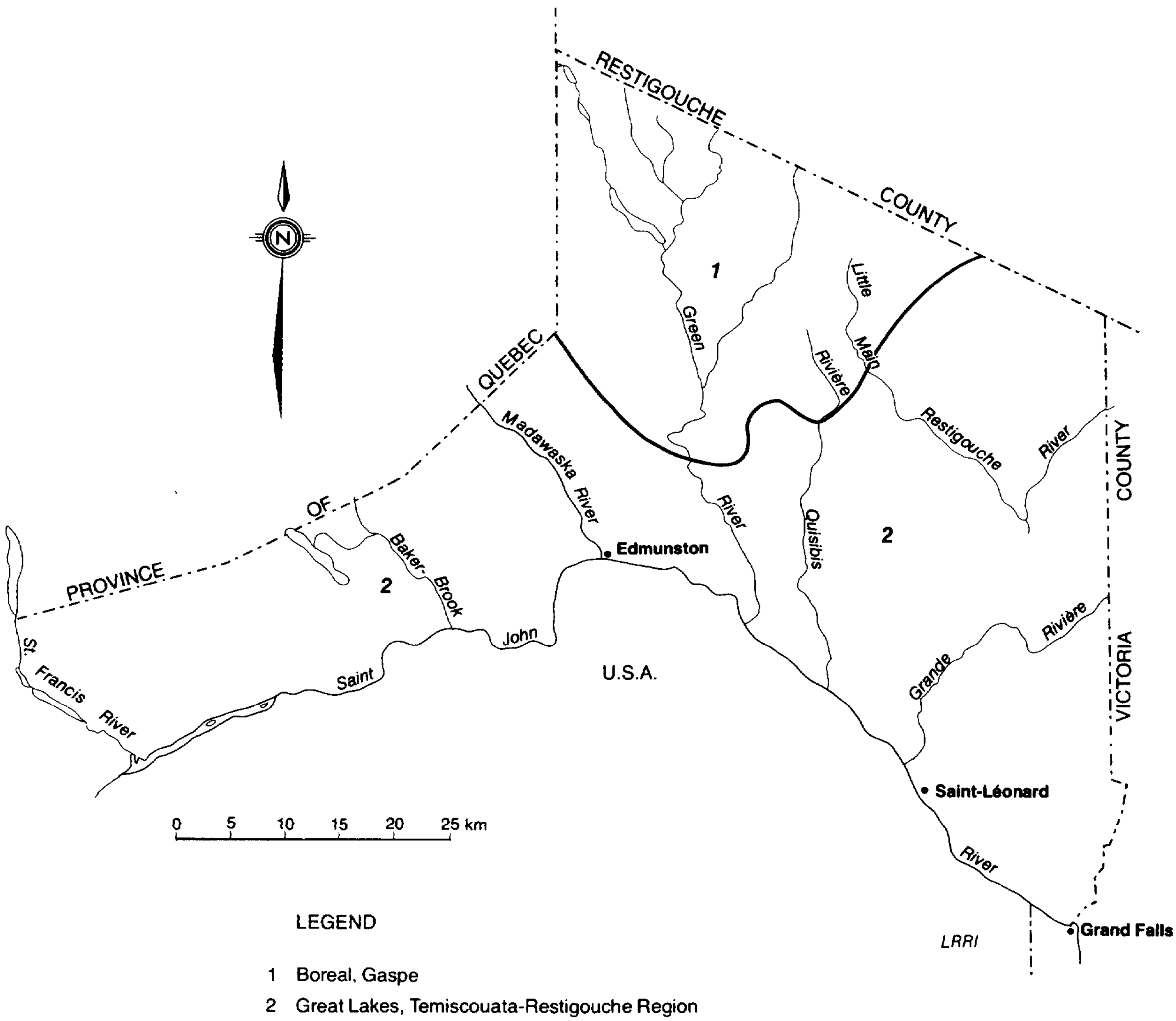
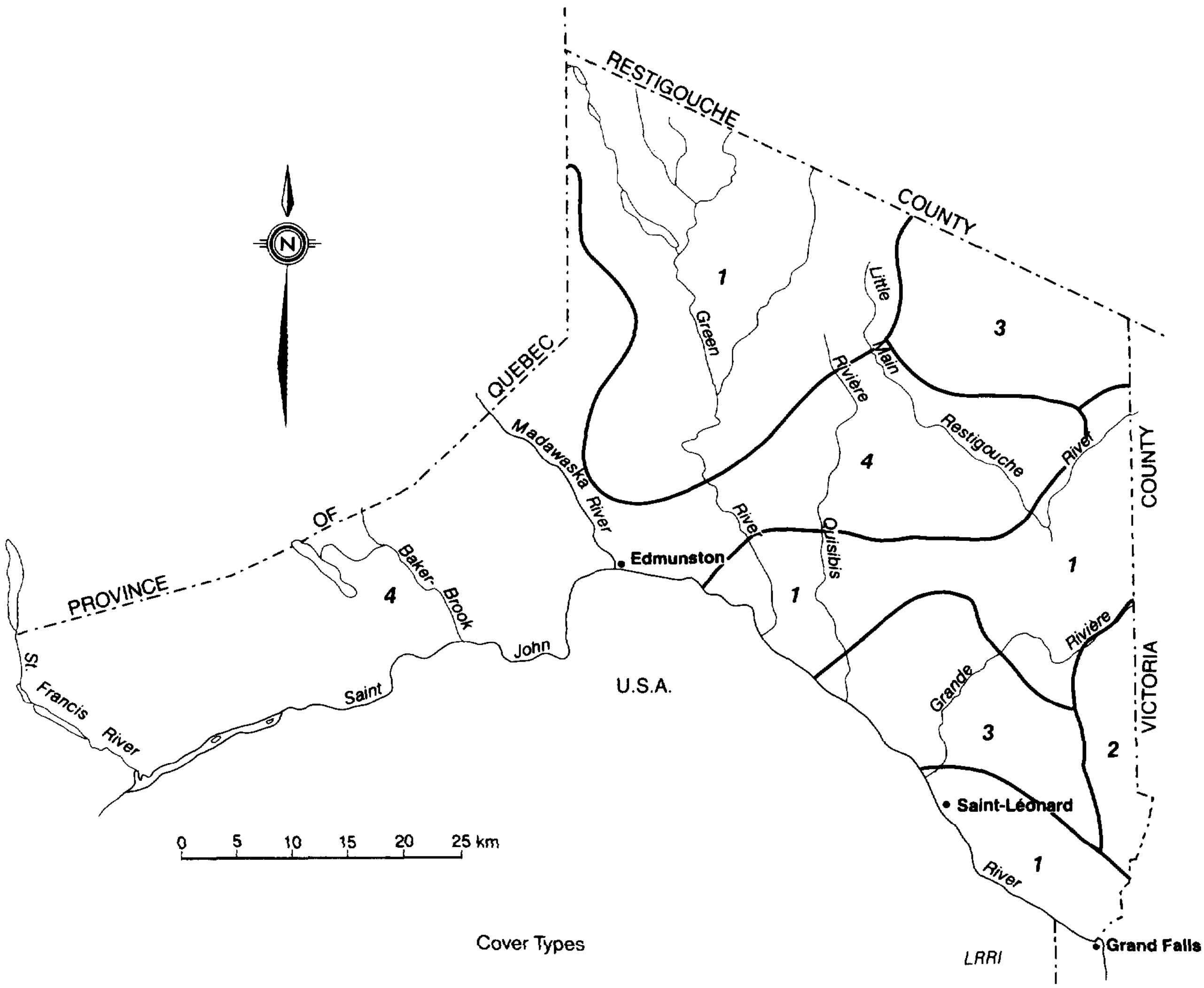


FIGURE 7 The forest regions of the County



Cover Types

1 Softwoods predominate: mixtures with hardwood species common
2 Mixed woods predominate: pure softwood and pure hardwood types mixed
3 Mixed woods predominate: intermixed softwood and hardwood species
4 Hardwoods predominate: mixtures with softwood species common

FIGURE 8 The forest cover of the County

cool boreal climate, whereas the inland regions have a cool boreal climate, with the soils having subaquic and perhumid moisture regimes respectively. Figures 3-5 and Tables 1-5 illustrate specific features of the climate.

Geology

The County has three major geological deposits. The southeast is underlain by vertically standing metamorphic, calcareous, and argillaceous sediments of Ordovician or Silurian age or both (Fig. 6). Northwest of this region is a fairly narrow band of weakly metamorphosed Silurian sediments of graywacke, slate, siltstone, sandstone, and limestone. These sediments occur in repetitive, narrow, vertically standing strata. The northwestern section of the County is underlain by vertically standing shale, limestone, and some sandstone of Devonian age intruded in several small regions by Devonian gabbro, diabase, diorite, granite, quartz, monzonite, and granodiorite.

The glacial movement was in a south to southeasterly direction, and the bulk of the material was derived from the gray sediments of the County and the adjoining areas of Quebec. Some of the erratics have moved considerable distances from north of the St. Lawrence, which indicates Laurentide glaciation.

The glacial deposits are characterized by two glacial drifts. The Grand Falls drift is marked near its southern limit by a well-developed moraine at Grand Falls with a large outwash apron and valley train south of the moraine. This moraine blocked the Saint John River at Grand Falls, which created glacial Lake Madawaska. The St. Jacques drift rests on the Grand Falls drift in several places.

Much of the County is covered by lodgment till with thin ablation material that is mixed in places with the ablation material. The texture of this till ranges from gravelly sandy loam to gravelly clay loam. The more resistant rocks of the upland regions have produced thin soils, many of which are residual. On the valley sides and in the moraine region around Grand Falls, considerable mixing and reworking is evident. This may be due to collapsed sediments and colluvial or periglacial action. The region covered by glacial Lake Madawaska has a wide variety of water deposition features such as old beaches, bars, alluvial fans, and quiet water sediments. Some of the silts occur at elevations of about 250 m and rest on a clay loam basal till, especially just north of Grand Falls.

Vegetation

About 95% of the County is covered by forest. The distribution of the forest regions is shown in Figure 7. The County is in the Temiscouata - Restigouche Forest Section of the Great Lakes - St. Lawrence Forest Region and the Gaspé Forest Section of the Boreal Forest Region.

The softwood species[1] in order of abundance are fir, spruce, cedar, white pine, and larch.

The hardwood species in order of abundance are sugar maple, yellow birch, beech, trembling aspen, red maple, balsam poplar, and white birch.

There are a number of other smaller hardwoods such as striped maple, mountain maple, mountain ash, alder, beaked hazel, pin cherry, various amelanchier, and willow. These species are considered to be weed trees because they are of little commercial importance.

The ground vegetation is widely varied. Some of the mosses and club mosses are present in varying amounts, as well as a number of ferns such as bracken, wood, and ostrich. There are a large number of herbaceous plants such as bunchberry and small fruits such as blueberry and raspberry. Juniper is common in some areas.

The soil texture, structure, depth, reaction, drainage, and water-holding properties all influence the type of vegetation, its rate of growth, and the life span of the trees and their resistance to disease.

SOIL DEVELOPMENT, MAPPING, AND CLASSIFICATION

Soil Development

The cool, humid climate of the County, interacting with the other soil-forming factors over long periods of time, has produced changes in the soil mantle that can be observed in a vertical section, or soil profile. The additions, losses, transformations, and translocations that occur have caused the formation of layers, or horizons, that differ from one another in thickness, texture, structure, or consistence. The horizons are named A, B, and C from the surface downward. Each horizon may be subdivided on the basis of differences in observable characteristics. The soils are classified on the basis of the features of the horizons. The main characteristics used are the number of horizons, their sequence, thickness, color, texture, structure, consistence, and mineral and chemical compositions.

Each soil does not have sharp boundaries but grades along its margins into others of unlike properties. Also, as a soil has depth as well as area, the features of each horizon may vary both laterally and vertically. It is therefore necessary to choose arbitrarily the range in features for each soil named.

Under certain climatic conditions over a fairly broad area, many soils that occur on materials with good drainage and aeration develop a few characteristics in common. In Madawaska County most of the well-drained soils are members of the Podzolic Order. A description of a typical

---

[1] See Appendix for scientific names.

undisturbed profile follows:

Horizon	Thickness (cm)	
L	2	Recent fallen leaf litter, twigs.
F	2	Brown to dark brown partially decomposed material, often felted and matted with roots and fungal mycelium; acid.
H	1	Black to dark brown decomposed greasy organic matter; usually well-developed structure; acid.
Ah	Trace	Black mineral horizon with up to 30% organic matter.
Ae	5	Light gray to pinkish gray mineral horizon; platy; acid.
Bhf	5	Dark reddish brown to black mineral horizon; somewhat firm to lightly cemented; not always present.
Bf1	5	Yellowish red to dark yellowish brown; granular; soft, friable, plastic.
Bf2	20	Yellowish brown; granular; soft, friable, plastic.
C	50	Olive brown; subangular blocky; very firm, hard, plastic.

Some of the soils have an accumulation of organic matter, usually in the upper B horizon. This organic matter imparts a dark color to the horizon. If this horizon meets the depth and organic content requirements, then these soils belong to the Ferro-Humic Podzol Great Group.

Some of the other soils show little profile development. The easily soluble salts have been leached out and a small amount of organic matter and iron has accumulated. If the Ae horizon is present it is very thin. These soils usually occur on parent materials that are weakly acid. They are members of the Brunisolic Order.

In regions where the parent material contained large amounts of free carbonates, the normal acid-leaching process required for the formation of a podzolic soil was retarded until the free carbonates were leached from the soil. During this time, clay was moved from the upper part of the profile and redeposited to form an argillic or Bt horizon. When the process has developed to this state, the soils belong to the Luvisolic Order. When leaching has gone beyond this stage and the upper part of the profile is sufficiently acid, a podzolic profile has formed above the Bt horizon. These soils belong to the Luvisolic Humo-Ferric Podzol, or Podzolic Gray Luvisol subgroups.

Wherever drainage is restricted by the topography or the parent material, the soils remain moist for considerable periods. Under these conditions the horizons are not so distinct and have duller colors than in the well-drained soils. Where drainage is only moderately slow, the horizons are usually distinct, but have yellowish brown, reddish brown, or gray mottles that become more prominent as drainage becomes poorer. The soils that retain the characteristic horizons of the well-drained order or great groups but are mottled have the term Gleyed before the appropriate subgroup name.

When conditions are such that water remains in the soils for most of the year, the horizons become less distinct, have colors of low chroma, and are prominently mottled. These soils belong to the Gleysolic order.

A generalized description of an Orthic Gleysol follows:

Horizon	Thickness (cm)	
L	2	Brown leaves, needles, twigs, and moss.
F	2	Dark brown semidecomposed organic material, felted.
H	3	Black well-decomposed organic material; strong, coarse crumb structure.
Ah	5	Dark grayish brown (10YR 4/2) to dark brown (10YR 2/2); coarse to medium granular; loose, friable.
Ahe	5	Grayish brown (10YR 5/2) to very dark grayish brown (10YR 3/2); strong, medium, granular to massive; common, fine, faint to no mottles.
Aeg	20	Light olive gray (5Y 6/2) to dark gray (10YR 4/1); platy to granular to massive; mottled.
Bg	15	Olive gray (5Y 4/2) to dark yellowish brown (10YR 3/4); granular to massive; mottled.
Cg	50	Dark grayish brown (2.5Y 4/2) to dark brown (10YR 4/3); granular to massive; mottled.

Along the stream courses of the County the sediments have not been in place long enough to develop profile characteristics, except for a surface horizon. These sediments may contain distinct layers, but they are a result of deposition rather than soil-forming processes. Such soils belong to the Regosolic Order.

There are many depressions in the County that are saturated with water for most of the year. These areas have accumulated a considerable thickness of organic material. Some of these areas are sites of former lakes. These organic soils do not have the distinct horizons found in the mineral soils, but have a succession of layers composed of moss and sedges in various stages of decomposition. If decomposition is well advanced the surface layer may be a muck, but in most cases the material is only partially decomposed and is commonly referred to as peat. This material may be acid or nearly neutral depending on the amount of carbonates in the parent material of the surrounding soils.

Soil Mapping

Soils were grouped into series on the basis of features and properties observed in the profiles.

On soil maps, the boundaries between soils in different series are shown by single lines. Soils rarely have sharp boundaries, but often form a complex pattern on the landscape. For this and other reasons, the delineation and mapping of a pure series is difficult and often impossible, except on a very large scale map. It is accepted practice to allow other soils to occupy up to 15% of the area delineated on the map as a soil series. Thus, on the scale of mapping used in Madawaska County, the mapping unit may range from a single soil series to an area containing complexes of one or two catenas. Because of the dense forest cover and the inaccessibility of the County, the detail of the mapping and the accuracy vary with the accessibility.

Soil profiles were examined near all roads and trails, in pits dug in fields and forested regions, and in road exposures. In places inaccessible by road, traverses were made by canoe and on foot. The boundaries between the various soils were plotted on aerial photographs on a scale of 1:15 840. Stoniness and slope were recorded for each soil and notes were taken on the vegetation, crops, agricultural practices and capability. Samples were taken of the main soil types for physical and chemical analysis and the results are given in Tables 16 and 17.

Classification of the Soils

Each of the soil great groups has a distinct kind of profile. Local variations in the texture, color, and consistency of the horizons are usually associated with differences in the parent material. For this reason it is convenient to divide the great groups into subgroups, based on some characteristic such as the kind of development of the B horizon. The subgroups are subdivided into series. The soils in each series have developed from the same kind of parent material, and have the same drainage and horizon characteristics, except for the texture of the surface layer. The surface texture is designated by adding the texture to the series name. Each series normally has only two or three textural classes. Soil phases are subdivisions based on characteristics, such as topography, stoniness, and erosion, that affect man's use of the soil.

Guide to the Soils

The guide to the soils (Table 6) is presented under three headings. The first is parent material, which is described under four subheadings; mode of deposition, geologic source, color, and texture. The second heading covers the drainage of the soil. The third heading is the classification in the Canadian system. The combination of these groups shows the relationship of the various soil series to each other.

DESCRIPTION OF THE SOILS

In the following descriptions, a definite order has been followed. The soil color, unless otherwise specified, is based on the moist sample in the field. The colors are classified according to the Munsell color system, which gives a color name followed by a symbol. The terms that may need explaining can be found in Glossary of Terms in Soil Science, (Agric. Can. Publ. 1459, Revised 1976).

The order used in the horizon descriptions is color; texture; abundance, size, contrast, and color of mottles; degree of development and size and kind of structure; moist, dry, and wet consistence; abundance and size of roots; clay films and flows, if present; rocks and pebbles; horizon boundary; and pH.

Shallow Soils Developed on Residual Materials

Undine Map Unit (1370 ha)

The Undine soils occur mainly in the Grand Falls - St. André area and in the area surrounding the forks of the Restigouche and Gounamitz rivers. Small scattered sites occur as far west as Edmundston. More than 85% of the soils of the Undine map unit belong to the well-drained Undine series. Other members of the map unit are the imperfectly drained Carlingford and the poorly drained Washburn series.

The parent material of these soils was formed primarily by the in situ weathering of a calcareous shale. The shale, of Silurian origin, increases with depth until there is only weathered shale that grades into the unweathered rock. Because of the nature of the parent material, these soils have very few stones, but rock outcrops may be numerous.

The soil usually occurs on hillsides and crests of hills, and has broken slopes caused by outcrops of bedrock.

Generally, the trees consist of sugar maple, beech, yellow birch, white birch, red maple, mountain maple, trembling aspen, white spruce, red spruce, white pine, and balsam fir. The ground vegetation consists of Canada yew, hobblebush, wild sarsaparilla, maple-leafed viburnun, one-sided pyrola, raspberry, common wood-sorrel, ground-pine, hypnum moss, haircap moss, running club moss, and plume moss.

The Undine soils are closely associated with the Caribou, Monquart, and Holmesville soils and are similar to the Mapleton soils in Maine. They are classified as Orthic Ferro-Humic Podzols and Orthic Humo-Ferric Podzols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4	Brown mixture of undecomposed leaves, needles, twigs, branches, cones; pH 5.4.
F	4-1	Dark brown layer of semidecomposed organic material, felted with white and yellow filaments and undecomposed roots and twigs; abrupt boundary; pH 4.6.
H	1-0	Black or very dark gray (10YR 3/1); decomposed organic matter; strong, medium granular; friable, slightly sticky; abrupt, smooth boundary; pH 4.6.
Ae	0-2	Light gray (10YR 7/2); silt loam; strong, medium platy; friable, soft to slightly hard, slightly plastic, nonsticky; gravel is bleached, contains 70% moderately soft, fine-grained sandstone, 20% quartzite, and 10% soft shale; abrupt, wavy boundary; pH 4.6.
Bhf	2-20	Yellowish brown (10YR 5/4); shaly silt loam; moderate, medium granular; friable, soft, slightly plastic, nonsticky; gravel fraction 80% soft shale, 20% argillite, sandstone, and quartzite; abrupt, wavy boundary; pH 5.0.
Bf	20-30	Brownish yellow (10YR 6/6); shaly silt loam; strong, medium granular; friable, soft, plastic, slightly sticky; gravel as in Bhf; clear, wavy boundary; pH 5.0.
BC	30-38	Light yellowish brown (10YR 6/4); shaly silt loam; moderate, medium granular; friable, slightly hard, slightly plastic, nonsticky; gradual, smooth boundary; pH 5.0. The gravel consists of 90% soft shale.
C	38-56	Light olive brown (2.5Y 5/4); shaly silt loam; moderate, medium granular; friable, soft, slightly plastic, nonsticky, shale becomes continuous at this depth; pH 5.0.

Variations. The texture of this soil may vary from a heavy loam to a silty clay loam in all or any one of the horizons. The plasticity and stickiness vary with variations in the texture. The depth of the horizons and of the whole profile is subject to considerable variation. The Ae horizon may be up to 10 cm thick in pockets or it may be absent. The Bhf horizon ranges from 5 to 18 cm thick, whereas the Bf is usually 10-13 cm. When these soils are cultivated, the organic layers are incorporated with the Ae and Bhf horizons to form a plowed layer of brown shaly silt loam. The BC horizon may not be present. The solum varies in depth and the C horizon may not be present in the very shallow phases of these soils. The degree and depth of weathering of the bedrock also varies considerably. There is considerable variation in color, especially in the Bhf and Bf horizons. The Bhf horizon ranges from a yellowish brown (10YR 5/4) to a reddish brown (5YR 4/4). The pH is variable, especially in the organic layers, where it ranges from about 4.2 to 5.4, and in the C horizon, where it ranges from 5.0 to 5.8.

Use. Where the topography is satisfactory, these soils are suitable for all crops that may be grown in the region. Because of their shallowness and their susceptibility to erosion, the topography is a critical limitation of these soils. About 41% of these soils are considered arable, 51% are marginal and the rest are nonarable.

Harquail Map Unit (930 ha)

The Harquail soils occur along the Restigouche River in the northeast corner of the County. More than 85% of the soils of the Harquail map unit belong to the well-drained Harquail series. The other members of the catena are the imperfectly to poorly drained Nickel Mill and the very poorly drained Five Fingers series, which cover areas too small to map separately. These soils are formed from residual material and shallow ablation till, and are similar to the Undine soils except for the occurrence of a Bt horizon overlying the bedrock. The bedrock is a weathered shale that contains a calcareous cementing material and calcite stringers. The landscape is rolling, but these soils usually occur just below the brow of hills or ridges, where the overburden is thin or has been eroded. The Harquail soil is associated with the Caribou catena, and is similar to the Mapleton soils in Maine. The vegetation is usually sugar maple, white birch, yellow birch, beech, mountain ash, white spruce, and balsam fir. This soil is classified as a Podzolic Gray Luvisol with the upper sequence of horizons resembling an Orthic Humo-Ferric Podzol. The description of a moist undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4	Brown leaves, twigs, and other organic debris.
F-H	4-0	Black to very dark gray well-decomposed organic matter; strong, medium, granular in lower part; pH 5.0.
Ae	0-2	White (10YR 8/2); loam; strong, medium and fine granular, some weak, platy; plastic, slightly sticky; abrupt, wavy boundary; pH 5.1.

Horizon	Depth (cm)	
Bf1	2-8	Brown to dark brown (7.5YR 4/4); loam; strong, fine granular; very friable, plastic, slightly sticky; clear, wavy boundary; pH 5.4.
Bf2	8-25	Yellowish brown (10YR 5/4); loam; strong, medium granular; friable, plastic, slightly sticky; clear, smooth boundary; pH 5.9.
Bt1	25-33	Yellowish brown (10YR 5/6); clay loam; strong, medium granular; friable, plastic, sticky; clear boundary; pH 5.9.
Bt2	33+	Dark yellowish brown (10YR 4/4); silty clay loam; moderate, medium granular; plastic, sticky; clay films common; abrupt boundary; pH 5.8. This horizon grades into soft weathered shale below.

Variations. The texture of this soil ranges from a loam to a silty clay loam in the Bf1 and Bf2 horizons, and ranges from a silty clay loam to a clay loam in the Bt horizons. The Bt horizons are usually only 2-13 cm thick, and lie immediately on the weathered bedrock. The depth to bedrock usually varies between 30 and 60 cm (the latter being the limit for this series). The organic horizons are incorporated with the Ae, Bf1, and Bf2 horizons to form a plowed layer of brown loam 20 cm thick.

Use. These soils are suitable for growing most crops, but they require good management practices because of their susceptibility to erosion. About 61% of the soils are considered arable, 15% are marginal, and the rest are nonarable.

Soils Developed Partly from Ablation Till and Partly from Residual Materials

Quisibis Catena

The Quisibis catena occurs in scattered sites west of St. Anne, throughout the panhandle, and in the Baker Lake region. The members of the Quisibis Catena are the well-drained Quisibis, the imperfectly to poorly drained Dubé, and the very poorly drained Big Spring series. These latter two, the Dubé and Big Spring series are included in the Quisibis map unit because they cover less than 400 ha. The parent material is a mixture of shallow ablation till and residual material derived from the underlying bedrock. The bedrock is a thinly bedded shale or phyllite, which is sometimes slightly calcareous and is considered to be of Silurian age. Usually these soils are not very stony, but erratics are found in places. The Quisibis catena is usually found associated with the Holmesville silt loam variant.

Quisibis Map Unit (16 565 ha)

The vegetation consists of balsam fir, red and black spruce, beech, sugar maple, yellow birch, white birch, ground-pine, and hobblebush. As a general rule, the hardwoods grow on the upper slopes and tops of ridges, whereas the softwoods occur on the lower slopes, but grow at higher elevations on north-facing slopes. Quisibis soils are classified as Orthic Humo-Ferric Podzols, and are strongly acid throughout the profile. A description of a typical undisturbed profile follows:

Horizon	Depth (cm)	
L	8-6	Undecomposed leaf litter; pH 5.4.
F	6-4	Brown semidecomposed organic material; matted; pH 5.2.
H	4-0	Black well-decomposed organic matter; granular; pH 5.2.
Ae+	0-6	Light gray (10YR 7/2); silt loam; strong, medium granular; friable, plastic, slightly sticky; wavy boundary; pH 5.0.
Bf1	6-11	Strong brown (7.5YR 5/6); loam; strong, medium granular; friable, loose; irregular boundary; pH 4.8.
Bf2	11-22	Yellowish brown (10YR 5/8); silt loam; weak, granular; friable, loose, plastic; pH 4.8.
BC	22-38	Dark yellowish brown (10YR 4/4); mostly fines between bedrock; a lot of well-weathered bedrock; pH 5.0.
C	38+	Well-weathered bedrock consisting of weathered slate, some fines washed down; pockety.

Variations. The main variation of these soils is in the depth of the organic horizons, which may range from 5 to 10 cm down to 2 cm or less. Another variation is the depth to bedrock, which ranges from several cm to 60 cm. Small sites of Dystric Brunisols occur with these soils. Where these soils are cultivated, a brown shaly or slaty silt loam layer 15-20 cm deep is formed, and the other horizons disappear down to the Bf2 or BC horizons.

Use. Because of the great variation in the soil depth to bedrock, small wet spots and rock outcrops are common. About 6% of these soils are considered arable and will grow most crops suitable to the area, 13% are marginal, and 81% are nonarable.

Glassville Catena

These soils occur mainly in the northern part of the County. The members of the Glassville Catena are the well-drained Glassville, the imperfectly to poorly drained Temiscouata, and the very poorly drained Foreston series. The area of the Temiscouata and the Foreston soils is so small that they are included with the Glassville map unit. The Glassville catena has developed on parent material composed of metamorphosed slates and quartzitic sandstones of Ordovician, Devonian, and Silurian age. There are two variants in the Glassville series. The most common variant is the Glassville loam, but sizeable areas of a stony sandy loam are also found. The topography is generally strongly rolling to hilly, because of the resistance of the bedrock to weathering. These soils are very channery and often very stony. The stones tend to be long, flat, and very hard.

Glassville Map Unit (33 918 ha)

The Glassville soils, which dominate this map unit, generally occur on the well-drained upper slopes of hills, and are frequently closely associated with the McGee soil. On the upper slopes the vegetation consists of yellow birch, sugar maple, beech, white birch, red maple, ironwood, striped maple, mountain maple, red spruce, balsam fir, bunchberry, common wood-sorrel, goldthread, wild sarsaparilla, spinulose wood-fern, raspberry, haircap moss, plume moss, hobblebush, and running club moss. The vegetation on the lower slopes consists of red spruce, balsam fir, eastern white cedar, yellow birch, white birch, striped maple, mountain maple, honeysuckle, bunchberry, spinulose wood-fern, ground-pine, common wood-sorrel, and Schreber's moss. The Glassville soils are classified as Orthic Ferro-Humic Podzols. A description of a typical undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4	Undecomposed needles, mosses, ferns, but predominantly deciduous leaves; pH 4.6.
F	4-2	Dusky red (10R 3/3); partly decomposed leaves, needles; pH 4.8.
H	2-0	Reddish black (10R 2/1); well-decomposed matted organic matter; pH 4.1.
Ae	0-3(10)	Pinkish gray (7.5YR 7/2); gravelly silty clay loam; firm, coarse crumb structure; loose in situ, sticky, plastic; abrupt, wavy boundary; pH 4.2.

Horizon	Depth (cm)	
Bhf1	3-5(7)	Dark reddish brown (2.5YR 2/4); gravelly silt loam; weak coarse crumb structure breaking to medium granular; loose, slightly sticky; abrupt, irregular boundary; pH 4.2.
Bhf2	5-13	Dark reddish brown (2.5YR 3/4); gravelly clay loam; moderately coarse crumb structure; loose, slightly sticky; abrupt, very wavy boundary; gravel fragments of flat subrounded slates; pH 4.5.
Bhf3	13-20	Yellowish red (5YR 4/8); gravelly silt loam; weak crumb structure breaking to medium granular; loose, nonsticky, nonplastic; abrupt, wavy boundary; gravel fragments of flat slates; pH 4.6.
Bf	20-30(58)	Yellowish brown (10YR 5/6); gravelly loam; weak crumb structure breaking to medium granular; loose, slightly sticky; abrupt boundary; pH 4.8.
BC	30-58	Dark brown (10YR 4/3); gravelly loam; coarse crumb structure breaking to coarse granular; loose; gradual, wavy boundary; many flat subrounded stones and cobbles, thin silt caps on stone fragments, in silt caps there is a lattice network presumably of old small root channels, strong, brown (7.5YR 5/6); gravel fragments are flat slates; pH 5.0.
C1	58-70	Dark grayish brown(10YR 4/2); gravelly loam; on top of this horizon there is a layer of flat semirounded stones with thin 2 mm silt coatings in which the lattice network of old roots is very pronounced, yellowish red (5YR 5/8); coarse crumb structure breaking to granular; firm in situ, very cobbly; slate fragments, pH 5.1.
C2	70-110	Dark grayish brown (2.5Y 4/2); gravelly loam; coarse crumb structure breaking to coarse granular; firm in situ, many stones and cobbles and considerably more gravel than other horizons, gravel fragments are flat and subangular slates, silt caps seem to be slightly compact with a tendency to brittleness; roots penetrate well into C horizon; pH 5.1.

Variations. The Bhf and Bf horizons usually contain more silt than the parent materials. The depth of the L, F, and H horizons varies from 2 to 8 cm. The Ae horizon varies from 2 to 13 cm and may be very wavy. The dark colored Bhf horizon is generally present at altitudes above 365 m. The dark reddish brown color of the B horizon ranges from 5YR 3/2 to 2.5YR 2/4. The color of the C horizon varies from a pale yellow (2.5Y 7/4) to an olive (5Y 3/4).

The drainage varies from excessive on the upper slopes where it is shallow over bedrock, to moderately well drained part way down the slopes where seepage occurs. These soils are usually very stony, and have a large percentage of slaty gravel and channeries. Where they are cleared and cultivated, the L-H, Ae, and at least part of the Bhf horizons are mixed to form a slaty loam. Several areas of soil formed from volcanic rocks are included in the Glassville series. The most notable area is on Quisibis Mountain.

Analytical results. One sample of Glassville soils is reported in Tables 15, 16, and 17. The chemical analysis shows that these soils meet all the conditions for a Ferro-Humic Podzol. The cation exchange capacity has a positive correlation with the organic-matter content. The exchangeable cation content drops throughout the profiles and the base saturation is extremely low. The exchangeable calcium is higher in the lowest horizon than in the horizons immediately above, probably because of the small amount of calcium carbonate in the original unweathered bedrock. The clay decreased from the top of the profile to near the bottom of the profile, where it increases slightly. The silt also decreases with depth. The decrease in total pore space and increase in bulk density are probably caused by the increase in gravel, not by compaction. The water-holding characteristics show that there is about the same amount of easily drainable pores and fine pores throughout the profile. The available water and the water-holding capacity are low in these soils.

Use. Some of these soils have been cleared and used for agriculture in the past; however, much of this land has since been abandoned and has reverted to forest. The soils are usually too stony and channery to clear and use for intertilled crops. They respond well to fertilizer, and good crops of hay and grain have been grown on them. They are best left under forest and only cleared under exceptional circumstances. About 6% of these soils are marginal and the remaining 94% are nonarable. The limiting factors are stoniness, topography, and shallowness to bedrock.

Boston Brook Catena

The Boston Brook catena is found in the northeastern part of the County. This catena is made up of the well-drained Boston Brook, the imperfectly to poorly drained Skin Gulch, and the very poorly drained Yellow Brook series. The Skin Gulch and Yellow Brook series cover too small an area to be mapped separately and are included in the Boston Brook unit. Boston Brook soils have been formed from parent material deposited as stony ablation till that has been derived from gray argillites, slates, and fine-grained sandstones. They are usually associated with the Glassville catena. The topography is gently rolling to rolling.

Boston Brook Map Unit (422 ha)

The Boston Brook map unit is dominated by the soils of the Boston Brook series.

The vegetation consists of yellow birch, eastern white cedar, spruce, balsam fir, sugar maple, white birch, beech, white pine, striped maple, hobblebush, billberry, pin-cherry, hazel, ferns, haircap moss, bunchberry, and raspberry. These soils are classified as Orthic Humo-Ferric Podzols. A description of a typical undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4.5	Freshly fallen leaf litter, twigs, pH 5.2.
F	4.5-2.5	Brown to black moderately decomposed organic matter; felted; pH 4.4.
H	2.5-0	Black well-decomposed organic matter; strong, coarse granular; pH 4.6.
Ae	0-5	Light brownish gray (10YR 6/2); gravelly silty clay loam; weak, platy breaking to fine granular; firm, slightly hard, plastic, sticky; abrupt, wavy boundary; pH 4.6.
Bf1	5-13	Brown to dark brown (7.5YR 4/4); gravelly loam; strong, fine granular; loose, plastic, sticky; clear boundary; pH 4.7.
Bf2	13-23	Yellowish brown (10YR 5/4); gravelly loam; moderate fine granular; friable, soft, plastic, sticky; roots penetrate to bottom of this horizon and some beyond; clear boundary; pH 4.8.
BC	23-38	Yellowish brown (10YR 5/6); gravelly loam; fine, medium granular; firm, loose, plastic, sticky; clear boundary; pH 5.4.
C	38-122	Light olive brown (2.5Y 5/4); gravelly clay loam; weak, coarse granular; firm, plastic, sticky; very stony; pH 5.5.

Variations. The organic horizons range in depth from 2.5 to 10 cm. The Ae ranges from 2.5 to 5 cm with pockets to 10 cm, and the texture may vary to a very fine sandy loam. Sometimes a pale brown AB horizon is present, as well as a thin Bhf horizon. A light olive brown (2.5Y 5/6) BC horizon may be up to 30 cm thick. The depth of the solum varies from 18 to 69 cm. The texture of the parent material ranges from a silt loam, a silty clay loam to a clay loam and the color may sometimes become as dark as a yellowish brown (10YR 4/4). The soils are all gravelly and stony. Pockets of gravel many centimetres in diameter, free of fines, are scattered through the material. A variation of the Boston Brook soils contains highly metamorphosed shale.

Use. At present these soils are used for forestry and none have been cleared for agriculture. Although they have a good water-holding capacity, the stones and channers would be an impediment to cultivation. These soils support a wide variety of trees; the tops of the ridges are predominantly hardwoods, and softwood species are dominant on the lower slopes.

Soils Developed on Loose Ablation Moraine Materials

These soils are not less than 60 cm thick over bedrock and the moraine material is seldom more than 300 cm thick. They have good moisture-holding capacity, and usually are not stony. The topography is undulating to hilly.

Monquart Map Unit (2299 ha)

The Monquart map unit occurs from the Quebec border to the eastern boundary of the county. At least 85% of the soils in this map unit belong to the Monquart series. Because the imperfectly to poorly drained soils associated with the Monquart soils are derived from similar material to the Caribou soils, they have been included in the lower drainage members of the Caribou catena. These soils have formed on farily deep ablation till, which is derived from easily weathered calcareous shales, quartzite, and argillites. This material is considered to be of Silurian age. The topography is undulating to rolling. These soils are associated with the Caribou, Holmesville, and Victoria catenas. The vegetation consists of spruce, fir, white birch, yellow birch, beech, sugar maple, red maple, trembling aspen, cedar, striped maple, mountain maple, beaked hazel, billberry, mountain ash, hobblebush, gooseberry, raspberry, moccasin flower, yellow lady-slipper, trillium, bunchberry, creeping snowberry, spinulose wood-fern, ground-pine, plume moss, haircap moss, and running club moss. These soils have been classified as Orthic Humo-Ferric Podzols. A description of a moist well-drained profile follows:

Horizon	Depth (cm)	
L	5-4	Brown undecomposed leaves with club moss, some needles, and branches; pH 4.8.
F	4-1	Dark brown semidecomposed compressed foliated mat of organic matter with undecomposed roots and branches; abrupt boundary; pH 5.1.

Horizon	Depth (cm)	
H	1-0	Black well-decomposed greasy organic matter; moderate, coarse granular; friable, sticky, nonplastic; abrupt boundary; pH 4.4.
Ae	0-5	White (2.5Y 8/2); gravelly silt loam; moderate, fine to medium granular and platy; friable, plastic, sticky; predominantly angular fragments of fine-grained sandstone and quartzite with small quantities of quartz, argillite, and weathered shale; abrupt, irregular boundary; pH 4.4.
Bf1	5-15	Brown to dark brown (7.5YR 4/4); gravelly loam; strong, medium granular; friable, plastic, sticky; fragments of fine-grained sandstone, quartzite, and soft shale with small amounts of quartz and argillite; clear boundary; pH 4.5.
Bf2	15-25	Reddish yellow (7.5YR 6/6); gravelly loam; strong, medium granular; friable, plastic, slightly sticky; fragments of fine-grained sandstone and soft shale with some quartzite, quartz, and argillite; gradual boundary; pH 4.9.
BC	25-66	Light yellowish brown (10YR 6/4); gravelly sandy loam; moderate, medium granular; friable; about 50% of rock fragments soft shale, the rest fine-grained sandstone, quartzite, quartz, and argillite; diffuse boundary; pH 5.0.
C1	66-107	Olive yellow (2.5Y 6/6); gravelly sandy loam; weak, fine granular; friable; stone fragments as above; diffuse boundary; pH 4.9.
C2	107-152	Pale yellow (2.5Y 7/4); gravelly sandy loam; weak, granular; friable; stone fragments same as above; pH 5.4.
C3	152-163	Pale yellow (2.5Y 7/4); gravelly clay loam; weak, granular; friable, plastic, sticky; pH 6.0.

Variations. The L, F, and H horizons vary from less than 2.5 to 7.5 cm in depth. The individual horizons vary in thickness from less than 0.5 to 4 cm in both the F and H horizons. The Ae horizon varies in thickness from 2.5 to 8 cm, and varies in color from white to pinkish gray. The texture remains fairly uniform as a silt loam or loam. A thin Bhf horizon is sometimes present, especially at high elevations. The Bf horizon varies in thickness from 8 to 20 cm, and varies in color from a dark red (2.5Y 3/6) to a strong brown (7.5Y 5/8). The texture is generally gravelly loam, and occasionally a gravelly sandy loam. The Bf horizon extends to a depth of about 28 to 48 cm from the mineral surface. The texture is generally a little coarser than the upper horizons and contains more gravel. The BC horizon extends to a depth of 46 to 75 cm, and the color varies from a light olive brown to a dark yellowish brown. The C horizon varies in color from an olive gray to a light yellowish brown. The pH of the parent material varies from 4.8 to 5.4. The pH of the organic horizons ranges from 4.0 to 5.2, and the Ae horizon ranges from 3.8 to 4.4. The Bf horizons range from a pH of 4.6 to 5.0. The amount of soft leached shale varies from 25% to 50% of the amount of gravel present.

Use. Many of these soils are still in forest. About 10% of the soils are considered arable, 56% are marginal, and the remaining 34% are nonarable.

Caribou Catena

The Caribou soils occur mainly in the eastern part of the County. The catena members are the well-drained Caribou, the imperfectly drained Carlingford, and the poorly to very poorly drained Washburn soils.

The Caribou soils have formed on ablation till derived from calcareous shales, some argillites, and quartzites of Silurian age. The topography is gently undulating to rolling and steeply sloping where the rivers have cut deeply into the soft shale bedrock.

The Caribou soils are associated with the Holmesville, Undine, and Monquart soils and correspond with the same series mapped in Maine.

Caribou Map Unit (2 780 ha)

The Caribou map unit is dominated by the soils of the Caribou series.

The vegetation consists of balsam fir, spruce, eastern white cedar, yellow birch, white birch, sugar maple, red maple, poplar, pin-cherry, ironwood, mountain ash, hazel, bunchberry, blueberry, raspberry, aster, spinulose wood-fern, wild sarsaparilla, and plume moss. The Caribou soils have been classified as Podzolic Gray Luvisols. A description of a well-drained undisturbed profile follows:

Horizon	Depth (cm)	
L	2.5-2	Brown undecomposed leaves with needles, club moss and other moss, branches, twigs, and cones; pH 6.8.
F	2-0.5	Black or very dark brown semidecomposed compressed foliated organic matter with undecomposed roots and branches; abrupt boundary; pH 4.6.

Horizon	Depth (cm)	
H	0.5-0	Black well-decomposed organic matter; strong, medium granular; abrupt boundary; pH 4.4.
Ah	0-5	Black (10YR 2/1); silt loam high in organic matter; moderate, medium granular; friable to firm; a few fragments of shale, argillite, fine-grained sandstone, and quartzite (the quartzite increasing in quantity in the fine gravel fraction); abrupt boundary; pH 5.0.
Ae	Trace	White (10YR 8/2); silt loam; moderate, medium granular with a tendency to weak platiness; firm, plastic, sticky; stone fragments of white leached sandstone, shale, gray argillite, quartzite, and quartz; clear, wavy boundary; pH 4.9.
AB	Trace	Very pale brown (10YR 7/3); silt loam; moderate, medium granular; firm, plastic, sticky; rock fragments of gray sandstone, argillite, shale, quartzite, and quartz; abrupt, wavy boundary; pH 4.9.
Bhf	5-25	Strong brown (7.5YR 5/6); clay loam; strong, medium granular; firm, plastic, sticky; 50% of the rock fragments of brown soft shale, the remainder being gray sandstone, quartzite, and argillite; gradual boundary; pH 4.9.
Bf	25-35	Brownish yellow (10YR 6/6); loam; moderate to strong, medium granular; friable, plastic, slightly sticky; 70% of the rock fragments of brown and gray shale, the remainder being sandstone, quartzite, and quartz; diffuse boundary; pH 5.0.
Bt1	35-61	Light yellowish brown (10YR 6/4); gravelly clay loam; compound weak, coarse granular to moderate, fine granular; permeable, friable;common clay films; diffuse boundary; pH 5.2.
Bt2	61-75	Pale yellow (2.5Y 8/4); gravelly clay loam; moderate, medium granular; friable; many clay films; diffuse boundary; pH 5.1.
C1	75-100	Light olive brown (2.5Y 5/4); gravelly clay loam; coarse, granular and strong, fine subangular blocky; firm, plastic, sticky; diffuse boundary; pH 5.7.
C2	100-124	Pale brown (10YR 6/3); gravelly clay loam; strong, coarse granular to fine subangular blocky; firm, plastic, sticky; gradual boundary; pH 6.2.

Horizon	Depth (cm)	
C	124+	Weathered bedrock.

The shale fragments are leached, weathered, and very porous. They are often referred to as ghosts.

Variations. The organic horizons vary in depth from a thin L horizon to about 5 cm of combined L, F, and H. The Ah horizon may not be present, but where earthworms are active, this layer may reach depths of 7 or 10 cm, and the organic and Ae horizons are obliterated. The Ae horizon may be intermittent or occur in pockets 5 to 7 cm deep. The texture may vary from a loam high in clay, to a silty clay loam. The AB horizon is often not present. The Bf horizons are characterized by their strong granular structure, which persists even after continuous clean cultivation. In some profiles the B horizons fall in the Bhf group. The texture varies from a silt loam to a silty clay loam. The same texture variation occurs throughout the profile and parent material. A slight increase in clay from 60 to 76 cm occurs in some of the profiles and a gradual increase in the pH down the profile. The depth of the solum varies from 46 to 76 cm. The rock fragments may be nearly 100% soft weathered shales.

Use. Most of these soils are still under forest. When cleared and cultivated, they are some of the better soils of the County, and are used for intensive cultivation of potatoes, peas, and beans. They are capable of growing all crops suited to the region. The strong structure, texture, and porosity make them easy to cultivate, and excess water is removed rapidly. They are subject to severe erosion. They have been placed in Class 2 of the Canada Land Inventory for Agricultural Capability. About 30% of these soils are considered arable, and the remaining 70% are marginal because of the erosion that occurs on the steeper topography.

Carlingford Map Unit (1007 ha)

The Carlingford soils, which dominate the Carlingford map unit, are the imperfectly drained members of the Caribou catena, and are similar to the Easton series in Maine. The Carlingford soils usually occur on seepage slopes and level areas and depressions. The vegetation consists of balsam fir, red spruce, white spruce, black spruce, eastern white cedar, larch, red maple, black ash, white birch, trembling aspen, balsam poplar, largetooth aspen, and striped maple. The understorey consists of raspberry, aster, creeping snowberry, haircap moss, hypnum moss, beaked hazel, and fern. These soils have been classified as Gleyed Gray Luvisols and Gleyed Brunisolic Gray Luvisols. A description of a moist undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4	Light brown to brown undecomposed needles with mosses,

Horizon	Depth (cm)	
		branches, twigs, and cones; pH 6.4.
F	4-2	Reddish black semidecomposed matted and fibrous organic matter with undecomposed roots, branches, and cones; abrupt boundary; pH 6.4.
H	2-0	Black well-decomposed organic matter; strong, granular; greasy when wet; pH 6.4.
Ah	0-5	Very dark brown (10YR 2/2); silt loam; high in organic matter; strong, medium granular; firm, plastic; stone fragments of brown soft shale and fine-grained sandstone with some quartzite; abrupt boundary; pH 6.5.
Aegj	5-12	Pale yellow (5Y 7/4); silt loam; few, fine, faint mottles; weak, fine granular; friable, slightly hard, plastic, slightly sticky; rock fragments, mainly argillite with fine-grained sandstone and shale; clear, irregular boundary; pH 6.6.
Btjg1	12-28	Yellowish brown (10YR 5/4); loam; common, fine, faint mottles; weak to moderate, medium granular; friable, loose, slightly plastic, slightly sticky; clay films and clay flows common; stone fragments of brown soft shale, argillite, and micaceous fine-grained sandstone; clear boundary; pH 6.6.
Btjg2	28-37	Light olive brown (2.5Y 5/5); loam; common, medium, distinct brownish yellow (10YR 6/6) mottles; moderate, medium granular; friable, less permeable than other horizons, plastic, slightly sticky; rock fragments mostly of soft shale with some fine-grained sandstone and quartzite; clay films and clay flows common; gradual boundary; pH 6.5.
Cg	37-76	Light olive brown (2.5Y 5/4); loam; common, medium, distinct brownish yellow (10YR 6/6) and pale yellow (2.5Y 7/4) mottles; weak, fine granular; friable, plastic, slightly sticky; rock fragments mainly of soft shale with some sandstone and quartzite; clay films common; diffuse boundary; pH 6.5.
C	76+	Pale olive (5Y 6/3); gravelly clay loam; very weak, coarse granular; friable, plastic, sticky; rock fragments same as in Cg horizon; some rock fragments and fines adhering to stones effervesce with acid; clay films common; pH 6.5.

Variations. The depth of the L, F, and H horizons may vary from 5 to 15 cm. The Ah horizon is often absent from the profile. The Aegj horizon varies in thickness from 2 to 7 cm. The Btjg horizon varies in thickness and in the amount of organic material present. As the drainage approaches the lower limits, this horizon becomes very weak. The texture of the profile may range from a loam to a silty clay loam and occasionally to a clay loam. The amount of gravel varies slightly. The pH varies widely, from about 4.0 to 6.5 in the Aejg, to about 5.0 to 6.5 in the parent material.

A Gleyed Dystric Brunisol variant of this soil occurs in small sites on the more acid parent material.

Use. When drained, these soils may be used for most of the crops grown in the County. Some exceptions are certain varieties of potatoes that require low pH.

As only 295 ha of Washburn soils occur in the County, they are included in the Carlingford map unit. These soils occur in depressions or areas where the permanent water table is close to the surface. They are classified as Orthic Humic Gleysols.

Soils Developed from Compact Ground Moraine Materials

These soils have developed on material deposited under glaciers as ground moraine. The parent material was derived from a number of different geological materials. The soil-forming processes have acted on these soils to form many different profiles.

Holmesville Catena

The Holmesville catena is the most widespread of all the soils mapped in the County. The catena members are the well-drained Holmesville, the imperfectly to poorly drained Johnville, and the very poorly drained Poitras series. The parent material was deposited as a fairly thin, 100 to 300 cm, mantle over the bedrock. It is possible that the loose material in which the solum formed is a thin layer of ablation material from the same bedrock source deposited on top of the ground moraine by the melting glacial ice. This would account for the varying depths of loose material overlying the compact till. This material was derived from Silurian quartzite, slightly metamorphosed, fine-grained sandstone, and small amounts of shale, argillites, and slates. The topography is undulating to strongly rolling, and is controlled by the bedrock.

Holmesville Map Unit (93 734 ha)

The soils of the Holmesville series occupy more than 85% of this map unit. These soils are classified as Orthic Humo Ferric Podzols. The vegetation consists of sugar maple, beech, yellow birch, red and white spruce, balsam fir, red maple, white pine, trembling aspen, pin-cherry, striped maple, mountain maple, bracken fern, blueberry, bunchberry, August flower, lichens, mosses, dwarf raspberry, and hobblebush. The modal Holmesville is a loam, but two variants have been mapped in the County. The silt loam variant, which was formerly called Violette, occupies 71 725 ha, and the fine sandy loam variant occurs on 2253 ha. A description of a well-drained undisturbed modal profile follows:

Horizon	Depth (cm)	
L	5-4	Brown undecomposed needles, leaves, twigs, moss; pH 3.9.
F	4-2	Very dark brown partially decomposed felty mor; abundant white filaments; pH 4.0.
H	2-0	Black well-decomposed organic material; moderate, medium granular; friable; charcoal; pH 3.9.
Ae	0-5	White (10YR 8/2); loam; weak, platy breaking to weak, fine granular; friable, soft, slightly plastic, slightly sticky; abrupt, irregular boundary; pH 3.5.
Bhf1	5-6	Dusky red (2.5YR 3/2); loam; strong, fine and medium granular; friable, soft, slightly plastic, slightly sticky; abrupt boundary; pH 3.9.
Bhf2	6-10	Dark reddish brown (5YR 3/4); silt loam; moderate, medium granular; friable, soft, plastic, sticky; clear boundary; pH 4.2.
Bf1	10-15	Brown (7.5YR 5/2); loam; moderate, fine granular; friable, soft, plastic, sticky; clear boundary; pH 4.6.
Bf2	15-30	Yellowish brown (10YR 5/4); gravelly loam; moderate, fine granular; friable, soft, plastic, sticky; gradual boundary; pH 4.7.
BC	30-46	Light olive brown (2.5Y 5/4); gravelly loam; weak, thick, platy breaking to moderate, medium subangular blocky; many clay films; clear boundary; pH 4.8.
C	46-100	Grayish brown (2.5Y 5/2); gravelly sandy loam; moderate,

Horizon	Depth (cm)	
		thick pseudoplaty breaking to medium blocky. very compact and firm in place, somewhat brittle, very firm, hard, plastic, sticky, many clay or silt films or flows; abrupt boundary; pH 5.2.
Cg	100-127	Grayish brown (2.5Y 5/2); gravelly loam to clay loam; few, fine, yellowish red (5YR 5/6) mottles; coarse pseudoplaty and coarse subangular blocky; very firm, hard, plastic, sticky, dense; few clay films; pH 5.5.
		This is heterogeneous till with lenses of gravelly clay loam, gravelly loam, and gravelly sandy loam.

Variations. The organic horizons vary in thickness from 2 to 5 cm. These horizons have been destroyed where earth worms have invaded the area. The Ae horizon ranges in thickness from 2 to 5 cm and to about 10 cm in pockets. The texture varies from a loam to a silt loam, and the structure shows varying degrees of platiness that breaks on handling to medium granular. A thin Bhf horizon is often present at high elevations, but it is seldom thicker than 2 cm. Occasionally, this horizon is thick enough (10 cm) to change the classification to an Orthic Ferro-Humic Podzol. Humic Podzol profiles occur on this parent material, but few were found in this County. The depth of the solum varies considerably, from 30 cm to 75 cm. The usual depth is 50 to 66 cm. The texture of the profile and parent material varies from a gravelly sandy loam to a gravelly loam. Occasionally, a sandy clay loam or clay loam is included in the parent material. The stone content of the soil varies and occasionally a soil is classified as Stony 3.

Analytical results. The oxalate soluble iron and aluminum both indicate that these soils are properly classified as Podzols. The organic carbon follows the typical Podzolic horizon pattern; low in the Ae, increasing in the Bhf, and declining to the C. A large variation in total amounts of carbon present occurs from one profile to another. The carbon content appears to increase in those horizons with a fine texture.

The cation exchange capacity is high in the profiles with the high carbon content. The degree of base saturation increases with depth in some of the profiles, but not in all.

The soils show a good supply of available water in the profile, especially in the solum, but drainage is restricted in the compact C material.

Use. The Holmesville soils are the most extensively cultivated soils of the County. They are used for growing potatoes, peas, grain, and hay. They respond well to fertilizers, and stand up well when they are used for continuous intertilled crops. They are subject to erosion, but the large amount of gravel helps to retard this problem. Where the slope is 5% or less, the soils are placed in capability class 2F. Considerable areas of these soils support a good-quality fast-growing forest. About 29% of these soils are considered arable, 32% are marginal, and the remaining 39% are nonarable. The limitations are topography and stoniness.

Johnville Map Unit (10 128 ha)

The Johnville soils, which dominate this map unit, are the imperfectly to poorly drained members of the Holmesville catena. They occur on the seepage slopes and on the edges of depressions. The silty phase occupies 6216 ha and the fine sandy loam phase 362 ha. The vegetation consists of black spruce, balsam fir, tamarack, eastern white cedar, white birch, gray birch, red maple, willow, pin-cherry, alder, black ash, and mosses. These soils are classified as Gleyed Humo-Ferric Podzols and Gleyed Dystric Brunisols. A description of an imperfectly drained undisturbed profile follows:

Horizon	Depth (cm)	
L	7-6	Dark yellowish brown to brown undecomposed leaves and needles; club moss, sphagnum moss, branches, twigs, and cones; pH 4.2.
F	6-4	Dark brown semidecomposed fibrous and matted organic matter with white filaments and undecomposed roots, branches, and cones; abrupt boundary; pH 4.0.
H	4-0	Black decomposed greasy organic matter; strong, medium granular; friable, nonplastic, sticky; pH 4.0.
Ahe	Trace	Very dark gray (10YR 3/1) to gray (10YR 5/1) rubbed; gravelly loam; moderate, medium granular; friable, loose; pH 4.2.
Aeg	0-5	Light gray (2.5Y 7/2); gravelly silt loam; few, fine, faint light yellowish brown (10YR 6/4) mottles; moderate, medium granular and weak, fine platy; friable, loose, slightly plastic, slightly sticky; abrupt, wavy boundary; pH 3.8.
Bfgj	5-10	Strong brown (7.5YR 5/6); gravelly silt loam; few, fine, faint, dark yellowish brown (10YR 4/4) mottles; moderate, medium granular; friable, loose, plastic, slightly sticky, permeable; clear boundary; pH 4.3.
BCg1	10-22	Brownish yellow (10YR 6/6); gravelly loam; common, coarse, prominent, yellow (10YR 7/6) and white (2.5Y 8/2) mottles; moderate, coarse granular breaking to weak, medium granular; friable, slightly hard, slightly plastic,

Horizon	Depth (cm)	
		slightly sticky; gradual boundary; pH 4.8.
BCg2	22-56	Yellowish brown (10YR 5/8); gravelly loam; common, medium, prominent, yellow (10YR 7/6) and reddish yellow (7.5YR 7/8) mottles; weak, medium granular; friable, slightly hard, slightly plastic, slightly sticky; sometimes more gravelly than other horizons; clear boundary; pH 4.8.
Cg1	56-80	Light yellowish brown (2.5Y 6/4); gravelly loam; common, fine, distinct, yellow (2.5Y 7/8) and brownish yellow (10YR 6/6) mottles; strong, fine pseudoplaty; firm, dense, slightly plastic, slightly sticky; gradual boundary; pH 4.9.
Cg2	80-121	Olive gray (5Y 5/2); gravelly loam; few, fine, distinct yellowish brown (10YR 5/4) mottles; strong, coarse, pseudoplaty and subangular blocky; very firm, hard, dense, slightly sticky; diffuse boundary; pH 5.0.
C	121-152+	Olive (5Y 5/3); gravelly loam to clay loam; strong, coarse, pseudoplaty; hard, dense, plastic, sticky; pH 5.0.

The profile includes rock and gravel fragments of quartz, quartzite, sandstone, and some argillite. The silt loam variant often contains soft shale.

Variations. The thickness of the L-H horizon remains about the same under different drainage conditions, but a thin Ah may occur under very moist conditions. An intermittent and thin Bhfg horizon may occur under the leached layer in the imperfectly drained areas, about a third of the way up the slope. Under poorly drained conditions, the Aegj horizon is mottled and underlain by a Bfg horizon. The colors become less intense as the drainage deteriorates. Texture varies from a sandy loam to a loam in the parent material, and to a silt loam in the Aeg horizon. In the silt loam variant the soil contains more silt in the parent material and as a result the whole profile has a finer texture.

The pH of the organic layers may be higher, with the pH of the L horizon 5.6 and of the H horizon 4.4. The pH of the mineral horizons may be slightly higher in the solum. The depth of the solum varies from 23 to 74 cm.

Analytical results. The clay content varies considerably between profiles. The Johnville silt loam sample has sufficient clay to reach the clay loam classification in the majority of horizons. Although the laboratory analysis shows this clay content, the field observations indicated that the profile was silty.

The determination of available water shows low available water deep in the soil, and the total and easily drainable pore space also decreases with depth.

The exchange capacity depends on profile development and accumulation of organic material in the B horizon. The exchange capacity decreases in the more poorly drained profiles. The degree of base saturation is highly variable in the parent materials. Only one horizon makes a Bf horizon by definition of Δ Fe + Δ Al.

Use. Most large regions of these soils have been left in forest. Where they are cleared, they may be used to grow permanent pasture or hay. When they are drained, they may be used for the same crops as the Holmesville soils with good results. They may be worked slightly later in the spring. About 13% of these soils are marginal, but could be drained fairly easily and the remaining 87% are nonarable.

Poitras Map Unit (2615 ha)

The Poitras soils, which dominate this map unit, are the very poorly drained members of the Holmesville catena. These soils occur in depressions and are classified as Orthic Gleysols. The silt loam phase occupies 1526 ha, and the fine sandy loam phase occupies 206 ha. The vegetation consists of black spruce, eastern white cedar, alder, balsam fir, running club moss, spinulosa wood-fern, goldthread, sphagnum mosses, tree moss, haircap moss, and sedges. The description of a moist undisturbed profile follows:

Horizon	Depth (cm)	
L	Trace	Leaf litter, mostly moss and twigs; pH 4.2.
F	5-3	Brown semidecomposed litter and roots, felted; pH 4.2.
H	3-0	Black well-decomposed organic material; moderate, medium granular; pH 4.2.
Aeg	0-25	Light gray (10YR 7/1); gravelly loam; many, coarse, prominent very pale brown (10YR 7/4) mottles; massive; plastic, sticky; abrupt, smooth to slightly wavy boundary; pH 4.7.
Bg	25-55	Light olive gray (5Y 6/2); loam; many, medium, prominent yellowish brown (10YR 5/6) mottles; some of these are concretions 2-4 mm in diameter; strong, coarse, granular; plastic, slightly sticky; clear, wavy boundary; pH 5.5.
Cg1	55-80	Light olive gray (5Y 6/2); gravelly loam; common, medium, prominent brownish yellow (10YR 6/6) mottles; very weak, platy; plastic, slightly sticky; pH 5.4.

Horizon	Depth (cm)	
Cg2	80-106	Light olive gray (5Y 6/2); gravelly loam; few, medium, faint mottles; weak, coarse pseudoplaty; slightly plastic, slightly sticky; pH 5.5.
Cg3	106-132	Light olive gray (5Y 6/2); gravelly loam; few, fine, faint mottles; strong, coarse pseudoplaty; hard, compact, slightly plastic, slightly sticky; pH 5.5.
Cg4	132+	Light olive gray (5Y 6/2); sandy loam; few, fine, faint mottles; strong, coarse pseudoplaty, hard, compact, slightly plastic, slightly sticky; pH 5.6.

Variations. The organic horizons may vary from 5 to 15 cm in thickness and occasionally to 30 cm. Although no Ah horizon was described above, this layer is often present with a thickness of up to 10 cm. This horizon is a dark brown (7.5YR 3/2) silt loam with strong, medium granular structure. An Ahe horizon is usually present along with the Ah, and varies in thickness from 2 to 17 cm. In the silty variant, the Bg is often absent and an Ahe and Cg type of profile is formed. The texture of the very poorly drained member of the catena may be somewhat finer than the well-drained member, especially in the upper horizons. The silt loam variant has more silt in the parent material and consequently the solum has a finer texture. The pH is sometimes 6 to 6.4, and is probably a result of $CaCO_3$ in the surrounding bedrock.

Use. The Poitras soils are generally left in forest, but the trees do not grow very quickly. If cleared, these soils may be used for unimproved pasture. If drained, they may be used for grain, hay, and other crops.

Siegas Catena

The Siegas catena is located in the eastern part of the County, just north and west of Grand Falls. The catena members are the well-drained Siegas, the imperfectly to poorly drained Salmon, and the very poorly drained Bourgoin series. The Siegas catena is developed on a gravelly clay loam ground moraine derived from gray quartzite, sandstones, argillites, and shales of Silurian Age. They are associated with the Holmesville and Bellefleur catenas. The parent material is usually calcareous and between 90 and 150 cm from the surface. The topography is undulating to rolling with gentle slopes. The Siegas catena is generally not very stony.

Siegas Map Unit (85 560 ha)

The Siegas series dominates this map unit. The vegetation consists of balsam fir, spruce, red maple, yellow birch, trembling aspen, alder, bunchberry, fern moss, spinulosa wood-fern, flat-topped aster, and hawkweed. The Siegas soils are classified as Brunisolic Gray Luvisols. A description of a moderately well-drained undisturbed profile follows:

Horizon	Depth (cm)	
L	Trace	Brown litter; pH 5.4.
F	2-1	Brown partially decomposed felted organic matter; pH 5.4.
H	1-0	Black well-decomposed slightly greasy organic material; fine granular; pH 5.2.
Ae1	0-2	Light gray (10YR 7/2); clay loam; moderate to fine platy breaking to moderate, medium granular; firm, plastic, slightly sticky; abrupt, wavy boundary; pH 5.1.
Bhf	2-5	Dark reddish brown (2.5YR 3/4); clay loam; strong, fine granular; soft, slightly plastic, slightly sticky; abrupt, broken boundary; pH 4.6.
Bfj	5-11	Strong brown (7.5YR 5/6); clay loam; strong, fine granular; friable, loose, plastic, sticky; clear, wavy boundary; pH 4.7.
Ae2	11-17	Grayish brown (10YR 5/2); clay loam; strong, fine granular; friable, plastic, sticky; clear, wavy boundary; pH 5.3.
Bt	17-25	Grayish brown (2.5YR 5/2); gravelly clay loam; strong, fine platy breaking to medium granular; firm, plastic, sticky; pH 5.5.
Btgj	25-38	Pale olive (5Y 6/3); clay; common, medium, faint, pale brown (10YR 7/4) mottles; coarse, platy to blocky; very firm, plastic, sticky; common clay films and flows; pH 6.6.
Btg	38-91	Light olive brown (2.5YR 5/4); clay loam; common, fine, distinct, dark yellowish brown (10YR 5/4) mottles; massive to weak subangular blocky; hard, plastic, sticky; common clay films and flows; pH 7.1.
Ckg	91-121	Light olive brown (2.5YR 5/4); gravelly loam; common, fine, distinct light gray (2.5Y 7/2) and yellowish brown (10YR 5/6) mottles; massive to pseudoplaty; hard, plastic, sticky; common clay films and flows; strongly effervescent; pH 8.0.

Horizon	Depth (cm)	
Cg	121-155+	Light olive brown (2.5Y 5/4); gravelly loam; common, fine, distinct light yellowish brown (10YR 5/6) mottles; pseudoplaty; hard, plastic, slightly sticky; clay films are not as common as above; pH 6.3.

Variations. The organic horizons vary in thickness from 2 to 5 cm. The Ae varies in thickness from 2 to 5 cm, and varies in texture from a clay loam to a silty clay loam. Clay films and flows are common from the top of the Btg to at least 150 cm. The pH increases with depth, and usually within 150 cm there are free carbonates. Occasionally, the soil remains weakly acid to depths of 210-240 cm. When this soil is plowed, a dark brown layer is formed and the horizons down to the Ae2 disappear.

Use. The Siegas soils have proven satisfactory for growing grain and grasses. Because of the shallowness of the solum and the slightly impeded drainage, these soils are relatively unsuitable for potatoes or other row crops. Various tree species grow very well. About 88% of these soils are considered arable and the rest are marginal.

Salmon Map Unit (5594 ha)

The imperfectly drained Salmon series dominates this map unit. The vegetation consists mainly of red maple, trembling aspen, balsam fir, ash, tamarack, beaked hazel, spinulose wood-fern, flat-topped aster, and violet. The Salmon soil is classified as a Gleyed Gray Luvisol and Gleyed Brunisolic Gray Luvisol. A description of a poorly drained undisturbed profile follows:

Horizon	Depth (cm)	
L	0.5-0	Fallen leaves starting to decompose; pH 5.4.
Ah	0-7	Very dark gray (5YR 3/1); silt loam; moderate, coarse, granular; friable, plastic, slightly sticky; abrupt, smooth boundary; pH 4.8.
Ahe	7-15	Grayish brown (10YR 5/2); silt loam; common, fine, faint mottles; weak, fine to medium platy; friable, plastic, slightly sticky; abrupt, smooth boundary; pH 4.8.
Aeg	15-28	Gray (5Y 6/1); gritty silt loam; many, coarse, prominent light yellowish brown (10YR 6/4) mottles, weak, fine, platy; plastic, slightly sticky; abrupt, smooth boundary; pH 4.8.

Horizon	Depth (cm)	
ABg	28-38	Gray (10YR 6/1); clay loam; many, coarse, prominent light yellowish brown (10YR 6/4) mottles; fine, subangular, blocky; firm, hard, plastic, slightly sticky; few clay films; clear, smooth boundary; pH 4.8.
Btg1	38-66	Olive brown (2.5Y 4/4); clay loam; common, fine, distinct light gray (2.5Y 7/0) mottles; weak, medium blocky to massive; hard, plastic, sticky; many clay films; pH 4.8.
Btg2	66-91	Olive brown (2.5Y 4/4); gravelly clay loam; common, medium distinct light gray (2.5Y 7/0) mottles; moderate, fine blocky; few clay films; pH 6.4.
C	91-111	Grayish brown (2.5Y 5/2); gravelly clay loam; common, fine, faint streaky light gray (2.5Y 7/0) and brown 10YR 5/3) mottles; pseudoplaty; hard, plastic, sticky; pH 6.6.

Variations. The organic horizons may vary from 0.5 to 7 cm or more. Where earthworms have invaded a region, the organic layer may be only 0.5 cm of leaf litter. Otherwise a 13 cm Ah horizon and a grayish brown Ahe horizon may be present. As drainage becomes poorer the Aeg may be 13 cm thick, and the colors of the profile become faded. The soil may become neutral at 90 to 120 cm.

Use. Only small tracts of these soils adjacent to the better-drained Siegas series have been cleared. Because of impermeable horizons, these soils are rather difficult to drain, and then are only suitable for growing hay and grain.

Bourgoin Map Unit (2833 ha)

The Bourgoin map unit is dominated by the soils of the Bourgoin series, the poorly drained member of the Siegas catena. The vegetation consists of eastern white cedar, balsam fir, black spruce, tamarack, balsam poplar, alders, red-osier dogwood, large toothed aster, goldenrod, sedge, and mosses. These soils are classified as Orthic Gleysols and Orthic Luvic Gleysols. A description of a very poorly drained undisturbed profile follows:

Horizon	Depth (cm)	
L	9-7	Brown needles, twigs, leaves, moss; pH 5.2.
F	7-5	Dark brown semidecomposed organic material; felted; pH 4.8.

Horizon	Depth (cm)	
H	5-0	Black well-decomposed greasy organic material; strong, coarse granular; pH 4.5.
Ah	0-2	Dark grayish brown (10YR 4/2); clay loam; strong, coarse granular; friable, loose, very high organic content; pH 4.3.
Ahe	2-7	Grayish brown (10YR 5/2); clay; massive; slightly plastic, slightly sticky; abrupt, smooth boundary; pH 4.7.
Aeg	7-30	Light olive gray (5Y 6/2); clay; common, medium, distinct light yellowish brown (2.5Y 6/4) mottles; massive; firm, plastic, nonsticky; pH 5.1.
Bg	30-40	Light olive brown (2.5Y 5/4); clay loam; many, medium, prominent yellowish brown (10YR 5/4) mottles; massive; firm, hard, plastic, nonsticky; pH 5.4.
Cg	40-91+	Dark grayish brown (2.5Y 4/2); silty clay; common, fine, distinct yellowish brown (10YR 5/6) mottles; massive, hard, plastic; pH 6.2.

Variations. The main variations occur in the depth of the organic horizons and in the Ah horizon. The organic horizons may vary from 7 to 30 cm in thickness. Occasionally a profile with an Ah from 7 to 22 cm occurs in association with the Poitras series. The Ahe horizon varies from 2 to about 13 cm, and the Aeg horizon from 7 to 27 cm. The pH is usually over 6 in the parent material and is often 6 or more throughout the profile. The parent material usually effervesces with acid below 90 cm. Occasionally the parent material is acid and does not start increasing in pH until a depth of 150-180 cm has been reached.

Use. These soils require major drainage programs before they can be cultivated. At present, they are considered nonarable.

Green River Map Unit (865 ha)

The well-drained soils of the Green River series occupy over 85% of this map unit. They are formed on a shallow basal till over shattered bedrock. The rock material is a blue gray slate or argillite similar to that forming the Glassville catena. These soils are found at higher altitudes and usually occur on the tops of the hills and ridges. These soils are associated with the Glassville and McGee catenas. The Green River soils are classified as an Orthic Ferro-Humic Podzols. A description of a well-drained undisturbed profile follows:

Horizon	Depth (cm)	
L	Trace	Leaves and needles.
F	2-1	Dark reddish brown (5YR 3/2) moderately felted semidecomposed organic matter; very dry, nongreasy; pH 4.8.
H	1-0	Black (2.5YR 2/0) well-decomposed greasy organic matter; abrupt boundary; pH 4.2. This horizon varies from 2 to 5 cm in thickness around the hole.
Ae	0-2	Light gray (5YR 7/1); silt loam; moderate, fine platy structure; slightly hard, firm; plastic, slightly sticky; abrupt, wavy boundary; roots penetrate well, pores frequent; pH 3.8. This horizon varies from a trace to 3.5 cm; some places intermittent because of wind throw and is an accumulation of 10 to 13 cm in pockets through the wind throw part of the profile.
Bhf1	2-5	Dark reddish brown (2.5YR 3/4); silt loam; strong, fine granular; loose, very friable; sticky, slightly plastic; roots penetrate easily; clear boundary; high organic matter; pH 3.8.
Bhf2	5-14	Reddish brown (5YR 4/4); silt loam; strong, fine granular; roots penetrate easily; soft, very friable; slightly sticky, slightly plastic; clear, wavy boundary; pH 4.8.
Bf	14-19	Brown to strong brown (7.5YR 4/6); silt loam; moderate, fine granular; somewhat firm in situ; slightly hard, friable; slightly sticky, plastic; clear boundary; pH 4.8.
BC	19-24	Pale brown (10YR 6/3); gravelly silt loam; moderate, fine subangular blocky; firm, friable, slightly sticky, slightly plastic; clear boundary; pH 5.2.
C1	24-50	Pale olive (5Y 6/4); gravelly silt loam; pseudoplaty to subangular blocky; hard, firm, slightly sticky, plastic; no evidence of clay films; some silt caps on top of the gravel stones; gravel is a hard blue slaty material; some pores; the roots are just in the upper part of this horizon; pH 5.2-5.4.
IIC	50+	Shattered bedrock with some fines in between fragments; same color as above. There is not much soil to do anything with and it seems to be more or less in situ, standing more or less vertical, but it is very highly shattered; angular, with no water rounding at all.

Variations. The main variation is in depth of material over bedrock (60-120 cm). The texture may be lighter than this in some places. It resembles the Serpentine series, but is apparently not as strongly podzolized. In some instances this soil would have to be classified as a lithic where there is less than 50 cm of material over bedrock.

Use. None of this soil has been cleared, and is probably best left in forest.

Soils Developed on Water or Colluvial Reworked Materials

Water or colluvial reworked materials are normally not stratified, except in a few instances where there is weak stratification. These materials are of uncertain origin and vary from nearly pure gravel to material that appears to be ground moraine or till. These soils may have resulted from material that was deposited on glacial ice; as the ice melted the material became mixed together. These soils may also have been caused by weak water action on till, or by colluvial or periglacial action. Probably all modes of deposition occurred. Two different complexes have been mapped in this area. These soils usually occupy the sides of the valleys, and occasionally, the valley bottom.

Victoria Map Unit (40 254 ha)

The Victoria map unit is a complex of well-drained soils found throughout the County. The map unit includes soil of more than one series, as do the corresponding imperfectly to poorly drained McCluskey and the very poorly drained Coté soils.

The parent material is mainly water reworked till and appears to be derived mainly from Silurian shales, sandstones, and quartzites. The topography is undulating to steeply sloping. The vegetation consists of spruce, balsam fir, eastern white cedar, white birch, striped maple, mountain maple, honeysuckle, wild sarsaparilla, bunchberry, common wood-sorrel, hypnum, wild gooseberry, spinulose wood-fern, and haircap moss. Soils in the Victoria map unit are classified as Orthic Humo-Ferric Podzols and Orthic Ferro-Humic Podzols.

A description of two typical undisturbed profiles follows:

Description No. 1

Horizon	Depth (cm)	
L	7-6	Leaves, litter, and fallen needles; pH 5.2.

Horizon	Depth (cm)	
F	6-4	Dark reddish brown semidecomposed organic matter; felted; pH 4.6.
H	4-0	Black well-decomposed organic material; fine, granular; some fibers and roots; pH 4.2.
Ae	0-5	Pinkish gray (5YR 6/2); silt loam; fine, medium platy; loose, sticky; wavy boundary; pH 4.0.
Bhf	Trace	Very dusky red (10R 2/2); gravelly loam; strong, granular; friable, loose; broken boundary; pH 4.2.
Bf1	5-22	Strong brown (7.5YR 5/6); gravelly loam; strong, fine granular; friable, loose; wavy boundary; pH 4.6.
Bf2	22-44	Yellowish brown (10YR 5/4); gravelly loam; weak, fine, granular; friable; gravel is subangular; wavy boundary; pH 4.8.
Bf3	44-57	Yellowish brown (10YR 5/8); silt loam; moderate, fine granular; friable, soft, sticky; very pockety; pH 5.0.
Bf4	57-75	Yellowish brown (10YR 5/4); gravelly sandy loam; weak, fine granular and single grain; friable, nonsticky; pH 5.2.
IIC1	75-106	Light olive brown (2.5Y 5/4); gravelly silt loam; weak, fine granular; friable; pH 5.2.
IIC2	106-165+	Olive brown (2.5YR 4/4); gravelly sandy loam; single grain; loose; pH 5.4.

Description No. 2

Horizon	Depth (cm)	
L	2.5-2	Freshly fallen leaves, twigs, and litter; pH 5.0.
F	2-0.5	Dark brown semidecomposed organic matter; slightly felted; pH 4.8.
H	0.5-0	Black well-decomposed organic matter; fine granular; fibrous; pH 4.6.
Ae	0-7	Pinkish gray (7.5YR 7/2); silt loam; fine, granular;

Horizon	Depth (cm)	
		slightly sticky, firm in situ; subangular rock fragments of sandstone and quartzite; wavy boundary; pH 4.6.
Bf1	7-11	Strong brown (7.5YR 5/8); gravelly silt loam to gravelly loam; granular; very friable, loose, firm in situ; wavy boundary; pH 4.8.
Bf2	11-16	Brownish yellow (10YR 6/6); gravelly loam; strong, granular; rock fragments bigger than in the upper horizon; pH 4.8.
C1	16-37	Olive brown (2.5Y 4/4); gravelly sandy loam; strong, granular; compact, very firm in situ; wavy boundary; pH 5.0.
C2	37-56	Light olive brown (2.5Y 5/4); gravelly sandy silt loam to gravelly sandy loam; strong, granular; pH 5.0.
IIC1	56-81	Light olive brown (2.5Y 5/4); gravelly clay loam; strong, granular; firm, sticky; common clay films; pH 5.0.
IIC2	81-111	Olive brown (2.5Y 4/4); silty clay loam; strong blocky; plastic, sticky; pH 5.2.
IIIC	111-132+	Light olive gray (5Y 6/2); gravelly loam; strong, medium granular breaking to fine granular; compact; pH 5.4.

Rock fragments are sandstone, quartzite, and some slate. The size of the cobbles increases as the profile deepens. Roots penetrate down to 5 cm.

Variations. The variations are illustrated by the two descriptions. The Bhf horizon may be nearly 5 cm and occasionally 7 cm thick or may be absent entirely. The Bhf occurs more frequently at high altitudes. In some cases, notably between the Saint John River and the state of Maine, the gravel is mixed or layered with a compact till.

Use. In the settled areas, these soils are widely used for agriculture. Although no official yields are available for these soils, farmers report excellent yields for grain, potatoes, peas, and hay. These soils can grow all crops climatically suited to the area, as well as good stands of timber. They are classes as 2F in the soil capability classification for agriculture. About 19% of these soils are considered arable and 46% are considered marginal. The limitations are slope and stoniness.

McCluskey Map Unit (7940 ha)

The McCluskey soils are found on the lower seepage slopes and around depressions. The vegetation consists of eastern white cedar, alder, spinulose wood-fern, black and white spruce, balsam fir, trembling aspen, mountain maple, white birch, dwarf raspberry, naked miterwort, tree moss, plume moss, bunchberry, gooseberry, common wood-sorrel, and sedges. The soils are a complex of Gleyed Humo-Ferric Podzols and Gleyed Dystric Brunisols. A description of a poorly drained undisturbed profile of a Gleyed Dystric Brunisol follows:

Horizon	Depth (cm)	
L	2-0	Litter, slightly decomposed; pH 4.8.
Ah	0-5	Very dark brown (10YR 2/2); silty clay loam; strong, coarse granular due to worm action; some of the Aeg materials can still be seen; very friable, plastic, slightly sticky; abrupt, smooth boundary; pH 5.2.
Bmgj	5-20	Pale olive (5Y 6/3); silty clay loam; many, coarse, distinct, light olive brown (2.5Y 5/4) mottles; amorphous; friable to firm, plastic, sticky; abrupt boundary; pH 5.0.
IICg	20-30	Light olive gray (5Y 6/2); gravelly sandy loam to sandy gravel; few, fine, faint mottles; single grain; slightly plastic, slightly sticky; considerable clay in fines, but very few fines; irregular boundary; pH 5.0.
IIICg	30-76	Olive gray (5Y 5/2); gravelly clay loam; many, coarse, distinct, light olive brown (2.5Y 5/4) mottles; amorphous; firm, plastic, sticky; common clay films and flows; pH 5.2.
IVCg	76-91	Olive gray (5Y 5/2); gravelly sandy loam to sandy gravel; common, fine, distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; single grain; pH 5.4.

Variations. These soils are highly variable in texture within the profile and between profiles, because of their mode of origin. The pH readings may vary from those given above to 6.2 to 6.8 in other profiles. An Aeg horizon of 2 to 5 cm is usually present; but in the profile described above, it has been destroyed by earthworm action. In the imperfectly drained profiles, the B horizon is more pronounced and a Bhg is common, as well as one or more Bfg horizons. In these instances, there may be a solum up to 75 cm in depth. The organic horizons may be up to 15 cm thick. Horizons such as the IIICg have some of the characteristics of a Bt horizon, but are considered to be deposited in this form and are not pedogenic in origin.

Use. Where these soils can be drained, they can be used for growing most crops of the region. Care should be taken to ascertain the pH before growing crops thay may be injured by a high pH. Generally, a good forest cover grows on these soils. They are placed in capability class 4W. About 20% of these soils are considered marginal and the rest as nonarable.

Coté Map Unit (4726 ha)

The Coté soils occur in dperessions and along stream channels. The vegetation consists of alder, willow, balsam fir, black spruce, beaked hazel, spinulose wood-fern, toothed and dotted mnium, northern bedstraw, three-flowered bedstraw, nodding wood grass, and Schreber's moss. The soils are a complex of Orthic Humic Gleysols. A description of a very poorly drained undisturbed profile follows:

Horizon	Depth (cm)	
L	Trace	Leaves and twigs; pH 6.0.
Ah	0-20	Dark reddish brown (5YR 2/2); silt loam; moderate, medium granular; soft, nonplastic, nonsticky; high in organic matter; pH 6.6.
Aheg	20-44	Dark gray (2.5Y 4/0); gravelly loam; common, fine, distinct, greenish gray (5G 6/1) mottles; structureless to very weak, platy; slightly plastic, sticky; pH 6.4.
Aeg	44-63	Gray (2.5Y 5/0); gravelly loam and gravelly sandy loam; common, distinct, greenish gray (5G 6/1) mottles; structureless; slightly plastic, sticky; pH 6.8.
Bg	63-76	Olive (5Y 5/3); loamy fine gravel; many, large, prominent, strong brown (7.5YR 5/6) mottles; structureless; slightly plastic, slightly sticky; pH 7.0.
C	76-94+	Pale olive (5Y 6/3); loamy gravel and gravel; mottles could not be observed as the material was semifluid on removal from pit; structureless; pH 7.0.

Variations. The variation in texture is similar to the two associated soils, the Victoria and McCluskey soils. The L, F, and H horizons are usually all present and may vary from 7 to 30 cm in thickness. The pH tends to be higher than in the well-drained member, but it is not always as high as in the profile described above. The high pH is related to the underlying limestone bedrock or to the bedrock in the drainage area. These soils may be classified as Orthic Humic Gleysols, peaty phase.

Use. Very few of these soils are cleared and used for agriculture except where they occur as small sites included within larger areas of well-drained soil. These soils are usually difficult to drain because of their high permanent water tables and poor drainage outlets. They are only fair for forest growing and are classified as 5W in the soil capability classification for agriculture.

McGee Map Unit (37 111 ha)

The McGee map unit is found throughout the northern part of the County and is made up of the well-drained soils of more than one series. The imperfectly drained soils and the very poorly drained soils of the Trafton series too small to map separately are included in the Nason map unit. The McGee soils are formed on colluvial or reworked till material. The parent material is derived mainly from metomorphosed gray slates, argillites, and quartzites. The texture is highly variable, both within the profile and between profiles because of the mixing action of the method of deposition. The topography is strongly rolling to hilly. The soils are frequently very stony and ledgy. The McGee soils are associated with the Glassville soils. McGee soils occur on the sides of hills and extend into the valley bottoms. The vegetation consists of white birch, yellow birch, maple, spruce, balsam fir, trembling aspen, wood sorrel, haircap moss, hobblebush, bunchberry, and spinulose wood-fern. These soils are classified as Orthic Humo-Ferric Podzols and Orthic Ferro-Humic Podzols. A description of a well-drained profile follows:

Horizon	Depth (cm)	
L	7.5-7	Freshly fallen leaves, needles, twigs; pH 4.4.
F	7-6	Partially decomposed organic material; fibrous; pH 4.2.
H	6-0	Black well-decomposed somewhat greasy organic material; fine granular; pH 4.2.
Ae	0-2	Grayish brown (10YR 5/2); silt loam; strong, granular; firm, sticky; wavy boundary; pH 4.0.
Bhf1	2-5	Dark reddish brown (2.5YR 2/4); loam; weak, granular; loose, slightly plastic, slightly sticky; wavy boundary; pH 4.5.
Bhf2	5-10	Dark reddish brown (2.5YR 2/4); gravelly loam; fine granular; gravel flat to subangular; rock fragments

Horizon	Depth (cm)	
		mostly slates; pH 4.5.
Bf1	10-23	Dark brown (7.5YR 4/4); gravelly loam; granular; gravel flat to subangular; very few fines, gravel stones and rock fragments, mostly slate; pH 4.5.
Bf2	23-55	Dark grayish brown (2.5YR 4/2); gravelly sandy loam; single grain, gravel flat to subangular; rock fragments mostly slate; pH 4.6.
BC	55-81	Dark yellowish brown (10YR 4/4); gravelly sandy loam; weak, granular; loose; rock fragments flat to subangular; wavy boundary; pH 4.8.
C	81-96	Dark grayish brown (2.5Y 4/2); gravelly sandy loam; subangular blocky to pseudoplaty; compact in situ; rock fragments slightly more rounded than the above horizons; pH 5.0.
IIC1	96-119	Olive brown (2.5Y 4/4); gravelly silt loam; moderate, fine granular; slightly plastic, slightly sticky; rock fragments rounded containing slate and soft shale; pH 5.0.
IIC2	119-129	Light olive brown (2.5Y 5/4); gravelly silt loam; pseudoplaty breaking to granular; slightly compact in situ; rocks predominantly slates; pH 4.8.

Variations. The variations are mainly the depth of the organic layers, which vary from 2 to 7 cm, and the depth of the Ae horizon, which varies from 2 to 5 cm. The solum is usually deep, but may only be 38 cm thick, and would have to be classified as a lithic phase (less than 50 cm thick over bedrock). The texture varies from a gravelly silt loam to a loamy gravel or gravelly sandy loam. The gravels are flat and angular to subangular and may vary from unsorted to fairly well sorted. The pH is 5.0-5.6 in the parent material and is seldom over 6.

Use. Very few of these soils have been cultivated. They are usually somewhat stony and often steep. If these soils were cleared and not too stony, they would make fair soils for most crops. They are classified as 3FM. About 3% of these soils are considered arable, 20% are marginal, and 77% are considered nonarable.

Nason Map Unit (836 ha)

The Nason soils occur on the lower seepage slopes and around depressions in association with the McGee soils. The vegetation consists of red spruce, fir, white birch, mountain maple, bunchberry, and mosses. Soils in the complex are classified mostly as Gleyed Humo-Ferric Podzols with up to 30% inclusion of Orthic Gleysols in the Trafton series too small to map separately. A description of a poorly drained undisturbed profile follows:

Horizon	Depth (cm)	
L	7.5-7	Brown leaf litter and twigs; pH 5.4.
F	7-6	Reddish brown semidecomposed organic material; fibrous, matted; pH 5.3.
H	6-0	Reddish black (10YR 2/1); well-decomposed greasy organic matter; fine granular; pH 5.3.
Ah	0-2	Reddish black (10R 2/1); silt loam; moderate, medium granular; plastic, nonsticky; high organic content; pH 5.4.
Ahe	2-5	Very dark gray (5YR 3/1) and very dark grayish brown (10YR 3/2); loam; moderate, fine granular; friable, slightly plastic; pH 5.4.
Bfg	5-33	Dark grayish brown (10YR 4/2); very gravelly loam; common, medium, faint, low contrast mottles; moderate, fine granular; friable, slightly plastic; clear, wavy boundary; pH 5.4.
BCg	33-66	Light olive brown (2.5Y 5/4); gravelly loam; common, medium, faint, low contrast mottles; weak, medium granular; friable, loose; pH 5.4.
C	66-132	Light olive brown (2.5Y 5/4); very gravelly loam; weak, fine granular in fines; friable, loose, pH 5.4.

Variations. The variation in depth of the organic horizons is from 7 to 15 cm. An Aeg horizon is often present. The Ahe horizon may not be present if the drainage is slightly improved. The Bfg horizons are more distinct and brightly colored in profiles that are slightly better drained. The texture from profile to profile varies considerably, especially in the amount of sand and gravel present.

Use. Very few of these soils have been cleared and used for agriculture. If they were drained and not too stony, they could be used for growing hay, grain, and potatoes. They grow fair to good forests. About 50% of these soils are considered marginal and the rest are nonarable.

Soils Developed on Glaciolacustrine Materials

Bellefleur Catena

The Bellefleur catena is found in the southeastern part of the County. The catena members are the well-drained Bellefleur and the imperfectly drained St. Amand series. Soils of the poorly drained Rob series cover only a small area and have been included in the St. Amand map unit. These soils have been developed on glaciolacustrine or ponded material of varying thicknesses, often only 100-130 cm deep over a clay till. This till is sometimes calcareous. These soils have very few small stones and gravels. The topography is undulating to gently rolling. These soils are associated with the Siegas, Holmesville, and Caribou catenas that occur on the plateau above the Saint John Valley.

Bellefleur Map Unit (2413 ha)

The soils of the Bellefleur series dominate this map unit and are classified as Brunisolic Gray Luvisols.

The vegetation consists of trembling aspen, red maple, balsam fir, mountain maple, mountain ash, bracken fern, flat-topped aster, and ground pine. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	Trace	Brown, loose leaves and needles.
F	4-.5	Dark brown matted, semidecomposed leaves and root hairs; pH 4.8.
H	.5-0	Dark reddish brown decomposed organic material; weak, fine granular; pH 3.9.
Ah	Trace	Very dusky red and black (2.5YR 2/2 and 2/0); silt loam; strong, coarse granular; broken boundary; pH 4.2.
Ae	0-4	Light gray (10YR 7/2); silt loam; moderate, medium platy; friable, plastic, slightly sticky; abrupt, wavy boundary; pH 5.0.
Bm1	4-20	Light yellowish brown (10YR 6/5); silt loam; strong, fine granular; very friable, plastic, slightly sticky; clear, wavy boundary; pH 5.0.

Horizon	Depth (cm)	
Bm2	20-25	Light yellowish brown (10YR 6/4); silt loam; weak, fine subangular blocky breaking to moderate, fine granular; friable, slightly firm, plastic, slightly sticky; pH 5.2.
BC	25-28	Light yellowish brown (2.5Y 6/4); silt loam to silt, few, weak, faint mottles; fine subangular blocky, breaking to very fine subangular blocky; firm, plastic, slightly sticky; pH 5.2.
Btj	28-71	Light olive brown (2.5Y 5/4); clay loam; light olive gray (5Y 6/2) streaks occur either horizontally or vertically along laminations, penetrate peds, may be slightly lighter in texture; there is more streaking than mottling and the brown is more intense next to these streaks; medium blocky and laminated; firm, plastic, sticky; pH 6.6.
Bt	71-121+	Light olive brown (2.5Y 5/4); silty clay loam; streaky light olive gray (5Y 6/2) mottles, not as plentiful as in the horizon above; coarse platy or laminated; very firm, plastic, sticky; very few pebbles, common clay flows; pH 6.6.

Variations. There is little variation in the depth of the solum. The Ah horizon may not be present or may be 2 cm thick. The depth of lacustrine material ranges from 60 to 180 cm, and is underlain by a gravelly clay loam till. The pH is usually more than 6.0 above the podzol B horizon. The color of the parent material varies from light olive brown to gray brown. The variations in texture between horizons are probably caused by the mode of deposition and not entirely by clay movement.

Use. These soils are cultivated quite extensively and are used mainly for hay and grain. Because these soils are slow to dry out and warm up in the spring they present problems for potato production. They have few stones, and this is an important factor in mechanical harvesting. No mature stands of trees were observed on these soils as the areas in forest are heavily cut. The soils are placed in Class 3 of the soil classification for agriculture. About 93% of the soils are considered arable.

St. Amand Map Unit (758 ha)

The soils of the St. Amand series, which dominate this map unit, are the imperfectly to poorly drained members of the Bellefleur catena. They are found in regions where the surface drainage is not adequate, around depressions, and lower slopes. The vegetation consists of balsam fir, eastern white cedar, willow, alder, red-osier, dogwood, toothed mnium, Schreber's moss, raspberry, spinulose wood-fern, and flat-topped aster. Soils of the St. Amand series are classified as Orthic Gleysols. A description of a poorly drained undisturbed profile follows:

Horizon	Depth (cm)	
L	15-14	Brown; litter and moss; pH 4.8.
F	14-12	Brown; partially decomposed organic material; loose; pH 5.0.
H	12-0	Black well-decomposed greasy organic material; strong, granular; pH 6.4.
Aeg	0-7	Dark grayish brown (2.5Y 4/2); fine gravelly loam; many, coarse, distinct mottles; weak, medium platy breaking to moderate, medium granular; slightly plastic, slightly sticky; abrupt boundary; pH 5.4.
Bg1	7-20	Very dark gray (5YR 3/1); silt loam; many, coarse, faint mottles; coarse platy; plastic, slightly sticky; pH 5.4.
Bg2	20-25	Dark gray (10YR 4/1); silt loam; many, coarse, faint mottles; coarse, laminated, tendency to blocky; plastic, slightly sticky; thin gravel lines between laminations; abrupt boundary; pH 5.0.
Cg	25-44	Gray (5Y 6/1); silt loam; many, coarse, prominent light olive brown (2.5Y 5/4) mottles; coarse platy to fine blocky; slightly plastic, slightly sticky; abrupt boundary; pH 5.8.
IICg1	44-48	Olive (5Y 5/4); coarse sandy loam; common, fine, distinct gray (5Y 5/1) mottles; medium platy; nonplastic, slightly sticky; abrupt boundary; pH 5.2.
IICg2	48-71	Gray (5Y 5/1); silty clay loam; common, coarse, prominent olive (5Y 5/3) mottles; laminated, medium blocky; plastic, sticky; some gravels; pH 5.2.
IICg3	71-76	Gray (5Y 5/1); silty clay loam; common, coarse, prominent brownish yellow (10YR 6/6) mottles; platy; very plastic, sticky; pH 5.4.
IIICg	76-132+	Grayish brown (2.5Y 5/2); heavy silt loam; few, fine, faint mottles; weak platy; plastic, sticky; considerable gravel consisting of 50% soft weathered shale; pH 7.2.

Variations. The depth of the organic horizons varies from 7.5 to 15 cm. When the drainage improves the colors become brighter and the horizons more distinct. Although the coarse sandy loam IICg horizon was not always present, it was found over a large area and was of uniform thickness. The thickness of the lacustrine material varies and may be 150 cm or more. The gravel that does occur in the lacustrine material is oriented between the laminae. The IIICg material appears to be a ground moraine similar to the Siegas material. Overlying the IICg2 and IICg3 horizons may be a horizon of clay illuviation (IIBtg).

Use. These soils are used for permanent pasture, or for a fairly slow-growing forest.

Soils Developed on Outwash Materials

Outwash materials are generally stratified, that is, deposited in layers of varying thickness and texture. Their particles and rock fragments are smooth and rounded. The moisture regime of each soil is governed by the depth of the layer with the finest texture. Outwash materials in the County have smoother topography and are less erodible than till soils. The outwash materials are separated into gravel and sand on the basis of their texture.

Outwash gravel in the County occurs in the form of terraces, small plains, and eskers. The terraces and the plains are smooth, whereas the eskers are steep sided and winding. Soils on outwash gravel have high permeability and generally lack moisture during the growing season unless they receive seepage water from neighboring hills.

Outwash sands in the County are free of stones and consist of stratified deposits of medium and coarse sand of varying thickness that may contain some lenses of fine gravel. Their topography varies from level to undulating, and drainage and erosion may become serious problems.

The soils on these deposits are generally productive and respond readily to liming and fertilization. In general, they retain moisture and fertility longer than soils on outwash gravel.

Muniac Catena

The Muniac catena is found along the Saint John River in the eastern part of the County. The members of the catena are the excessive to well-drained Muniac, the imperfectly to poorly drained Ennishore, and the very poorly drained Cyr series. The small areas of Ennishore soils are included in the Muniac map unit. These soils usually occur in the old river terraces, and are confined to areas where the parent material was derived, from calcareous shales and slates, or to areas where the ground waters are high in calcium carbonate. The materials are outwash or glacial colluvial gravels, which are coated with calcium carbonate below the weathered zone. The topography varies from knob and kettle to eskers, or level terraces, and steeply sloping valley train deposits. These soils are associated with the Caribou, Holmesville, Jardine, and Maliseet catenas.

Muniac Map Unit (478 ha)

The soils of the Muniac series dominate this map unit. The vegetation consists of spruce, balsam fir, white birch, white pine, trembling aspen, red maple, yellow birch, bunchberry, goldenrod, fireweed, raspberry, and bristle club moss. These soils are classified as Ortho Humic-Ferric Podzols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4.5	Brown undecomposed leaves, needles, moss, branches, and cones.
F	4.5-1	Dark reddish brown semidecomposed matted and foliated organic matter with white and yellow filaments, undecomposed roots, branches, and cones; abrupt boundary; pH 4.7.
H	1-0	Black; well-decomposed organic matter; firm, strong, granular; friable; abrupt boundary; pH 4.2.
Ae	0-7	Light brownish gray (10YR 6/2); gravelly loam; moderate, medium platy; friable, loose, abrupt boundary; pH 4.2.
Bf1	7-17	Dark brown (7.5YR 4/4); gravelly sandy loam; moderate, fine granular; friable, loose; clear boundary; pH 4.6.
Bf2	17-23	Strong brown (7.5YR 5/8); gravelly sandy loam; weak, fine granular; very friable, loose; gradual boundary; pH 4.9.
BC	33-50	Brownish yellow (10YR 6/6); very gravelly sandy loam; weak, fine granular; loose; diffuse boundary; pH 5.0.
C	50-121	Light olive brown (2.5Y 5/4); loamy gravel or gravelly sandy loam; single grained; loose; clear boundary; pH 5.3.
Ck	121+	Light olive brown (2.5Y 5/4); loamy gravel; free carbonates effervescing with acid; single grained; loose; pH 7.7.

Variations. The main variation is the depth of the solum, which varies from 50 to 75 cm. The pH is variable and although free carbonates are present in all cases at depth below 120 cm, they may be found at 90 cm. The pH may remain below 5.6 to depths of 120 cm before abruptly rising above 7.0, or the pH may gradually build up to 7.0.

Use. Where these soils occur in settled areas, they are cleared and farmed. The limiting factors are low water storage and low fertility retention. The soils warm up early in the spring and are excellent for early small fruits, vegetables, and pasture. They are only fair for forestry although sugar maple and certain other hardwoods may do very well. About 60% of the soils are considered arable and 22% are marginal for agriculture.

Cyr Map Unit

The Cyr soils include the very poorly drained members of the Grand Falls catena, and are discussed in the following section.

Grand Falls Catena

The Grand Falls catena occurs throughout the County. The catena members are the excessive to well-drained Grand Falls, the imperfectly to poorly drained Sirois, and the poorly drained Cyr series. These soils are formed on acid outwash or glaciofluvial gravels, and are usually deposited as river terraces or outwash plains. The topography is knob and kettle or sink hole from material deposited on stagnant ice, or as level terraces usually separated by steep terrace slopes.

Grand Falls Map Unit (38 683 ha)

The soils of the Grand Falls series dominate this map unit.

The vegetation consists of spruce, balsam fir, poplar, yellow birch, white birch, pin cherry, haircap moss, hypnum moss, bunchberry, birches, spinulose wood-fern, and creeping snowberry. These soils are classified as Orthic Ferro-Humic Podzols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4.5	Twigs, needles, and leaves; pH 4.8.
F	4.5-2	Semidecomposed organic material, fibrous, matted; pH 4.4.
H	2-0	Dark brown to dark gray; well decomposed organic matter; granular; pH 4.4.

Horizon	Depth (cm)	
Ae	0-2	Pinkish gray (7.5YR 7/2); sandy loam; pockets to 10 cm; strong, fine granular; irregular boundary; pH 4.0.
Bhf	2-18	Strong brown (7.5YR 5/6); gravelly sandy loam; fine granular; friable, slightly hard; wavy boundary; pH 4.6.
Bf	18-33	Yellowish brown (10YR 5/8); gravelly sandy loam; fine granular; loose; wavy boundary; pH 4.8.
C1	33-61	Olive gray (5Y 4/2); sandy gravel; loose; pH 5.0.
C2	61-100	Olive gray (5Y 4/2); very fine gravel; pH 5.0.
C3	100+	Light olive brown (2.5Y 5/4); very sandy gravel; pH 5.0.

Variations. The thickness of the L, F, and H horizons varies from 2 to 7 cm. The Ae horizon has a thickness of from 2 to 10 cm and in pockets to 15 cm. The depth of the solum varies from 28 to 66 cm.

Use. These soils are cleared and used for agriculture in the settled areas. They are used for growing most of the crops suitable to the County, but normally the yields are lower than on soils with a finer texture. They have a low water-holding capacity and low fertility retention. These soils are used extensively for road material. About 78% are considered marginal and 22% are considered nonarable.

Sirois Map Unit (10 691 ha)

The soils of the Sirois series dominate this map unit.

These soils occur on the lower slopes and depressions. The vegetation consists of larch, black spruce, balsam fir, willow, alder, bunchberry, Schreber's moss, running club moss, and sedges. They are classified as Gleyed Humo-Ferric Podzols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	5-4.5	Leaves, needles, and moss; pH 3.8.
F	4.5-2	Dark brown to black; semidecomposed organic material; felted; pH 4.2.
H	2-0	Black (5YR 2/1); well-decomposed greasy organic material; strong granular; pH 4.2.

Horizon	Depth (cm)	
Aeg	0-10	Light gray (2.5Y 7/2); gravelly silt loam; many, fine, distinct, yellowish brown (10YR 5/4) mottles; strong, fine platy; firm, slightly sticky; abrupt, wavy boundary; pH 4.2.
Bfgj1	10-33	Brown (10YR 5/3); gravelly sandy loam; many, medium, distinct mottles; weak, fine granular; loose, nonplastic, nonsticky; clear, wavy boundary; pH 4.6.
Bfgj2	33-46	Yellowish brown (10YR 5/6); gravelly loamy sand; common, fine, distinct, brownish yellow (10YR 6/6) mottles; single grain; loose, nonplastic, nonsticky; pH 4.8.
Cgj1	46-61	Olive gray (5Y 4/2); sandy gravel; common, fine, faint, brownish yellow (10YR 6/6) mottles; single grain; loose; pH 5.0.
Cgj2	61-86+	Olive gray (5Y 4/2); very fine gravel; common, fine, faint mottles; single grain; loose, pH 5.0.

Variations. The L, F, and H horizons may be up to 15 cm thick. If earthworms are present an Ah horizon may be formed up to 13 cm thick. The soil would then be classified as a Sombric Humo-Ferric Podzol, but this only occurs occasionally in the County. When earthworms are present, the Aeg disappears and most, if not all, of the organic horizons. This also occurs when the soils are plowed. With increased wetness, the Bf disappears and a weak Bfg or Bgf is the only sign of a B horizon present. The depth of the solum varies from about 36 to 60 cm. The texture varies similarly to the well-drained members of the catena, because of the mode of deposition. These soils become calcareous at a much greater depth from the surface than the Ennishore soils.

Use. When cleared, these soils may be used for permanent pasture and hay. To be used efficiently, they must be drained and then grow most of the crops suitable to the region. They are limited by low fertility retention and low water-holding capacity after drainage.

Cyr Map Unit (2507 ha)

The Cyr soils occur in depressions. The vegetation consists of eastern white cedar, tamarack, black spruce, willow, balsam fir, alder, raspberry, crested wood-fern, strawberry, hawkweed, creeping snowberry, and toothed mnium. They are classified as Rego Humic Gleysols, peaty phase. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	18-17	Undecomposed leaf litter; pH 7.2.
F	17-10	Brown; fibrous material; somewhat raw; pH 6.4.
H	10-0	Black; fibrous organic matter; strong granular; no worms; pH 6.0.
Ah	0-18	Dark reddish brown (5YR 3/2); silty gravel; very faint, mottles, structureless and some weak granular; loose, nonplastic; slightly sticky; clear boundary; pH 6.4.
IICg	18-41	Light yellowish brown (10YR 6/4); gravelly silty clay loam; many, medium, prominent, yellowish red (5YR 4/6) mottles; massive; hard, plastic, sticky; pH 6.4.
IIICg	41+	Light olive brown (2.5Y 5/4); gravelly sandy loam and sandy gravel; structureless, nonplastic, nonsticky; no mottles clearly seen; pH 6.6.

Variations. The organic horizons vary in depth from 15 to 30 cm and grade into peat. The pH may be about 4.5 to 5.0, especially where these horizons are associated with the Grand Falls and Sirois series. An Aeg may be present when the soil is more acid. The IICg horizon appears to be typical of the very poorly drained soils. This horizon is probably caused by siltation, rather than having been developed in situ. Because of the high water table, the characteristics of the IICg horizon are hard to observe; it is calcareous at depth.

Use. These soils are not suitable for agriculture because of drainage difficulties. They produce a slow-growing forest.

Maliseet Catena

The Maliseet soils are found along the Saint John River and its tributaries. The catena members are the moderately well-drained Maliseet and the imperfectly drained Wapske series. They are associated with the Muniac, Holmesville, Caribou, Jardine, Grand Falls, and Interval catenas. They are formed on olive brown outwash and alluvial sands, derived from shales, argillites, and quartzites. These soils are usually deposited as river terraces, and are level to gently undulating with steep slopes between terraces. They are usually free of stones.

Maliseet Map Unit (3882 ha)

The soils of the Maliseet series dominate this map unit. The vegetation consists of balsam fir, spruce, white pine, white birch, aspen, elm, and ash. These soils are classified as Orthic Humo-Ferric Podzols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	3-2	Brown; needles, leaves, and twigs; pH 4.6.
F	2-1	Dark reddish brown; semidecomposed organic material; felted; pH 4.3.
H	1-0	Black; well-decomposed organic material; strong, medium granular; pH 3.9.
Ae	0-5	Light gray (10YR 7/2); fine sandy loam; weak, fine platy; friable, loose; abrupt, wavy boundary; pH 3.9.
Bf1	5-10	Yellowish red (5YR 4/8); sandy loam; strong, fine granular; firm, weakly cemented; abrupt, wavy boundary; pH 4.9.
Bf2	10-17	Dark brown (7.5YR 4/4); sandy loam; weak, fine granular; friable, loose; clear, wavy boundary; pH 5.4.
BC	17-28	Yellowish brown (10YR 5/6); sandy loam; weak, fine granular; friable, loose; pH 5.4.
C	28-61	Light olive brown (2.5Y 5/4); sandy loam; weak, granular and single grain; friable, loose; pH 5.9.
C2	61+	Olive gray (5Y 5/2); loamy sand; single grain; friable, loose, firm; pH 5.4.

The C horizon is made up of layers of sandy loam, loamy sand, fine gravel, and silt.

Variations. The L, F, and H horizons vary in thickness from 2 to 7 cm. The Ae horizon varies in thickness from 2 to 10 cm or more in pockets. The depth of the solum varies from 38 to about 76 cm. The texture of the Ae and Bf horizons often varies from a loam to a very fine sandy loam, and some gravel may appear lower in the profile. The particles of sand vary in size from fine to medium.

Analytical results. With only one or two exceptions, the sand fraction in the samples is fine to very fine. The large pore space is greater than the capillary pore space in all horizons. The B horizons have an adequate exchange capacity, but are very base unsaturated.

Use. In the settled areas these soils have all been cleared and are used to grow all crops climatically suited to the County. Generally, the texture is fine enough to give these soils an adequate water-holding capacity and they respond readily to proper fertilizer treatments. The Maliseet soils are classed as 2f in the soil capability classification for agriculture. About 80% of these soils are considered arable and 14% are marginal. They produce good fast-growing forests, but stands of balsam fir deteriorate rapidly after about 50 years.

Wapske Map Unit (469 ha)

The Wapske map unit is a complex of soils that occurs in depressions or at the contact of terraces and till soils of the higher elevations. The vegetation consists of eastern white cedar, white spruce, black spruce, larch, red maple, elm, alder, ash, beaked hazel, moss, and interrupted fern. Two types of soil profiles are common to the Wapske map unit; a Gleyed Humo-Ferric Podzol and a Rego Humic Gleysol. Descriptions of these two types of profiles follow:

Horizon	Depth (cm)	
L	7.5-7	Brown; needles, leaves, and twigs; pH 5.4.
F	7-4	Reddish brown; semidecomposed organic material, roots, and mycellium; matted; pH 5.0.
H	4-0	Black; well-decomposed organic material; strong, medium granular; pH 4.0.
Aeg	0-7	Light gray (10YR 7/2); fine sandy loam; many, medium, prominent mottles; weak, fine platy; friable; abrupt, wavy boundary; pH 4.2.
Bfg	7-28	Yellowish brown (10YR 5/6); fine sandy loam; common, medium, distinct mottles; weak, fine granular; friable, loose; clear, wavy boundary; pH 4.4.
BCg	28-61	Light olive brown (2.5Y 5/4); sandy loam; common, medium, distinct mottles; weak, fine granular and single grain; friable, loose; clear, wavy boundary; pH 4.4.
Cg	61-91	Olive gray (5Y 5/2); loamy sand; common, fine, distinct mottles; single grain; loose; pH 4.8.
C	91+	Olive gray (5Y 5/2); loamy sand, single grain; loose; pH 4.8.

A description of a Rego Humic Gleysol follows:

Horizon	Depth (cm)	
L	Trace	Freshly fallen leaves; pH 7.6.
Ah	0-20	Very dark gray (7.5YR 3/0); silt loam; strong, coarse granular; friable, plastic, slightly sticky; abrupt, smooth boundary; pH 7.2.
ACg	20-30	Olive gray (5Y 5/2); very fine sandy loam and dark gray (7.5YR 3/0); silt loam; strong, coarse granular (a mixture of Ah and Cg by worm action); friable, slightly plastic, slightly sticky; pH 7.2.
Cg	30-100	Olive gray (5Y 4/2); loamy sand, few, coarse, distinct olive (5Y 5/4) mottles; single grain; stratified; loose, nonplastic, nonsticky; pH 7.2. The water table was at 21 inches.

Variations. The Wapske Complex includes imperfectly to very poorly drained soils. The first profile described above covers the imperfectly drained soils, and the second description covers the very poorly drained soils. The soils falling in between these drainage conditions have profiles intermediate to these. As the drainage becomes poorer, the soils become duller in color, and the number and character of the horizons change. The Bfg horizons may become Bgf, and eventually the B horizon disappears. The pH of the Rego Humic Gleysol may be as low as that in the Gleyed Podzol.

Use. These soils may be used for growing pasture or hay after they are cleared. They require drainage before they can be used for other crops.

Flemming Map Unit (5568 ha)

The Flemming soils are found along the Saint John River and its tributaries. They are well-drained soils that belong to more than one series. The imperfectly drained Martial and the poorly drained Kelly soils occur on similar materials. They have been deposited as alluvial flood plain terraces, which have been elevated and are no longer subject to flooding. These soils are similar in texture to the present floodplains and are composed of laminated fine sands and silts. The topography is level to gently undulating. The Flemming soils are associated with the Maliseet, Muniac, Grand Falls, and Interval catenas.

The vegetation consists of eastern white cedar, white spruce, black spruce, white birch, yellow birch, trembling aspen, alder, white ash, striped maple, balsam fir, raspberry, bunchberry, aster, spinulose wood-fern, haircap moss, and running club moss. These soils are classified as Orthic Humo-Ferric Podzols and Eluviated Dystric Brunisols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
L	3.5-3	Undecomposed needles, leaves, and twigs.
F	3-1	Very dusky red (2.5YR 2/2); partly decomposed needles, leaves, and twigs; pH 4.8.
H	1-0	Reddish black (10Y 2/1); well-decomposed humus; pH 4.5.
Ae	0-2	Pinkish gray (5YR 6/2); silt loam; weak granular; nonsticky, very slightly plastic, thin and pockety. A very thin (trace) transition zone above and below, forming an Aeh and an AB horizon. Very little effect on the horizons caused by earthworm activity; pH 4.3.
Bhf	2-5	Dark reddish brown (2.5YR 3/4); loam; weak granular; very loose, fluffy; abrupt boundary, upper boundary blends into the Ae forming an AB; pH 4.3.
Bf1	5-7	Yellowish red (5YR 4/6); loam; very weak, fine granular; fluffy, loose in situ; wavy boundary; pH 4.3.
Bf2	7-15	Dark brown (7.5YR 4/4); loamy sand; single grain; loose in situ; abrupt boundary; pH 4.8.
BC1	15-30	Dark brown (10YR 4/3); fine sandy loam; single grain; loose; abrupt boundary; pH 4.8.
BC2	30-44	Dark brown (10YR 3/4); fine sandy loam, weak, coarse crumb structure breaking to single grain; loose in situ; abrupt boundary; pH 5.0.
C1	44-81	Olive (5YR 4/4); a number of alternating layers of sand and silt loam. These layers vary from 2 to 15 cm in depth; slightly sticky and firm in situ; sand layers have single grain structure and are loose, many old root channels in silt layers; pH 4.8.
C2	81-109	Olive brown (2.5Y 4/4); loam; some pure sand lenses; sticky and nonplastic; leaching along root channels, numerous rust flecks or spots, probably from decomposition of roots; a few silt flows; pH 4.8.
Cg	109-121	Olive (5Y 4/4); loam; alternative layers of silt and sand; many, fine, distinct yellowish brown (10YR 5/6) mottles; friable in situ, sticky, nonplastic; some leaching along old root channels; pH 5.0.
IICg1	121-132	Gray (5Y 5/1); loam; few, coarse, distinct yellowish brown

Horizon	Depth (cm)	
		(10YR 4/4) to dark yellowish brown mottles; medium blocky breaking to single grain structure; friable, appears laminated; few silt flows; some root penetration, very wet; pH 5.0.
IICg2	132-166	Dark gray (5Y 4/1); very fine sandy loam; large, distinct, common, reddish brown (5YR 4/4) mottles; coarse structure breaking to single grain; firm in situ; no evidence of roots, but there are a few old root channels with leached rings around them; pH 5.2.
IIIC	166+	Olive gray (5Y 4/2); loam; many cobbles and stones, flat well-rounded predominantly slates with some well-weathered brown shales; pH 5.0.

Analytical results. The variation of particle size fractions shown in Table 15 gives a good indication of the range in texture of these soils; often the total sand and fine sand is much higher, especially in the lower part of the profile. The pore space shows considerable variation between the solum and the bottom of the profile. A good available water capacity occurs in all horizons. The upper part of the profile has a good cation exchange capacity, but the base saturation is low.

Use. Most of these soils are cleared and farmed where they occur in settled areas. They grow all the crops that are climatically suitable to the County.

Martial Map Unit (1832 ha)

The Martial map unit is a complex of soils that occurs in depressions or seepage areas near the upland. The vegetation consists of balsam fir, black spruce, ash, white birch, alder, ironwood, aspen, gray birch, ferns, haircap moss, and sphagnum moss. The soils are classified as Gleyed Melanic Brunisols and Gleyed Eluviated Dystric Brunisols. A description of an undisturbed Gleyed Melanic Brunisol profile follows:

Horizon	Depth (cm)	
L	1-0	Leaves, needles, twigs, and moss; pH 6.8.
Ahgj	0-11	Very dark brown (10YR 2/2); silt loam to light silty clay loam; few, faint mottles; strong, coarse granular, created by worms; friable, plastic, slightly sticky; clear, wavy boundary; pH 6.8.

Horizon	Depth (cm)	
Bmgj	11-25	Brown (10YR 5/3); silt loam; few, fine, faint mottles; weak, medium granular, evidence of lamination; slightly plastic, very slightly sticky; clear, wavy boundary; pH 6.4.
Bg	25-44	Grayish brown (2.5Y 5/2); silt loam; many, medium, distinct mottles; weak, medium granular; laminated; friable, slightly plastic, slightly sticky; pH 6.2.
Cg1	44-76	Light olive gray (5Y 6/2); silt loam; many, coarse, prominent strong brown (7.5YR 5/6) mottles; structureless, some lamination; firm, slightly plastic, slightly sticky; pH 6.2.
Cg2	76-87	Dark gray (5Y 4/1); fine sandy loam; many, medium, prominent, strong brown (7.5YR 5/8) mottles; structureless; laminated; firm, slightly plastic, nonsticky; pH 6.2.
IIC	87+	Gravel; pH 6.2.

A description of an undisturbed Gleyed Eluviated Dystric Brunisol profile follows:

Horizon	Depth (cm)	
L	15-14	Undecomposed needles and twigs; pH 3.7.
F	14-5	Very dusky red (10R 2/2); partly decomposed needles and twigs; fibrous, yellow mycelium; pH 3.4.
H	5-0	Dark reddish brown (2.5YR 2/4); well-decomposed needles and twigs; below this layer is a thin .3 cm intermittent layer of charcoal; pH 3.2.
Aeg	0-20	Pinkish gray (7.5YR 6/2); loam; a few distinct coarse mottles of pale brown (10YR 6/3); platy structure; firm in situ, plastic, sticky; abrupt boundary; pH 4.2.
Bmgj	20-30	Brownish yellow (10YR 6/6); silty clay loam; few, distinct yellowish brown (10YR 5/6) mottles; weak, medium granular; very friable, slightly plastic, sticky; some fine gravel fragments of well-rounded slates; most of the root penetration stops in this horizon; pH 4.5.
Bg	30-46	Light olive gray (5Y 6/2); silty clay loam; many, medium

Horizon	Depth (cm)	
		distinct strong brown (7.5YR 5/6) mottles and iron concretions; strong, platy; firm in situ, sticky, plastic; pH 4.2.
BCg	46-71	Pale olive (5Y 6/3); silty clay loam; many medium prominent mottles and iron concretions of yellowish brown (10YR 5/6); strong, platy; very firm, sticky, slightly plastic; pH 4.9.
Cg	71-87	Olive gray (5Y 5/2); silt loam; many distinct medium mottles of yellowish brown (10YR 5/8); moderate strong platy; friable, nonsticky, nonplastic; pH 4.8.
IIC1	87-89	Olive (5Y 5/3); sandy loam; single grain; well-rounded, loose, gravel fragments mainly slates with some quartz and basalts; pH 4.7.
IIC2	89-99	Yellowish red (5YR 4/6); loamy sand; loose, single grain, slightly cemented; the cementation and color appears due to iron coatings on the particles; pH 4.8.
IIC3	99-121	Dark gray brown (2.5Y 4/2); loamy sand; loose, single grained; slightly cemented; pH 4.9.

Variations. The Ah horizon described in the first profile above may be replaced by F and H horizons of several centimetres or more in depth, a 2-5 cm Aeg horizon, and a thin Bfg horizon. The pH of the Ah horizon may be as low as 4, which gradually increases with depth to a pH of 4.9. The soils are free of stones.

Analytical results. The texture of these soils varies widely within the profile. The pore space is also variable. There may be horizons with little or no macro pore space, which produces a definite depth limit for free drainage. There is a good supply of available water down to about 70 cm. None of the horizons have the iron and aluminum requirements for a podzolic B horizon. The cation exchange capacity is fairly high in the upper three mineral horizons, but drops rapidly below these horizons.

Use. Some of these soils are cleared and drained and have the same land use as the Flemming soils. If they are not drained, they can only be used for hay and pasture.

Kelly Map Unit (1010 ha)

The Kelly complex of soils occurs in depressions associated with the Martial soils. The vegetation consists of balsam fir, trembling aspen, fir, alder, mosses, red-osier dogwood, and fern moss. They are classified as Orthic Humic Gleysols. A description of an undisturbed profile follows:

Horizon	Depth (cm)	
Ah1	0-10	Black (5YR 2/1); silt loam; strong, medium granular; friable, slightly plastic, slightly sticky; clear, smooth boundary; worms; pH 6.8.
Ah2	10-44	Black (5YR 2/1); silt loam, structureless; slightly firm, slightly plastic, slightly sticky; clear, smooth boundary; pH 6.8.
Bg	44-63	Dark gray (10YR 4/1); silt loam; many, coarse, distinct, pale brown (10YR 6/3) mottles; structureless; firm, slightly plastic, slightly sticky; black material from the horizon above is infiltrated along cracks in this horizon; gradual, smooth boundary; pH 6.8.
Cg	63+	Gray (5Y 6/1); silt loam to very fine sandy loam; many, fine, distinct, light yellowish brown (10YR 6/4) mottles; massive; firm, slightly plastic, slightly sticky; pH 7.2.

Variations. There is some variation in depth of the Ah horizons, and if worms are not present, the L, F, and H horizons may be up to 30 cm thick. The pH may be considerably lower than the description above, and may be 6.0 or lower in the Cg horizon.

Use. Only small areas of these soils are cleared and farmed. These areas were included with the Martial soils. These soils must be drained if they are to be used for anything except unimproved summer pasture.

Soils Developing on Recent Alluvium Materials

These are immature soils that are in the process of being deposited on low terraces and flood plains.

Interval Catena

The soils of the Interval catena are found on the low terraces along the

Saint John River and its tributaries. The material consists of silts and fine sands deposited by the rivers in flood stage. Increments of soil are added yearly and the time factor is so short that no profile development has taken place.

Interval Map Unit (550 ha)

The catena members are the moderately well-drained Interval and the imperfectly to poorly drained Wassis series. Only 210 ha of the latter occur in the County, and are included in the Interval Map Unit.

The vegetation consists of various grasses, herbaceous weeds, and occasional elms. These soils are classified as Orthic Regosols. A description of a typical profile follows:

Horizon	Depth (cm)	
Ap	0-30	Dark brown (10YR 3/3); silt loam; strong, coarse granular; worms present; pH 6.0.
C	30-66	Brown (10YR 5/3); silt loam; weak, fine blocky; friable, very slightly plastic, very slightly sticky; pH 6.4.
Cgj1	66-76	Brown (10YR 5/3); silt loam; many, medium, prominent, strong brown (7.5YR 5/6) and light olive gray (5.Y 6/2) mottles; laminated; friable, slightly plastic, slightly sticky; pH 6.6.
Cgj2	76-121	Brown (10YR 5/3); silt loam varved with very fine sandy loam; many, faint, fine brownish yellow (10YR 6/6) mottles; laminated and massive; plastic, slightly sticky; pH 6.6.

Variations. Some slight variations in color takes place from one profile to another, and in the depth at which mottling occurs. The pH is usually quite uniform within the profile, but varies from about 4.8 to nearly 7.0 from profile to profile.

Use. These are some of the best agricultural soils of the County. They are suitable for growing all crops climatically suited to the County. The fertility is somewhat higher than for the other soils, and they retain their fertility very well. The chief limitation of these soils is the susceptibility to flooding, but this usually occurs in early May and lasts only a few days.

Organic Soils (3030 ha)

Organic soils are not very extensive in the County. They usually occur in low-lying areas along streams. When this County was mapped, a criterion for an organic soil was more than 30 cm of organic material. Some of these soils may not meet present-day standards for organic soils (more than 40 or 60 cm thick depending on the kind of peat material). They may vary in depth up to 300 cm, but are generally more shallow as illustrated by those described below.

The organic soils are classified according to degree of decomposition, depth, and pH. Typic Mesisols and Terric Fibric Humisols are the two most common types that occur in the County and are described below.

Peat Map Unit (2586 ha)

The vegetation consists of cedar, black spruce, white birch, balsam fir, tamarack, sphagnum moss, labrador tea, and sheep-laural. The soil is classified as a Typic Mesisol. A description of a typical profile follows:

Horizon	Depth (cm)	
L	0-2	Very dusky red (10R 2/2, wet), and very dusky red (2.5YR 2/2, pressed and rubbed wet); moss, twigs, and needles; pH 4.4.
Of1	2-30	Reddish black (10R 2/1), wet) and very dusky red (2.5YR 2/2, pressed or rubbed wet); partially decomposed moss and litter; pH 4.2.
Om1	30-38	Dusky red (10R 3/4, wet), dark reddish brown (2.5YR 3/4, pressed), and very dusky red (2.5YR 2/2, rubbed wet); rotten wood and moss; pH 4.2.
Om2	38-56	Reddish black (10R 2/1, wet), very dusky red (10R 2/2, pressed), and reddish black (10R 2/1, rubbed wet); well-decomposed moss and fine rotten wood; pH 4.2.
Of2	56-66	White wood, fairly sound.
Om3	66-121	Reddish black (10R 2/1, wet, pressed, and rubbed), moderately decomposed moss and wood fibers. Layers of undecomposed wood at 94-96 cm and 119-121 cm; pH 4.7.
Om4	121-164	Very dusky red (2.5YR 2/2, wet), reddish black (10R 2/1, pressed), and black (5YR 2/1, rubbed wet); well-decomposed moss and wood; pH 5.7.

Muck Map Unit (444 ha)

Muck occurs in depressions and is usually associated with the Caribou catena. This material is fairly shallow and has a neutral pH. The vegetation consists of balsam fir, eastern white cedar, black spruce, hepatica, sedges, creeping snowberry, and plume moss. The soil is classified as a Terric Fibric Humisol. A description of a typical profile follows:

Horizon	Depth (cm)	
Of1	0-7	Reddish black (10R 2/1, wet), weak red (2.5YR 5/2, pressed), and very dark grayish brown (10YR 3/2, rubbed wet); moss and tree litter; pH 6.3.
Of2	7-36	Reddish black (10 R 2/1, wet), dusky red (10R 3/2, pressed), and dusky red (10R 3/3, rubbed wet); partially decomposed litter, moss, and dead wood; pH 6.4.
Oh1	36-39	Black (2.5YR 2/4, wet), very dusky red (10R 2/2, pressed), and very dusky red (10R 2/2, rubbed wet); well-decomposed, moss, and wood; pH 6.5.
Oh2	69-96	Reddish black (10R 2/1, wet), very dusky red (10R 2/2, pressed), and very dusky red (10R 2/2, rubbed wet); decomposed moss and wood; pH 6.4.
Of3	96-117	Dark reddish brown (5YR 3/2, wet), dark brown (7.5 YR 3/2, pressed), and dark reddish brown (5YR 3/3, rubbed wet); fibrous, slightly decomposed sphagnum moss; pH 6.7.
Oh3	117-124	Reddish brown (10R 2/1, wet, pressed, and rubbed wet); well-decomposed organic matter appears to be colloidal; pH 6.95. It occurs on the opposite side of the pit (121 cm) from the Of2 horizon and underlies this horizon.
Aeg1	124-127	Gray (5Y 6/1, dry) and gray (5Y 5/1, wet); gravelly clay loam; many, medium distinct mottles; weak, platy to massive; firm, hard, plastic, sticky; pH 6.6
Aeg2	127-132	Gray (5Y 6/1, dry) and olive gray (5Y 5/2 wet); gravelly clay loam; many, medium distinct mottles; weak platy to massive; firm, hard, plastic, sticky; pH 6.4
Cg1	132-145	Light olive gray (5Y 6/2, dry) and olive gray (5Y 5/2, wet); gravelly clay loam; many, coarse distinct mottles; weak subangular blocky to massive; very firm, hard, plastic, sticky; strongly effervescent; pH 7.8.

Horizon	Depth (cm)	
Cg2	145-153+	Pale yellow (5Y 7/4, dry) and grayish brown to light olive brown (2.5Y 5/3, wet); gravelly clay loam; weak subangular blocky to massive; very firm, hard, plastic, sticky; strongly effervescent; pH 8.0.

Variations. Because the depth of the organic material may vary from 30 cm to over 200 cm, these mucks could fall into more than one subgroup. When these soils were mapped, the lower limit for depths of organic soils was 30 cm. Old tree trunks occur at various depths. There is considerable hydraulic pressure between the organic material and the till.

Use. These soils are not used for agriculture in this County, and their potential productivity is unknown. However, similar types of soil are used intensively for agriculture in other parts of the world.

Land Types

Bottomland (380 ha)

The Bottomland is a complex of alluvial and colluvial material, which is often found along brooks. This material varies greatly in texture, drainage, stoniness, and pH, and is chiefly used for pasture. This material usually has 15-30 cm of silt loam, which is high in organic material and is underlain by coarse sand and gravel. These undifferentiated soils are classified as Orthic and Cumulic Regosols. The poorly drained members would be in the gleyed subgroups.

LAND USE

History and Development

The Saint John River and its tributaries were the early transportation routes of western New Brunswick. The Saint John River was part of the communications route between Quebec and the French settlements at Chignecto and in Nova Scotia. The County was first settled in 1783-84, when French settlers from the lower Saint John Valley moved into what is now known as Madawaska County. A French fort was located at Grand Falls and an English military post was established there in 1790. Later, the County was settled by more French- and some English-speaking settlers.

Agriculture

The type and intensity of agriculture varies widely from place to place in the County. In some parishes there is intense potato production, whereas other parishes grow very few potatoes and concentrate more on dairy and mixed farming.

From 1961 to 1971 the number of census farms decreased from 858 to 368, whereas the number of farmers reporting gross sales of $15 000 or more increased from 3 in 1956, to 17 in 1961, and to 30 in 1971. In 1971, 14 of these farmers reported sales of over $35 000.

The number of farms growing potatoes has decreased from 762 in 1956 to 158 in 1971, whereas the number of hectares of potatoes grown has increased from 2368 in 1956, to 4188 in 1966, and to 3987 in 1971.

The total number of farms has declined from 1501 in 1956 to 603 in 1966, and to 368 in 1971. The total area in farms has declined from 91 513 ha in 1956 to 52 349 ha in 1966, and to 39 025 ha in 1971. The area under crops in the County has declined from 24 200 ha in 1956, to 16 187 ha in 1966, and to 12 082 ha in 1971. However, there has been no change in Saint Andre Parish.

The following statistics give an indication of the trends in agriculture.

	Hectares			Number				
	Hay	Oats	Potatoes	Horses	Cattle	Cars	Tractors	Trucks
1956	13 314	5362	2367	1020	11 910	571	745	384
1966	7 669	2922	4188	283	8 360	396	684	301
1971	4 731	1955	3986	182	6 183	274	536	278

The main agricultural problems are those of management. Potatoes have been grown continuously in the same place for periods of up to 25 years. Very few farmers use any conservation practices, and erosion has been severe on the steeper slopes. Slopes of up to 15% or more have been farmed. With the increased use of the potato combine, and the necessity of picking stones, other problems are appearing. Preliminary experiments at the research station in Fredericton (4) have shown that potato yields have decreased with stone removal because soil compaction takes place. Stone removal also increases the danger of erosion because small stones absorb much of the erosive energy of raindrops, retard the flow of water, and reduce soil erodibility. Another important problem is obtaining optimum fertility for high quality produce on the various soils of the County.

Soil Capability Ratings

The following section of the report contains the interpretation of soils information for various uses. These are generalized statements and further studies in the field would be required for specific projects.

Good management is assumed in both agriculture and forestry ratings. In forestry, the rating is based on optimum stocking with the most favorable species. In the interpretation of the material in this report for other phases of land use, the work done by the USDA Soil Conservation Service and the College of Life Sciences and Agriculture, University of Maine, was used as a basis for many of the interpretations given in this report (5, 6, and 9). The data in these tables must not be considered the final word in land use, but should serve as a guide for workers in these fields.

A soil capability classification for agriculture was established in 1963 and revised in 1964 and 1965.

Table 8 shows each series, the number of hectares in each class, and the limiting factors that placed them in these classes. It is assumed that Class 2 land has the limiting factor of fertility, which keeps it out of Class 1. Although subclass "F" is not shown, it is implied in all soils in the County. Those soils that are severely affected by fertility limitations have been placed in Class 3 and Class 4. These soils usually respond well to fertilizers. The soils that are limited by wetness "W" can be changed by artificial drainage. Some poorly drained soils are enclosed by steeply sloping areas. Because of the small map scale, these soils are mapped as complexes.

Soil Suitability for Various Agricultural Crops

A rating of the soils for various agricultural crops is given in Table 7. There is no data for crop yields on the soils in the County and only meager information in other areas. Many of the soils have never been cleared and so there was no chance of seeing the soils under cultivation. The soils were rated by observing the crops growing on the cultivated soils and by estimating how the undisturbed soils with similar physical characteristics would react to cultivation.

Many of the soils were downgraded because of excessive stoniness and steep topography. In many instances, a soil was rated very high, but has three limitations with degrees listed as (a-c). This means that the limiting factor varies from slight to severe and in this case the rating was made where the limitation is slight. When the limitation becomes "c" or severe, the rating goes down and the soil may be unsuited for agriculture.

Because of the great interest today in organic soils, particularly for horticultural crops, it was decided to rate these soils. The disadvantages are that they must be drained and in some instances they occur in frost pockets.

Soil Suitability for Forestry

A productivity rating for tree growth on the various soils is provided in Table 9. Four degrees of potential were recognized, poor, good, fair, and not suitable. It was assumed that there was optimum stocking and pure stands. Very little data is available, but the information from the permanent plots of the Inventory Division of the New Brunswick Department of Natural Resources was made available. These plots were visited, where possible, during the survey and the soil was checked at the center of each plot. Information obtained from these plots was used to rate similar soils on which plots were not established. Because the plots were on natural forest, the stocking was varied as to density and species, and was often random aged. The maximum yields in cubic feet per acre per year were used where more than one plot fell on a series. The plots are being rescaled at 5- or 6-year intervals. Where no data was available, ratings were placed on the soils by relating the observable physical properties with those of soils for which information was available. This was coupled with observations made during the survey, but the ratings must be regarded as estimations.

The ratings in cubic metres per hectare per year are Good (5-10), Fair (2.5-5), Poor (0.7-2.5), and N.S. (Not Suitable). The inability to observe pure stands on these soils made them difficult to rate. The effect of exposure and excessive wetness, which cuts down the growth rate very severely, would tend to make our ratings too high for certain areas of these soils.

Soil Suitability for Recreation Use

Table 10 provides a general idea of the suitability of the soils in the area for recreational development. However, many factors not included in the table contribute to determining the suitability of this type of development. For example, a soil on a gentle slope may be given an "A" rating for cottage development, but if the slope is not near water or has no other aesthetic interest people would not be interested in using it for this purpose. This is true for the other uses as well.

This table was developed from a similar table prepared for the soils of Maine. A number of the soils have been correlated along the Maine - New Brunswick border, and this made it fairly simple to use the same standard.

Engineering Use and Interpretations

Although the soils of this County have been classified from a pedological viewpoint, a great deal of information presented is useful to engineers. The accompanying soil maps designate the areas occupied by different soils, the slope, the degree of stoniness, and the occurrence of bedrock at the surface. The description of the soils given in the earlier parts of the report give further information on the physical characteristics, and the analytical data in the appendix gives more details.

The estimated soil properties significant to engineering (Table 13) were arrived at by using analytical data and descriptions of the soils gathered for other uses, and the USDA Soil Conservation Service "Guide for Interpreting Engineering Uses of Soils". Although some of the data was gathered expressly for engineering purposes, other parts were, in the pedological sense, extrapolated. Only the soil parent materials were rated for these purposes. The available water was expressed just for this horizon and was the difference between wilting point and field capacity at a tension of 60 cm of water. The Unified Classification was determined from replotting the mechanical analysis results for the Pedological Classification, and where results for individual series were not available, the results from the other catenary members were used. This should give results that are satisfactory for this type of table.

Physical properties on only six soils were determined for engineering purposes, and the results from these tests are given in Tables 11 and 12. Interpretations of the engineering properties of soils (Table 14) were obtained by using similar tables developed by the United States Soil Survey for Aroostook County, Maine, and from Table 13. During a correlation tour in Maine and New Brunswick, a number of soils were observed that were similar, but had been given different names. Twenty of the soils included in this report have counterparts in Maine. The recommendation given for these soils would be as valid in New Brunswick as in Maine, so they could be used. The approximately 30 series that did not occur in Maine could be rated by extrapolating from known soils with similar characteristics.

It must be understood the information for the physical properties are generalizations and although this information can be used for perliminary planning, further field examination and laboratory work would be necessary for anything more than a minor structure.

APPENDIX

Analytical Methods

Available water. Calculated from pores drained at 66 cm suction and wilting point.

Bulk density. Calculated from weight of known volume of soil in cores.

Exchangeable calcium, magnesium and potassium. Chemical methods of soil analysis and flame photometer, Chemistry Division, Science Service, Canada Department of Agriculture, 1949.

Exchange capacity. A 2 g sample was placed in a 15 ml centrifuge tube with 4 ml of normal ammonium acetate solution, pH 7. Adsorbed ammonia was displaced with NaCl solution and the extract was steam-distilled with 1 N NaOH in a mocro-Kjeldahl distilling apparatus. Ammonia was collected in boric acid and titrated with standard acid.

Free iron and aluminum. McKeague, J. A., and J. H. Day. 1966. Dithionite- and oxalate-extractable Fe and Al as aids in differentiating various classes of soils. Can. J. Soil Sci. 46:13-22. Schwertmann. 1964. Z Pflanzenerhakr. Dung. Bodenkunde 105:194-201.

HF-extractable carbon. Schnitzer, M., and J. R. Wright. 1957. Can. J. Soil Sci. 37:89-95, 1957.

Hygroscopic moisture. By heating at 105^{o}C until the weight remained constant.

Maximum water-holding capacity. Samples taken with a Uhland core sampler and pF measured by the method of R. H. Leamer and B. Shaw. 1941. Amer. Soc. Agron. 33:1003.

Mechanical analysis. Hydrometer method. Bouyoucos, G. G. 1936. Soil Sci. 42:225-230.

Moisture equivalent. Briggs, L. J., and J. W. MacLane. 1907. USDA Bur. Soils Bull. 45.

Reaction (pH). Beckman glass electrode. Thick paste method. McGeorge, W. T. 1945. Soil Sci. 59:231-237.

Readily available phosphorus. Truog, E. 1930. J. Amer. Soc. Agron. 22:874-882.

Total carbon. Schollenberger, C. J. 1945. Soil Sci. 29:53-56. Walkley, A., and J. A. Black. 1939. Soil Sci. 27:29.

Total nitrogen. Association of Official Agricultural Chemists. 1955. 8th ed., p. 12. Metallic mercury alone was the catalyst and the ammonia was collected in boric acid.

Total volume of pores. Calculated from bulk density assuming a specific gravity of 2.65.

Volume of gravel and sand. Measured by the volume of displaced water.

Wilting point. Pressure membrane method.

Physical Analysis

The results of the physical analysis for some of the soils of the County are given in Table 16. The pore space, volume of gravel, and bulk density were all determined on undisturbed cores. The remainder of the determination was made on the material that passed the 2 mm sieve. Because of the stony nature of many of the soils, undisturbed cores were difficult to obtain. The cores with stones protruding from the top were leveled in the laboratory and the stones were marked. After the determinations were made, the stones were removed, cleaned, and cut along the marks with a diamond saw. The weight of the excess was then subtracted from the weight of the soil in the core. This gave the approximate true weight of the soil and gravel.

The available water was determined from the moisture equivalent and wilting point, then calculated on a true volume of fines per cubic cm from the volume of gravel and the bulk density. The stones larger than about 6 cm were ignored in these profiles. The available water is the difference between the moisture equivalent (approximates the field capacity) and the 15-atmosphere moisture (wilting point). The volume of gravel and bulk density of fines are used to obtain a realistic figure. The maximum water-holding capacity is different from the total pore space. More soil water relationships are given in Table 16. The volume of fines and total solids can be easily calculated from the figures in the table.

The total pore space is of interest in separating the ground moraine from the ablation moraine and water-deposited soils. The pore space was of the same order in the upper part of the solum in all three deposits, but in the C horizons of the ground moraine the total pore space was usually below 35%, whereas in the ablation and water deposited soils it was above 37% and generally considerably higher than this. This difference is mainly in the large or noncapillary pores. The soil water relationships follow closely the organic matter content. However, the available water is dependent on the amount of gravel present because the higher the gravel and stone content the less fines are present to control the water.

REFERENCES

1. Lee, H. A. 1959. Surficial geology of the Grand Falls area. Map 24. Geological Survey of Canada.

2. Sanderson, M. 1948. The climate of Canada according to the Thornthwait classification. Sci. Agr. 28:501-517.

3. Munsell Color Company, Inc., Baltimore 18, Maryland, USA.

4. Saini, G. R., and A. A. MacLean. 1967. Effect of stones on potato yield, soil temperature and moisutre. Amer. Potato J. 44:209-213.

5. Maine Agricultural Experiment Station. 1965. Soil suitability guide for land use planning in Maine. Misc. Publ. 667. pp 77.

6. Soil Survey Aroostook County, Maine. Southern part; Soil Survey Series 1968. No. 27.

7. The System of Soil Classification for Canada. 1973. Proc. Canada Soil Survey Committee, Saskatoon.

8. Rowe, J. S. 1972. Forest regions of Canada. Department of the Environment, Canadian Forest Service, Publ. 1300. pp. 171.

9. Soil Suitability Guide for Land Use Planning in Maine, S.C.S., USDA, University of Maine, Miscellaneous Publications 667 (Rev.). Reprinted Sept. 1969.

10. Guide for Interpreting Engineering Uses of Soils, S.C.S., USDA. 1971.

11. Glossary of Terms in Soil Science. 1976. Can. Dep. Agric. Publ. 1459.

12. Soils Manual for Design of Asphalt Pavement Structure. 1969. Asphalt Institute Manual No. 10.

COMMON AND SCIENTIFIC NAMES OF PLANTS

alder	Alnus spp.
ash, black	Fraxinus nigra Marsh.
aspen, large-toothed	Populus grandidentata Michx.
aspen, trembling	Populus tremuloides Michx.
aster	Aster spp.
bedstraw	Galium spp.
beech	Fagus grandifolia Ehrh.
billberry	Vaccinium spp.
birch, gray	Betula populifolia Michx.
birch, yellow	Betula alleghaniensis Britton
blueberry	Vaccinium angustifolium Ait.
bunchberry	Cornus canadensis L.
cedar, eastern white	Thuja occidentalis
fern (bracken)	Pteridium aquilinum (L.) Kuhn
fern, crested wood-	Dryopteris cristata (L.) Gray
fern, interrupted	Osmunda claytoniana L.
fern, spinulose wood-	Dryopteria spinulosa (O.F. Huell). Watt.
fir, balsam	Abies balsamea (L.)Mill.
fireweed	Epilobium augustifolium L.
goldenrod	Solidago spp.
goldthread	Coptis groenlandica (Oeder) Fern.
Gooseberry	Ribes spp.
grass, nodding wood	Cinna latifolia (Trev.) Griseb.
ground-pine	Lycopodium obscurum L.
hawkweed	Hieracium canadense Michx.
hazel, beaked	Corylus cornuta Marsh.
hepatica	Hepatica americana (DC.) Ker.
hobblebush	Viburnum alnifolium Marsh.
honeysuckle	Lonicera canadensis Bartr.

ironwood (hop-hornbeam)	*Ostrya virginiana* (Mill.) K. Koch
Labrador tea	*Ledum groenlandicum* Oeder
lady-slipper, yellow	*Cypripedium calceolus* L.
larch (hackmatack, tamarack)	*Larix laricina* (Du Roi) K. Koch
laurel, sheep-(lambkill)	*Kalmia angustifolia* L.
lichen (caribou moss)	*Cladonia* spp.
maple, mountain	*Acer spicatum* Lam.
maple, red	*Acer rubrum* L.
maple, striped	*Acer pensylvanicum* L.
maple, sugar	*Acer saccharum* Marsh.
miterwort, naked	*Mitella nuda* L.
mnium, dotted	*Mnium punctatum* Hedw.
mnium, toothed	*Mnium affine* Bland.
moccasin flower	*Cypripedium acaule* Ait.
moss, bristly club	*Lycopodium annotinum* L.
moss, fern	*Thuidium delicatulum* (Hedw.) Mitt.
moss, haircap	*Polytrichum commune* Hedw.
moss, feather	*Hylocomium splendens* (Hedw.) B.S.G.
moss, plume	*Hypnum crista-castrensis* Hedw.
moss, ribbed bog	*Aulacomnium palustre* (Web. & Mohr) Schwaegr.
moss, running club	*Lycopodium clavatum* L.
moss, Schreber's	*Pleurozium schreberi* (B.S.G.) Mitt.
moss, acuteleaf sphagnum	*Sphagnum capillaceum* (Weiss) Schrank.
moss, spoonleaf sphagnum	*Sphagnum palustre* L.
moss, squarrose sphagnum	*Sphagnum squarrosum* Crome
moss, tree	*Climacium dendroides* (Hedw.) Web. & Mohr.
mountain-ash	*Sorbus decora* (Sarg.) Schneid.
pin-cherry	*Prunus pensylvanica* L.
pine, ground	*Lycopodium obscurum* L.
pine, red	*Pinus resinosa* Ait.
pine, white	*Pinus strobus* L.
poplar, balsam	*Populus balsamifera* L.
pyrola, one-sided	*Pyrola secunda* L.
pyrola, roundleaf	*Pyrola rotundifolia* L.
raspberry	*Rubus strigosus* Michx.
raspberry, dwarf	*Rubus pubescens* Raf.
raspberry, trailing	*Rubus pedatus* Smith
sarsaparilla, wild	*Aralia nudicaulis* L.
sedges	*Carex* spp.
snowberry, creeping	*Gaultheria hispidula* (L.) Bigel.
spruce, black	*Picea mariana* (Mill.) BSP.
spruce, red	*Picea rubens* Sarg.
spruce, white	*Picea glauca* (Moench) Voss
starflower	*Trientalis borealis* Raf.
strawberry, woodland	*Fragaria vesca* L.
tamarack	*Larix laricina* (Du Roi) K. Koch
trillium	*Trillium* sp.
twin flower	*Linnaea borealis* L.

viburnum, maple-leaved	*Viburnum acerifolium* L.
violet, blue	*Viola renifolia* Gray
violet, northern white	*Viola pallens* (Banks) Brainerd
willows	*Salix* spp.
wood-sorrel, common	*Oxalis montana* Ref.
yew, Canada	*Taxus canadensis* Marsh.

Table 6. Guide to the soils of Madawaska County

Parent material				Soil mapping units identified by drainage classes					Classification*	
Mode of deposition	Geologic source	Color	Texture	Excessive to well	Well	Moderately Well	Imperfect to poor	Very Poor	Dominant**	Significant**
Shallow soils developed in situ	weakly calcareous shales and fine grained sandstone	yellowish brown to olive brown	Shaly loam		Undine				O.FHP Lithic phase	O.HFP Lithic phase
			Silty clay loam		Harquail				PZ.GL	
Partly in situ, partly on ablation till	Gray phyllites, argillites, slate shale, may be weakly calcareous	Dark yellowish brown	Loam to silt loam	Quisibis					O.HFP	
	Gray slates, argillites, sandstone, quartzite, schist	Light olive brown to light yellowish brown	Channery to stony loam	Glassville					O.FHP	
		Light olive brown to light olive gray	Channery to stony clay loam			Boston Brook			O.HFP	

*Canada Soil Survey Committee, 1978. The Canadian system of soil classification. 1978. J.A. McKeague ed. C.D.A. Publication 1455.

**Dominant is 50-100%; significant is 20-49%

Table 6. Guide to the soils of Madawaska County (continued)

Parent material				Soil mapping units identified by drainage classes					Classification*	
Mode of deposition	Geologic source	Color	Texture	Excessive to well	Well	Moderately well	Imperfect to poor	Very Poor	Dominant**	Significant**
Loose ablation moraine	Shale, quartzite argillite, sandstone, acid or weakly calcareous	Yellowish brown	Gravelly sandy loam to loam		Monquart				O.HFP	
	Shale, quartzite, argillite, sandstone, calcareous	Pale brown to pale olive	Shaly silt loam to shaly silty clay loam		Caribou		Carlingford		PZ.GL GL.GL	GLBR.GL
Ground moraine compact	Quartzite, sandstone, some shale, argillite, slate	Olive to light olive gray	Gravelly sandy loam		Holmesville		Johnville	Poitras	O.HFP GL.HFP O.G	O.FHP FE.G;GL.DYB FeG
		Light olive brown to light grayish brown	Gravelly clay loam to gravelly clay			Siegas	Salmon	Bourgoin	BR.GL GL.GL O.G	LU.HFP GLBR.GL O.LG
	Slate, argillite, some quartzite	Pale olive to light olive brown	Gravelly silt loam		Green River				O.FHP	

Table 6. Guide to the soils of Madawaska County (continued)

Parent material				Soil mapping units identified by drainage classes					Classification	
Mode of deposition	Geologic source	Color	Texture	Excessive to well	Well	Moderately well	Imperfect to poor	Very Poor	Dominant**	Significant**
Water or colluvial reworked material	Sandstone, shale, quartzite	Light olive brown to pale olive	Gravelly sandy loam to gravelly clay loam	Victoria	Victoria	McCluskey		Coté	O.HFP GL.HFP O.HG	O.FHP GL.DYB
	Gray slates and argillite	Light olive brown to grayish brown	Stony gravelly loam	McGee	McGee	Nason			O.HFP GL.HFP	O.FHP FE.G
Reworked glaciolacustrine deposits	Undifferentiated material	Light olive brown	Silty clay loam			Bellefleur	St. Amand		BR.GL O.G	
Glacial outwash	Slate, shale, quartzite, sandstone with free carbonates	light olive brown	Gravel and sand	Muniac				Cyr	O.HFP R.HG	
	Without free carbonates	Light olive brown to yellowish brown	Gravel and sand	Grand Falls			Sirois	Cyr	O.FHP GL.HFP R.HG	O.HFP FE.G
Glacial outwash and alluvial	Slates and shales	Olive gray	Sandy loam to loamy sand		Maliseet		Wapske	Wapske	O.HFP GL.HFP R.HG	FE.G

Table 6. Guide to the soils of Madawaska County (continued)

Parent material				Soil mapping units identified by drainage classes					Classification*	
Mode of deposition	Geologic source	Color	Texture	Excessive to well	Well	Moderately well	Imperfect to poor	Very Poor	Dominant**	Significant**
		Light olive brown to gray	Stratified silt and sand		Flemming		Martial	Kelly	O.HFP GLE.DYB O.HG	E.DYB GL.MB
Recent alluvium	Varied	Brown to grayish brown	Silt loam to fine sandy loam		Intervale				O.R	
		Silt over gravel			Bottomland			Bottomland	O.R R.HG	Cu.R GLCu.HR

TABLE 7. Ratings[1] of the soils for production of various crops

Soils	Potatoes	Green peas	Other hoed crops	Grain	Hay	Pasture	Special problems[2]
			I. Very Good				
Caribou	A	A	A	A	A	A	Erosion (b-c)
Flemming	A	A	A	A	A	A	
Holmesville	A	A	A	A	A	A	Erosion (a), topography (a-c)
Interval	A	A	A	A	A	A	Flooding (b)
Maliseet	A	A	A	A	A	A	
Monquart	A	A	A	A	A	A	Erosion (b)
Thibault	A	A	A	A	A	A	Erosion (c)
Victoria	A	A	A	A	A	A	Erosion (b)
			II. Good				
Bellefleur	B	B	B	A	A	A	Physical properties (b)
Boston Brook	B	B	C	A	A	A	Stoniness (a-c), topography (b)
Bottomland	B	C	C	A	A	A	Stoniness (a-c), topography (b)
Carlingford	B	C	C	B	A	A	Drainage (b)
Green River	C	C	C	B	A	A	Shallow rooting zone (b)
Harquail	B	B	B	B	B	B	Shallowness (a-c), erosion (c), topography (b)
Johnville	C	B	C	B	A	A	Drainage (b)

TABLE 7. Ratings[1] of the soils for production of various crops (continued)

Soils	Potatoes	Green peas	Other hoed crops	Grain	Hay	Pasture	Special problems[2]
Martial	C	C	B	B	A	A	Drainage (b)
McCluskey	C	B	C	B	A	A	Drainage (b)
Muck	A	B	A	B	B	B	Drainage (c), acidity (c)
Muniac	B	B	B	B	B	B	Draughtiness (b), topography (a-b)
Quisibis	B	B	C	B	B	A	Shallowness (b), topography (a-c)
Undine	B	B	B	B	B	B	Shallowness (c), erosion (c)
				III. Fair			
Dubé	C	C	D	B	A	A	Drainage (b), shallowness (b-c)
Ennishore	C	C	D	B	B	B	Drainage (b)
Glassville	C	C	D	B	B	B	Stoniness (a-c), topography (a-c)
Grand Falls	B	B	B	B	C	C	Draughtiness (b), fertility (b)
McGee	C	C	C	B	B	B	Stoniness (a-c), topography (a-c)
Peat	B	B	B	C	C	C	Drainage (c), acidity (c)
Siegas	C	C	D	B	A	A	Physical properties (b)
Sirois	C	C	C	C	B	B	Drainage (b)
St. Amand	D	D	D	B	A	A	Drainage (b), physical properties (b)
Waasis	C	C	D	B	B	B	Drainage (b), flooding (b)
Wapske	C	C	C	C	B	A	Drainage (b-c)

TABLE 7. Ratings[1] of the soils for production of various crops (continued)

Soils	Potatoes	Green peas	Other hoed crops	Grain	Hay	Pasture	Special problems[2]
				IV. Poor			
Bourgoin	D	D	D	C	C	B	Drainage (c)
Coté	D	D	D	D	C	B	Drainage (c)
Cyr	D	D	D	D	C	B	Drainage (c)
Foreston	D	D	D	D	C	B	Drainage (c), stoniness (a-c)
Nason	D	D	D		C	B	Drainage (b), stoniness (a-c)
Poitras	D	D	D	D	C	B	Drainage (c)
Rob	D	D	D	D	C	C	Drainage (c)
Salmon	D	D	D	C	B	B	Drainage (b), physical properties (c)
Skin Gulch	D	D	D	C	B	A	Stoniness (a-b), drainage (b-c)
Temiscouata	D	D	D	C	B	B	Stoniness (a-c), drainage (b)
Trafton	D	D	D	D	C	B	Drainage (c)
Washburn	D	D	D	C	B	B	Drainage (c)
Yellow Brook	D	D	D	C	B	B	Drainage (b), stoniness (a-b)

[1]A - very good; B - good; C - fair; D - unsuitable.

[2]a - slight; b - moderate; c - acute.

Table 8. Capability classes, areas, and limitations of the various soils

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Bellefleur	Be						
	b0		103 d				
	b1		861 d				
	b2		126 d				
	c0		8 d				
	c1		415 d				
	c2		11 d				
	cd1		563 d				
	cd2		63 d				
	d1		83 d				
	deI				9 t/r		
	de1			85 t			
	e0			6 t			
	e1			35 t			
	e2			14 t			
	ef1				21 t		
	ef2				10 t		
Total	2413		2233	140	40		
Big Spring	BS						
	C2II					11 w/r	
	d2					4 w/d	
	de2					29 w/d	
	de2I					8 w/r	
	d2I					36 w/r	
	d2II					4 w/r	
	e3					10 w/r	
	ef2II					45 w/r	
Total	147					147	

Note: See the last page of this table for an explanation of symbols.

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Bottomland	L						
	b0			55 w/i			
	c0			19 w/i			
	c1			25 w/i			
	c2			92 w/i			
	d1			2 w/i			
	d0			55 w/i			
	d2			6 w/i			
	de2			34 w/i			
	de1			29 w/i			
	e2			62 w/i			
Total	379			379			
Boston Brook	Bob						
	cd3		26 t/s				
	d2		27 t/s				
	d3				140 p/t		
	de2			2 t			
	e1			24 t			
	ef2				168 t		
	f1				1 t		
Total	388		53	26	309		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Bourgoin	<u>B</u>						
	b0				21 w		
	b1				49 w		
	b2				162 w		
	c1				1256 w		
	c2				607 w		
	cd1				110 w		
	cd2				295 w		
	d1				50 w		
	d2				42 w		
	de1				21 w		
	de2				190 w		
	e1				4 w		
	e2				25 w		
Total	2832				2832		
Caribou	<u>Ca</u>						
	c1	181 f					
	c2	23 f					
	cd1		382 t				
	cd2		123 t				
	d2		123 t				
	de1			434 t			
	de2			1080 t			
	e1			100 t			
	e2			323 t			
	ce1			4 t			
	d1		16 t				
Total	2789	204	644	1941			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class 2	3	4	5	7	0
Carlingford	<u>Cf</u>						
	b0			15 w			
	c1			5 w			
	c2			4 w			
	cd1			35 w			
	d2			102 w			
	de2			505 w			
	e2			45 w			
Total	711			711			
Coté	<u>Ct</u>						
	b0				49 w		
	b1				36 w		
	b2				36 w		
	c0				35 w		
	c1				721 w		
	c2				254 w		
	c3					326 w/p	
	cd1				110 w		
	cd2				895 w		
	cd3					81 w/p	
	d1				104 w		
	d2				784 w		
	d3					326 w/p	
	de2				790 w		
	de3				54 w		
	e2				69 w		
	f0				25 w		
	ef2				15 w		
	de1				107 w		
Total	4817				4084	733	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Cyr	Cy						
	b1				25 w		
	b2				215 w		
	c1				45 w		
	c2				49 w		
	c3					42 w/p	
	cd1				34 w		
	cd2				206 w		
	d1				314 w		
	d2				525 w		
	de2				700 w		
	de2I					33 w/r	
	e2				6 w		
	ef2					183 w	
	f2					2 w	
	de1				73 w		
	ef2I					28 w/r	
	cd3					11 w/p	
	ef1					14 w	
Total	2505				2192	313	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Dubé	Du						
	d2			8 w			
	de2II					25 w/r	
	e1			5w			
	e2			29w			
	e3			14 w			
	ef2				40 w/t		
	ef2II					17 w/r	
	f2I				4 w/t		
	fg2					21 w/r	
	fg2II					2 w/r	
	fg2III					35 w/r	
	undif.			4 w			
	de3				5 w/p		
	cd2II					5 w/r	
Total	214			60	49	105	
Ennishore	E						
	c1			62 w			
	d1			19 w			
	de2			33 w			
Total	114			114			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Flemming	<u>Fl</u>						
	b0	2727 f					
	b1	10 f					
	b1I				6 r		
	c0	1450 f					
	c1	280 f					
	c2	40 f					
	cd0	20 f					
	cd1	118 f					
	d0		306 t				
	d2		63 t				
	bc0	73 f					
	bc1	11 f					
	d1		2 t				
Total	5061	4729	371		6		
Flemming fsl	<u>Fl</u>						
	b0	78 f					
	c0	87 f					
	cd0	338 f					
	de		4 t				
Total	507	503	4				

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Glassville	Ge						
	c2		8 m/f				
	c3				48 p		
	c2I				33 r		
	cd2		140 tm				
	cd3				1053 p		
	d2		142 tm				
	d2I				30 r		
	d3				227 p		
	de1			101 t			
	de2			70 t			
	de3				1358 p		
	de3I				340 p/r		
	e2			1824 t			
	e2I				83 r		
	e3				629 p		
	ef2				3764 t		
	ef2I				749 t/r		
	ef2II					1629 p/r	
	ef3					5452 t/p	
	ef3I					2189 t/p	
	ef3II					920 t/r	
	f2				1046 t		
	f2I					335 t/r	
	feII					301 t/r	
	f2III					35 t/r	
	f3					982 t/p	
	f3I					616 t/p	
	f3II					131 t/r	
	fg2					1374 t	
	fg2I					829 t/r	
	fg3					1724 t/p	
	fg3I					818 t/p	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Glassville (cont'd)	fg3II					866 t/r	
	g2					86 t	
	c2-3			35 p			
	de4					35 p/t	
	de2I				23 t/r		
	e2II					8 t/r	
	eI			35 t			
	e2-3				91 p		
	e3I					98 p/r	
	e3II					44 p/r	
	ef2-3					131 t/p	
	de3III					53 r/p	
	f1				4 t		
	f4					89 p/t	
	fg1					17 t	
	fg3II					1272 t/r	
	fg3-4					25 p/t	
	fg4III					36 p/r	
	g3					68 t/p	
	eg3					105 t/p	
	g3II					97 t	
	g3I					40 t/p	
	ef2III					81 r/t	
	c1		9 m/f				
	ef4III					194 r/p	
	e3III					23 r/p	
	ef3III					15 r/p	
	ef1				143 t		
	fg2II					78 t/r	
	e2II					11 r/t	
Total	32 792		299	2065	9621	20 807	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Glassville sl	Ge						
	de2			8 t			
	de3				81 p/t		
	e2			118 t			
	e3				69 p/t		
	ef2				78 t		
	ef3					69 p/t	
	ef3I					32 p/t	
	f3I					337 p/t	
	fg3I					145 p/t	
	fg3II					145 p/r	
Total	1082			126	228	728	
Grand Falls	GF						
	b1			232 f/m			
	b2			195 f/m			
	b0			180 f/m			
	c0			259 f/m			
	c2			1611 f/m			
	c1			998 f/m			
	cd1			1448 f/m			
	cd2			2314 f/m			
	d0			20 f/m			
	d1			521 f/m			
	d3					70 p	
	d2			5549 f/m			
	de0			76 f/m			
	de1			432 f/m			
	de2			13 964 m/f			
	e1			243 m/g			
	e2			2091 m/f			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Grand Falls (cont'd)	e3					11 p	
	ef1				429 t		
	ef2				5667 t		
	ef2I				339		
	f2				437 t		
	fg1					32 t	
	fg2					370 t	
	fg2I					20 t/r	
	fg2II					17 t/r	
	de2I				29 r/t		
	f2I					14 t/r	
	undif.			9 m/g			
	d4					15 p	
	d2I				87 r		
	d2III					20 r	
	e2I				302 r		
	ef3I					152 p/t	
	eg3					54 p/r	
	de2I				28 t/r		
	g2					41 t	
	cd0			55 m/f			
	bc0			32 m/f			
	ceI			25 m/t			
	de2I				17 t/r		
	deI				180 t/r		
	dII				17 r		
	cII				17 r		
	cdII				8 r		
	bc1			11 m/f			
	f1				5 t		
	f2I					50 t/r	
Total	38 693			30 265	7562	866	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Green River	GR						
	c2-3			35 p			
	de2			82 t			
	cd1		41 t				
	e1			20 t			
	e2			97 t			
	ef2				144 t		
	ef3					82 t/p	
	f2I					32 t/r	
	ef3I					153 t/p	
	fg3II					38 t/p	
	fg3I					49 t/p	
	de3				15 p		
	e2I				57 t/r		
	fg2					21 t	
Total	866		41	234	216	375	
Harquail	Ha						
	b1		5 r				
	b2		23 r				
	cd1		294 r				
	de1		203 t				
	c2		42 r				
	e1			79 t			
	de2			62 t			
	ef2				222 t		
Total	930		567	141	222		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class 2	3	4	5	7	0
Holmesville	<u>H</u>						
	d2		956 T				
	de2			2166t			
	de2II				79 t/r		
	e2			828 t			
	e2-3				57 p		
	ef2				2879 t		
	ef2-3				63 t/p		
	ef3					177 t/p	
	e1			414 t			
	b1	264 f					
	b2	91 f					
	c-ef2				137 t		
	c1	776 f					
	c2	2930 f					
	cd1		667 t				
	cd2		2618 t				
	d1		540 t				
	de1			263 t			
	ef1				921 t		
	f2				344 t		
	fg2					400 t	
	de3				51 p/t		
	b0	14 f					
	d2		400 t				
	f1				19 t		
	c0	31 f					
	de2			614 t			
	de2II				123 p		
	e3			123 p			
	c2I			8 r			
	deI			276 r			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Holmesville (cont'd)	fg3					15 p/t	
	fgl					15 p/t	
	de2-3				29 p		
	eg2					93 t	
	f2I					53 t/r	
	c2-3				33 p		
	df3					79 t/p	
	el			2 t			
	fg2					136 t	
Total	19 684	4106	5181	4694	4735	968	
Holmesville fsl	H						
	d2		60 t				
	de2			396 t			
	e2			375 t			
	efl				100 t		
	ef2				372 t		
	ef2I					131 t/r	
	f2				1468 t		
	fg2I					608 t	
	fg2II					408 t	
	fg2					326 t	
	f2I					252 r	
	de2I				215 t/r		
	cd2		269 t				
	el			324 t			
	d2I				106 t/r		
	cl	415 t					
	fl				168 t		
	e2I				116 t		
	elI				116 t/r		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Holmesville fsl (cont'd)	d1		99 t				
	de1			99 t			
Total	6423	415	428	1194	2661	1725	
Holmesville sil	H						
	b0	1 f					
	b1	15 f					
	b2	153 f					
	c1	877 f					
	c2	2597 f					
	c0	59 f					
	cd1		331 t				
	cd2		8082 t				
	d1		89 t				
	d2		6170 t				
	d2II				117 r/t		
	d4					39 p	
	de1			883 t			
	de2			16 669 t			
	de2I				584 t/r		
	deII					117 r	
	e2			7603 t			
	e2I				50 t/r		
	e1			116 t			
	ef2				13 379 r/t		
	ef2I					833 t/r	
	ef2II					958 r/t	
	f2				3607 t		
	f2I					212 t/r	
	f2II					241 r/t	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Holmesville sil (cont'd)	fg2					2779 t	
	fg3					77 t/p	
	fg2I					1099 t/p	
	fg2II					1868 t/r	
	g2					43 t	
	fl				134 t		
	efl				669 t		
	efII					53 t/r	
	cel			30 t			
	cd2I				78 r		
	ef2III					74 r/t	
	f3III					32 p/r	
	de2II					186 r	
	e2II					145 4	
	ef3III					44 p/r	
	cd3				55 p		
	deI				30 r		
	e3				17 p		
	de3I					24 p/r	
	fg3III					60 p/r/t	
	c2I				29 r		
	ef3II					76 p/r	
	fglI					34 t/r	
	de3				35 p		
	fgl					80 t	
	eg3					127 t/p	
Total	71 661	3703	14 672	25 300	18 785	9201	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Interval	I						
	a1	10 i					
	a2	15 i					
	b0	234 i					
	b1	6 i					
	c0	59 i					
	de2	8 i					
Total	332	332					
Interval sl	I						
	b0	8i					
Total	8	8					
Johnville	J						
	b0			9 w			
	b1			48 w			
	b2			102 w			
	c1			204 w			
	c2			662 w			
	cd1			68 w			
	cd2					104 t	
	c-ef2				1232 w		
	d1			48 w			
	d2				255 w		
	d3					48 p/w	
	de2				463 w		
	de2II					14 w/r	
	e2				193 w		

Table 8. Capability classes, areas and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Johnville	ef1					16 w	
	ef2					63 w	
	f2					7 w	
	e1			4 w			
	de1			10 w			
Total	3550			1155	2143	252	
Johnville sil	J						
	b1			44 w			
	b0			9 w			
	b2				91 w		
	c0			2 w			
	c1			78 w			
	c2				796 w		
	cd2				546 w		
	cd1			10 w			
	d1			14 w			
	d2				915 l/w		
	de2				2242 l/w		
	de2I					40 w/r	
	de2II					16 w/r	
	de4					14 w/p	
	e2				355 w		
	e1				5 w		
	ef2					519 w/t	
	ef1					127 w/t	
	f2					54 w/t	
	f2I					1 w/r	
	fg1					73 w/t	
	fg2					32 w/t	
	de1				2 w		

Table 8. Capability classes, areas and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Johnville sil (cont'd)	c3					14 w/p	
	cd3					35 w/p	
	d3					10 w/p	
	de3I					24 w/p	
	e3					9 w/p	
	ef2I					72 w/p	
	fg2III					30 w/r	
	f3					24 w/p	
	de3					14 w/p	
	de4					19 w/p	
Total	6236			157	4952	1127	
Johnville fsl	J						
	d2				20 w		
	de2				256 w		
	e2				23 w		
	ef2					26 w	
	cd3					30 p/w	
	d3					6 p/w	
Total	361				299	62	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Kelly	KL						
	b0				483 w		
	b + bc0				156 w		
	b1				6 w		
	c0				331 w		
	c1				8 w		
	d0				19 w		
	c2				6 w		
Total	1009				1009		
Maliseet	Ma						
	b0	424 f					
	b-bc0	34 f					
	b1	178 f					
	b2	20 f					
	c0	678 f					
	c1	189 f					
	c2	337 f					
	cd0		93 t				
	d0		120 t				
	cd2		159 t				
	cd1		180 t				
	d1		140 t				
	d2		269 t				
	de1			106 t			
	de2			68 t			
	de0			165 t			
	e2			125 t			
	e0			35 t			
	ef2				89 t		
	f1				33 t		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Maliseet (cont'd)	f2				5 t		
	deI			15 t			
	bc0	132					
	d2I		6 t				
	ef1				82 t		
	c-el			25 t			
Total	3707	1992	967	539	209		
Maliseet csl	Ma						
	b0		39 m				
	c0		70 m				
	cl		16 m				
	c2		9 m				
	del			4 t			
	de0			34 t			
Total	172		134	38			
Martial fsl	Ml						
	c0			11 w			
Total	11			11			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Martial	Ml						
	b0			628 w			
	b2			23 w			
	c0			800 w			
	cl			153 w			
	c2				79 w		
	cdl			11 w			
	d0			72 w			
	cd0				30 w		
	cd2			9 w			
					15 w		
Total	1820			1696	124		
McCluskey	Mc						
	b0			50 w			
	bl			64 w			
	c0			107 w			
	cl			736 w			
	c2				152 w		
	cd0			29 w			
	cdl			407 w			
	cd2				834 w		
	cl			202 w			
	d2				1464 w		
	d3					123 p/w	
	de2				2369 w		
	de3					35 p/w	
	e2				255 w		
	e3					8 p/w	
	ef2					694 w	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
McCluskey (cont'd)	f0					25 w	
	f2					69 w	
	fg2					76 w	
	de1				30 w		
	e1				53 w		
	ef1					8 w	
	f1					10 w	
	ef3					2 w/p	
	de1				108 w		
	c3					28 w/p	
Total	7938			1595	5265	1078	
McGee	Mg						
	c1	8 m/f					
	c2	157 m/f					
	cd2	204 m/f					
	c3				186 p		
	cd1	234 m/f					
	c2I				33 r		
	d1	6 m/f					
	d2	669 m/f					
	d2I				60 r		
	d31			191 t			
	de2			3989 t			
	de3				15 p		
	de2I				176 t/r		
	de3					1183 p	
	d3					34 p	
	de2II					14 r	
	de2III					20 r	
	e1			598 t			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
McGee (cont'd)	e2			3231 t			
	e3					367	
	e21				51 r		
	e211					25 r	
	ef1				1061 r		
	ef2				7962 r		
	ef2I					341 t/r	
	ef2II					1258 t/r	
	ef1I					110 t/r	
	ef3					3470 p/t	
	ef3I					2146 p/t	
	ef3II					710 p/r	
	f2				989 t		
	f3					724 t/p	
	f2I					78 t/r	
	f2II					296 t/r	
	f2III					35 t/r	
	f3I					783 t/r	
	fg2					1609 t	
	fg3					170 t/p	
	fg2I					814 t/r	
	fg2II					41 t/r	
	fg3I					332 t/p	
	fg3II					1382 t/p	
	g1					16 t	
	g2					147 t	
	e3I				89 t/r		
	ef4III					194 p/p	
	e3III					21 p/r	
	f3II					21 p/r	
	ef3III					15 p/r	
	fgI					187 t	
	de3III					23 p/r	
	eg3					20 p	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
McGee (cont'd)	ef2III					77 r/t	
	eg1					199 t	
	e3II					6 r/t	
	ef2-3				40 t/p		
	f1				14 t		
	g3					32 t/p	
	f3II					15 p/r	
	de4					35 p	
	g31					17 p/1	
	g3II					65 p/4	
	cd3					97 p	
	de3I					12 p/r	
Total	37 089	1278		8009	10 676	17 126	
Monquart	Mt						
	c1	79					
	c2	14					
	cd3				26 p		
	d1		68 t				
	d2		112 t				
	de2			791 t			
	de2II				19 p/r		
	e2			118 t			
	ef1				111 t		
	ef2				194 t		
	f2				69 t		
	fg1					169 t	
	de1			76 t			
	cd		11 t				
	e1			200 t			
	f1				46 t		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Monquart (cont'd)	gl					49 t	
	e0			6 t			
	e3				19 p		
	del			95 t			
	df2				23 t		
Total	2295	93	191	1286	507	218	
Muck	M						
	ed						63
	a0						51
	a						28
	b0						178
	c0						15
	cl						74
	c2						26
	cdl						9
Total	444						444

Table 8. Capability classes, areas and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Muniac	Mu						
	b1		6 m				
	c1		88 m				
	cd1		91 m				
	d2		35 t				
	de2			48 t			
	e1			10 t			
	e2			25 t			
	ef2				62 t		
Total	365		221	83	62		
Nason	Na						
	c2			30 w			
	cd2			51 w			
	cd1			12 w			
	d1			96 w			
	d2			6 w			
	de1			43 w			
	de2			53 w			
	de2I				4 w/r		
	e2			12 w			
	ef1				12 w		
	ef2					104 w	
	fg3					36 p/w	
	c0			5 w			
	e1				51 w		
	f2					15 w	
	deI					20 w/r	
	de3					53 p/r	
Total	606			310	68	229	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Peat	P						
	a0						428
	a2						165
	b0						500
	c0						50
	d1						281
	d2						542
	de2						227
	cd2						57
	e2						34
	ef2						1
	c2						17
	b2						2
	undif.						111
	de1						40
	ef2I						28
	bc0						19
	cd3						76
	d2						9
Total	2587						2587
Poitras	Ps						
	b0				4 w		
	b1				62 w		
	b2				73 w		
	c1				82 w		
	c2				373 w		
	cd1				55 w		
	cd2				298 w		
	c-ef2				103 w		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class: 2	3	4	5	7	0
Poitras (cont'd)	d1				197 w		
	d2				167 w		
	d3					46 w/p	
	de3					15 w/p	
	e1				4 w		
	e2				5 w		
	ef1					16 w	
	de2				8 w		
	df2					6 w	
	f2					11 w	
Total	1525				1431	94	
Poitras fsl	Ps						
	d2				70 w		
	de2				114 w		
	de3					21 p/w	
Total	205				184	21	
Poitras sil	Ps						
	c0				5 w		
	c1				32 w		
	c2				309 w		
	cd2				225 w		
	d1				5 w		
	d2				72 w		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Poitras	e1				2 w		
sil	a0				8 w		
(cont'd)	cd3					76 p/w	
	e2				6 w		
	de2				102 w		
	c3					41 p/w	
Total	883				766	117	
Quisibis	<u>Q</u>						
	b0		8 r				
	b2		12 r				
	b1I				5 r		
	c0		15 r				
	c1		229 r				
	c2		152 r				
	c2II				23 r		
	cd1		12 r				
	cd2		166 r				
	d1		82 r				
	d2		314 r				
	d2I				23 r		
	d2II				98 r		
	de1			103 t/r			
	de2			130 t/r			
	de2I				308 r		
	de2II				290 r		
	e1			41 t/r			
	e2			715 t/r			
	e2I				270 t/r		
	e2II				48 t/r		
	e3					5 p/r	
	e3II					9 p/r	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Quisibis (cont'd)	ef2				1670 t/r		
	ef2I					982 t/r	
	ef2II					798 t/r	
	ef3					360 p/t	
	ef3III					73 p/r	
	f2				921 t/r		
	f2I					669 t/r	
	f2II					331 t/r	
	f3					4 p/t	
	fg2					720 t/r	
	fg2I					1980 t/r	
	fg2II					2417 t/r	
	fg2III					208 t/r	
	fg3					210 t/p	
	fg3I					70 t/p	
	fg3II					159 p/r	
	fg3III					38 p/r	
	f3I					5 p/t	
	f3II					142 p/r	
	ef2III					25 t/r	
	d4					9 p/r	
	de3				4 p/r		
	dlI				11 r		
	clI				4 r		
	cdlI				1 r		
	c2I				9 r		
	elII					24 r	
	fgIII					44 t/r	
	c2III					10 r	
	ef3II					19 t/p	
	fglI					15 t/r	
	cd2I				41 r		
	ce2II					12 r	
	deI				19 r		
Total	15 062		990	989	3745	9338	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Rob	R						
	b1					78 w	
	c1					4 w	
Total	82					82	
	Sa						
Salmon	b0				48 w/d		
	b1				420 w/d		
	b2				311 w/d		
	c1				1779 w/d		
	c2				769 w/d		
	cd1				200 w/d		
	cd2				861 w/d		
	d1				399 w/d		
	d2				369 w/d		
	de1				36 w/d		
	de2				350 w/d		
	e2				48 w/d		
	e1				4 w/d		
Total	5594				5594		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Siegas	S						
	b0		14 d				
	b1		762 d				
	c1		2268 d				
	c2		650 d				
	cd1		812 d				
	cd2		1033 d				
	d1		868 d				
	d2		917 d				
	de1			149 t			
	de2			603 t			
	e1			29 t			
	e2			157 t			
	b2		264 d				
	c0		6 d				
	ef2				26 t		
Total	8558		7594	938	26		
Sirois	Si						
	b0			73 w			
	b1			87 w			
	b2			287 w			
	b + bc2			39 w			
	c0			8 w			
	c1			1008 w			
	c2			512 w			
	cd1			60 w			
	cd2			1819 w			
	d1			414 2			
	d2			2323 w			
	d4					17 p/w	
	de1			92 w			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class 2	3	4	5	7	0
Sirois (cont'd)	de2			2777 w			
	de2I					14 w/r	
	e1			17 w			
	e2			385 w			
	ef2				627 w		
	f2				25 w		
	g2					4 w	
	undif			9 w			
	ef2I					29 w/r	
	cd0			12 w			
	c3					26 w/p	
	cd3					12 w/p	
	dcI					14 w/r	
Total	10 690			9922	652	116	
St. Amand	A						
	b1				626 d/w		
	c1				28 d/w		
	c0				5 d/w		
	d1				17 d/w		
Total	676				676		
Temiscouata	Te						
	de2I					4 r/w	
	e3					16 p/w	
Total	20					20	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Thibault	Th						
	cl	73					
	dl		43 t				
	fl				11 t		
	del			17 t			
	ef2				38 t		
Total	182	73	43	17	49		
Trafton	Tr						
	c2				25 w		
	cdl				93 w		
	cd2				45 w		
	d2				5 w		
	del				23 w		
	efl				8 w		
	c0				5 w		
	de2				15 w		
	deI					12 w/r	
Total	231				219	12	
Undine	U						
	cl		229 r				
	c2		42 r				
	c3				5 p		
	cdl		146 t/r				
	cd2		15 t/r				
	dl		24 t/r				
	d2		114 t/r				

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Undine (cont'd)	de2			419 t/r			
	e2			264 t/r			
	ef2				55 t		
	ef3II					19 p/r	
	de1			6 t/r			
	e1			9 t			
	g1					21 t	
Total	1368		570	698	60	40	
Victoria	<u>Vi</u>						
	B0	10 f					
	b	4 f					
	b1	41 f					
	b2	51 f					
	c1	663 f					
	c2	744 f					
	c0	8 f					
	c2II					8 r	
	cd1		601 t				
	cd2		1774 t				
	d1		2263 t				
	d2		1771 t				
	de3					14 p	
	de1			1287 t			
	de2			10 939 t			
	de2II					26 r	
	de3					26 p	
	e1			2775 t			
	e2			3667 t			
	ef1				1343 t		
	ef2				6526 t		

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class 2	3	4	5	7	0
Victoria (cont'd)	ef2I					232 t/r	
	ef3					243 p/t	
	ef4					29 p/t	
	eg1					101 t	
	f1				224 t		
	f2				1725 t		
	f2I					121 t/r	
	f3					48 p/t	
	f3I					126 p/r	
	f4					19 p	
	fg2					1141 t	
	fg2I					238 t	
	fg2II					496 t/r	
	fg3					68 t/p	
	fg3II					12 p/r	
	g2					41 t	
	ef2II					54 t/p	
	de2I				57 r		
	e2II					71 r	
	deI				120 r		
	f2III					11 r	
	fg1					141 t	
	do		6 t				
	e3				17 t		
	fgI					111 t/r	
	g1					106 t	
	ce2			54 t			
	df1				91 t		
	e2I				28 r/t		
Total	40 272	1521	6415	18 722	10 131	34 83	

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map Symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Waasis	Wa						
	b0				74 w/i		
	b1				26 w/i		
	c0				105 w/i		
	d2				4 w/i		
	be2				1 w/i		
Total	210				210		
Wapske	Wp						
	b0			35 w			
	b1			4 w			
	c0			195 w			
	c1			51 w			
	c2			9 w			
	cd0			12 w			
	cd1			39 w			
	d0			45 w			
	d1			6 w			
	d2			35 w			
	ef2			29 w			
	d2I			8 w			
Total	468			468			

Table 8. Capability classes, areas, and limitations of the various soils (continued)

Soils	Map symbol	Hectarage and limitations of capability class					
		2	3	4	5	7	0
Washburn	W/d2				101 w		
	de2				165 w		
	e2				30 w		
Total	296				296		
Yellow Brook	Yb/d3					34 p/w	
Total	34					34	

Total area: 346 657 ha

Symbols

c - Adverse climate
d - Undesirable permeability or structure, depth of rooting zone
f - Low fertility
i - Flooding (inundation)
m - Droughtiness
p - Stoniness
r - Shallowness to bedrock
s - Combination of two or more of depth of rooting, fertility, and droughtiness
t - Topography
w - Excess moisture

Table 9. Ratings of the soils for forest productivity

Soils	White Spruce	Black Spruce	Balsam Fir	Sugar Maple
Bellefleur	F-G*	F-G	F-G	F
Boston Brook	G	G	G	F
Bottomland	F-G	F-G	F-G	F-P
Bourgoin	F-P	F	F-P	N.S.
Caribou	G	G	G	G
Carlingford	G	G	G	G-F
Coté	F-P	F	F-P	N.S.
Cyr	P	F	F-P	N.S.
Dubé	F	G	F	F
Ennishore	G-F	G-F	G-F	N.S.-P
Flemming	F-G	F-G	F-G	F-G
Foreston	P	P	P	N.S.
Glassville	G	G	G	G
Grand Falls	F	F	G	G
Harquail	F	F	F	F
Holmesville	G	G	G	G
Interval	G	G	G	F
Johnville	F-G	G	G	F
Maliseet	F-G	F	F-G	F-G
Martial	F-G	F-G	F-G	P
McCluskey	G-F	G	G-F	F
McGee	G	G	G	G
Monquart	G	G	G	G
Muck		Cedar good		
Muniac	F	F	F	F
Nason	G-F	G-F	G-F	F
Peat	P-N.S.	P-N.S.	P-N.S.	N.S.
Poitras	P	F	F-P	N.S.
Quisibis	G	G	G	G
Rob	F-P	F-P	F-P	N.S.
Salmon	F	G	F-G	P
Siegas	F-G	G	F-G	F

* See last page of this table for explanation of symbols.

Table 9. Ratings of the soils for forest productivity (continued)

Soils	White Spruce	Black Spruce	Balsam Fir	Sugar Maple
Sirois	G	G	G	F
Skin Gulch	F	G	F	N.S
St. Amand	F-G	F-G	F-G	P
Temiscouata	F	G	G	P
Thibault	G	G	G	G
Trafton	F-P	F	F-P	N.S.
Undine	F	F	F	F
Victoria	G	G	G	G
Waasis	P-G	F-G	F-G	P-N.S.
Wapske	F-P	F	F-P	N.S.
Washburn	F-P	F	F-P	N.S.
Yellow Brook	F-P	F-G	F-G	N.S.

G - Good (5-10 m^3/ha/yr)

F - Fair (2.5-5 m^3/ha/yr)

P - Poor (0.7-2.5 m^3/ha/yr)

N.S. - Not suitable (<.7 m^3/ha/yr)

Table 10. Soil suitability for recreation development *

Mapping Unit	Slope	Stoniness and/or rockiness	Undeveloped tent site	Developed tent site	Trailer park sites	Camp or cottage sites	Playing field, driving ranges	Golf courses	Small pond building	Winter sports area	Roads, recreation, farm, forest
Bellefleur	a-d	0-1	B	C	C	B	B	B	A	D	C
	e	0-1	D	C	C	B	D	B	C	A	C
Big Spring	c-d	2	D	D	D	D	D	D	D	D	D
	c-d	2I-2II	D	D	D	D	D	D	D	D	D
	e-f	3-2II	D	D	D	D	D	D	D	D	D
Boston Brook	a-d	1-2	A	A	A	B	A	A	B	D	B
	e	1-2	D	D	D	B	D	B	C	A	D-C
	f-g	1-2	D	D	D	D	D	D	D	B	D
	a-d	3-4	A	B	B	B	C-D	D	B	D	A-B
	e	3-4	D	D	D	B	D	D	C	B	C
	f	3-4	D	D	D	D	D	D	D	C	D
Bottomland	A-D	0-3	C-D	D	D	D	B-D	C-D	C	D	D
Bourgoin	a-d	0-2	D	D	D	D	D	D	A	D	C-D
Caribou	a-d	0-2	A	A	B	B	A-B	A	D	D	B
	e	0-2	D	C	C	B	D	A	D	A	C
	f-g	0-2	D	D	D	C-D	D	C	D	B-D	D
Carlingford	a-d	1-2	D	D	D	D	D	D	C	D	D
	e	1-2	D	C	C	B	D	B	D	A	D
Coté	a-d	1-2	D	D	D	D	D	D	B	D	D
Cyr	a-d	0-2	D	D	D	D	D	D	C	D	C
Dubé	a-d	1-2	B-D	B-D	B-D	B-D	C-D	B-D	A	D	B-C
	e	1-2	D	C-D	C-D	B-D	D	B-D	D	B	C
	f	1-2	D	D	D	D	D	D	D	C	D
Ennishore	a-d	0-2	B-C	B-C	B-C	B-C	B-C	B-C	D	D	B-C
	e	0-2	D	C	C	B-C	D	B	D	A	C
Flemming	a-d	0	A	A	A	A	A-B	A	D	D	A-C
	e	0	D	C	C	A	D	A	D	A	C
Glassville	a-d	1-2	A	A	A	C	A	A	D	D	B
	e	1-2	D	C	C	C	D	B	D	A	C
	f-g	1-2	D	D	D	D	D	D	D	B	B
	a-d	3-4	B	C	C	C	D	D	D	B	C
	e	3-4	D	C	C	C	D	D	D	B	D
	f-g	3-4	D	D	D	C-D	D	D	D	B	D
		1-II									
Grand Falls	a-d	1-2	A	A	A	A	A-B	B	D	D	A
	e	1-2	D	C	C	C	D	B	D	A	B
	e	3	D	D	D	C	D	D	D	B	B
Green River	a-d	1-2	A	A	D	C	C	C	D	D	B
	d-e	3	A	B	D	D	D	C	D	D	C
	e-f	1-2	D	D	D	D	D	D	D	B	D
		3	D	D	D	B	D	D	D	B	D
	f-g	3+I	D	D	D	D	D	D	D	C	D
		3+II	D	D	D	D	D	D	D	C	D

* See last page of this table for an explanation of symbols.

Table 10. Soil suitability for recreation development (continued)

Mapping Unit	Slope	Stoniness and/or rockiness	Undeveloped tent site	Developed tent and picnic areas	Trailer park sites	Camp or cottage sites	Playing field, driving ranges	Golf courses	Small pond building	Winter sports area	Roads, recreation, farm, forest
Harquail	a-d	1-2	A	C	C	C	C	C	D	D	B
	e	1-2	D	C	D	C	D	C	D	A	C
	f	1-2	D	D	D	D	D	D	D	B	C-D
Holmesville	a-d	0-2	A	C	C	C	A	A	B	D	B
	e	0-2	D	C	C	C	D	A	C	A	B
	f-g	0-2	D	D	D	C-D	D	C-D	D	B-D	C-D
	a-d	3-4	B	C	C	C	C	D	B	D	B
	e	3-4	D	C	C	C	D	D	C	C	B
	f-g	3-4	D	D	D	C-D	D	D	D	C-D	C-D
Interval	A-B	0	A	C	C	D	B	B	D	D	B
Johnville	a-d	1-2	C-D	D	D	D	C-D	D	A	C	C-D
	e	1-2	D	C-D	C-D	D	D	D	C	A	D
	a-d	3-4	C-D	D	D	D	D	B-D	B	D	C-D
Kelly	all	all	D	D	D	D	D	D	B	D	D
Maliseet	a-d	0-2	A	B	B	B	A-B	A	D	D	B
	e	0-2	D	C	D	C	D	A	D	A	C
Martial	A-D	0-1	B-C	C-D	C-D	C-D	C-D	C-D	D	D	B-C
McCluskey	a-d	1-2	D	D	D	D	D	D	C	D	D
McGee	a-d	1-2	A	A	A	A	A-B	A	D	D	A
	e	1-2	D	C	C	C	D	A	D	A	B
	f-g	1-2	D	D	D	C-D	D	C-D	D	B	C
	a-d	3-4	B	C	C	A	C	C	D	D	A
	e	3-4	D	D	C	C	D	D	D	B	B
Monquart	a-d	1-2	A	A	A	A	A-B	A	D	D	A
	e	1-2	D	C	C	C	D	A	D	A	B
	f	1-2	D	D	D	C	D	C	D	B	C
Muck	A-B	0	D	D	D	D	D	D	D	D	D
Muniac	a-d	0-2	A	A	A	A	B	B	D	D	A
	e	0-2	D	C	C	A	D	B	D	A	B
	f-g	0-2	D	D	D	C-D	D	C-D	D	B-D	C-D
Nason	a-d	1-2	B	B-C	B-C	B-C	C	B-C	C	D	C
	e	1-2	D	C-D	C-D	C-D	D	B-C	D	B	C
	a-d	3-4	B-C	C-D	C-D	B-C	D	D	C	D	B
	e	3-4	D	D	D	C-D	D	D	D	B	C
	f	3-4	D	D	D	D	D	D	D	C	D
Peat	A	0-2	D	D	D	D	D	D	D	D	D
Poitras	a-d	0-2	D	D	D	D	D	D	A	D	D
	a-d	3-4	D	D	D	D	D	D	B	D	D
Quisibis	a-d	1-2	A	C	C	C	C	C	D	D	B
	e	1-2	D	C	C	C	D	C	D	A	C
	f-g	1-2	D	D	D	C-D	D	C-D	D	B-D	C-D
	f-g	3-II	D	D	D	C-D	D	D	D	B-D	D

Table 10. Soil suitability for recreation development (continued)

Mapping Unit	Slope	Stoniness and/or rockiness	Undeveloped tent site	Developed Tent and picnic areas	Trailer park sites	Camp or cottage sites	Playing field, driving ranges	Golf courses	Small pond building	Winter sports area	Roads, recreation, farm, forest
Rob	a-d	2-3	D	D	D	D	D	D	A	D	D
Salmon	a-d	1-2	C	D	D	C	C-D	C	A	D	D
Siegas	a-d	1-2	B	C	C	B	C	B	A	D	C
	e	1-2	D	C	C	B	D	B	C	A	C
Sirois	a-d	0-2	B-D	D	D	D	D	D	C	D	B-C
	e	0-2	D	C-D	C-D	B-D	D	B-D	D-C	A	C
St. Amand	a-d	0-2	B-C	C-D	C-D	C-D	C	C	A	D	C-D
Temiscouata	a-d	1-2	B	C	C	C-D	C	C	B	D	D
	e	1-2	D	D	D	D	D	C	D	A	D
	a-d	3-4	B	C-D	C-D	C-D	D	D	B	D	D
	e	3-4	D	D	D	D	D	D	D	B	D
	f	3-4	D	D	D	D	D	D	D	C	D
Thibault	a-d	2	A	A	A	A	A-B	A	D	D	B
	e	2	D	C	C	B	D	A	D	A	C
	f	2	D	D	D	D	D	C	D	B	D
	a-d	3	A	A	A	A	D	D	D	D	B
	e	3	D	C	C	C	D	D	D	B	C
	f	3	D	D	D	D	D	D	D	C	C
Trafton	a-d	1-2	D	D	D	D	D	D	B	D	D
	e	1-2	D	D	D	D	D	D	D	D	D
	a-d	3-4	D	D	D	D	D	D	D	D	D
	e	3-4	D	D	D	D	D	D	D	D	D
Undine	a-d	0-2	A	C	C	C	C	C	D	D	B
	e	0-2	D	C	D	C	D	C	D	A	C
	f-g	0-2	D	D	D	C-D	D	C-D	D	B	C
Victoria	a-d	1-2	A	A	A	A	A-B	A	D	D	A
	e	1-2	D	C	C	C	D	A	D	A	B
	f	1-2	D	D	D	D	D	C-D	D	B	C
	a-d	3-4	B	B	C	C	C	C	D	D	A
	e	3-4	D	D	D	C	D	D	D	B	B
Waasis	A-B	0	B	C	C	D	B	B	D	D	C
Wapske	A-B	0	D	D	D	D	D	D	C	D	C
Washburn	a-d	1-2	D	D	D	D	D	D	A	D	C
Yellow Brook	a-d	2	B-D	C-D	C-D	B-D	C	B-C	A	D	B
	e	2	D	D	D	C-D	D	B-C	D	B	B-C
	e-f	4	D	D	D	D	D	D	D	C	C-D

*A - Good (slight limitations)
B - Fair (moderate limitations)
C - Poor (severe limitations
D - Very poor (very severe limitations)

I- Rocky 1
II-Rocky 2

Table 11. Particle-size distribution (engineering) of some soils

Soils	Coarse aggregate, % passing							Fine aggregate, % passing							Total %			
	75 mm	50 mm	37.5 mm	25 mm	19 mm	12.5 mm	8.4 mm	No.4	No.10	No.20	No.40	No.60	No.100	No.200	Gravel	Sand	Silt	Clay
Bellefleur	100	100	100	100	100	100	99.8	98.1	95.9	91.0	89.0	85.7	81.8	77.8	4.1	13.2	28.9	41.9
Boston Brook	100	98.7	98.0	95.5	95.3	90.8	87.2	78.7	67.7	58.5	51.7	46.9	41.7	35.3	32.3	39.7	9.0	19.0
Flemming	100	100	100	100	100	100	100	100	99.7	98.8	98.1	97.6	95.8	84.8	0.3	34.7	50.0	15.0
Holmesville	100	96	94.6	89.7	85.9	80.2	75.4	63.7	51.8	42.2	35.9	32.0	27.7	22.0	48.2	30.8	11.0	10.0
Homesville (sil)	100	100	97.6	94.6	91.1	84.8	80.6	71.6	62.6	64.5	48.4	44.2	39.4	33.6	37	29	21.0	9.0
Siegas	100					98.6	96.6	94.0	88.9	83.0	77.4	72.8	67.6	61.9	11	27.0	27.0	35.0

Table 12. Engineering properties of some soils

Soils	G.B.R.	Liquid limit	Plastic limit	Plasticity index	T.P.V.	AASHO	Unified	H.R.B.	Density corrected	Moisure potential	Moisture corrected	Moisture optimum	Voids	Void ratio
Bellefleur	ND	24.5	17.5	7.0	32.5	A7	CL-ML	A4(8)	114.0	17.8	16.0	16.0	3.3	0.481
Boston Brook	ND	NP	NP	NP	21.8	A-2-4	SM	A2(4)	132.0	10.5	9.5	10.0	1.4	0.289
Flemming	18-27	NP	NP	NP	35.7	A-4	ML	A4(8)	108.5	20.7	15.0	15.0	9.7	0.556
Holmesville	29-39	NP	NP	NP	31.5	A-4	SM	A-1-b	121.0	17.0	10.7	12.0	9.2	0.460
Holmesville (sil)	45-49	NP (2)	NP	NP	22.7	A-4	SM	A-2-4	130.5	11.0	8.0	8.5	5.3	0.294
Siegas	ND	24.0	17.5	6.5	30.5	A-7	CL-ML	A-4(5)	118.3	15.9	12.0	12.0	7.5	0.432

Table 13. Estimated soil properties significant to engineering

	Depth to bedrock, cm	Seasonal highwater table	Depth of horizon from surface, cm	Classification: USDA texture	Unified	Aasho	Coarse fraction greater than 7.5 cm	Percentage less than 7.5 cm passing sieve: No.4 4.7 mm	No.10 2 mm	No.40 0.42 mm	No.200 0.74 mm
Bellefleur	120-300	100	30-150	C-SICL	CL-ML	A7-A6	1-5	5-9	91-95	84-92	79-89
Big Spring	25-90	25	20-90	L	SM	A4	1-5		Similar to Quisibis		
Bottomland	100	0-25	30	GRSL	SM-SW	A-1	1-10		Gravel and sand		
Boston Brook	100-200	-100	38-122	L-GCL	SM	A-2-4	1-5		32	25	20
Bourgoin	150-300	10	40	SIC	CL	A6	5-10		92	86	54
Caribou	60-150	100	75	GRCL-CL	SC	A-7	1-3		57-77	55	36-50
Carlingford	60-150	12	75	GRCL-CL	SC	A-7	1-3		57-91	60	36-53
Coté	150-300	1	75	GR-GRSL	GP-GM	A-1			Similar to Victoria		
Cyr	150-300	13	41	GRSL-SGR	GW	A-1			Same as Muniac and Grand Falls		
Dubé	38-80	0	19-43	SIL	SM	A-4			Same as Quisbis		
Ennishore	300-	13	91+	GR-LS	SW	A-1			Same as Muniac		
Flemming (loam)	100-300	100	45	SIL-SL	ML	A4	0	0	100	92-94	56-63
Flemming(fine sandy loam)	100-300	100	48	FSL-LS	ML	A4	0	0	100	similar	
Glassville	60-150	100	45	GRL-SL	SM	A4	30-50		24-63	18-48	12-34
Glassville (sandy loam)	60-150	100	45	GRSL	SM	A4	30-50		Similar to above		
Grand Falls	300-	100	40	GRS	GW	A1	15-20		37	9	2-3

Liquid limit	Plasticity index	Permeability	Available water capacity and volume	Reaction	Corrosivity concrete
24.5	7.0	slow	9-17	4.8-7.7	Mod.-high
25		slow-med.	--	5.3	Moderate
NP	NP	rapid	--	5.0-7.0	Moderate
NP	NP	slow	14-24	5.5	Moderate
34.5	--	slow	--	6.2	Low
--	--	mod.-rap.	15-26	6.2	Low
--	--	mod.	30-37	6.5	Low
NP	NP	rap.-mod.	--	6.0-7.0	Low
NP	NP	rapid	--	5.4-7.0	Moderate
--	--	mod.	--	5.0-5.4	Moderate
NP	NP	rapid	--	7.0	Low
NP	NP	mod.	13	5.4	Moderate
NP	NP	rapid	--	5.4	Moderate
NP	NP	rapid	11	4.9	High
NP	NP	rapid	--	4.9	High
NP	NP	rapid	14	5.0	High

	Depths to bedrock, cm	Seasonal highwater table	Depth of horizon from surface, cm	Classification			Coarse fraction greater than 7.5 cm	Percentage, less than 7.5 cm passing sieve			
				USDA texture	Unified	Aasho		No. 4 4.7 mm	No. 10 2 mm	No. 40 0.42 mm	No. 200 0.74 mm
Green River	50-150	None	24-50	GRSIL	ML	A4			--	--	--
Harquail	38-60	--	38	SICL	CL	A6	0-1		83	77	67
Holmesville (sandy loam)	150-300	100	25-35	GRL	SM	A2-4	3		64	50	32
Holmesville (fine sandy loam)	150-300	100	25-35	GRSL	SM	A4			83	67	50
Holmesville (silt loam)	100-300	100	25-35	GRSIL	GM-ML	A1-A4			45-77	30-65	38-74
Interval	150-	Floods	76	SIL-FSL	ML	A4	0	0	100	--	65
Johnville (sandy loam)	150-300	5	24	GRL	SM	A-2-4			69	60	38
Johnville (fine sandy loam)	150-300	5	24	GRL	SM	A-2-4			Similar to other Johnville		
Johnville (silt loam)	100-300	5	25	GRL	SM	A2-4			59	56	42
Kelly	150-300	0	63	SIL-FSL	ML	A-4	0		Similar to Flemming		
Maliseet (sandy loam)	100-300	100	61	SL-LS	ML-SM	A-4	0		97-100	78-96	34-49
Maliseet (coarse and sandy loam)	100-300	100	37	SL	SM	A-1	0	98	96	93	34
Martial	150-300	5	86	SIL-SL	ML-CL	A-4	0		100	99.8	94
Martial (fine sandy loam)	150-300	5	86	FSL	GW-SW	A-1	0		100	45	20
McCluskey	150-300	5	75	GRSL	GM	A-1			39	28	21
McGee	100-300	100	135	GRSL-GCL	GM	A-1			51	34	18
Monquart	100-300	100	150	GRSL-GRL	SM	A2-4			69	65	23
Muck	---	--	--	Organic	0	Org.		--	--	--	--
Muniac	300-	100	121	GRSL	SW	A1		100	44	32	14
Nason	100-300	5	66	VGRL	SM-SW	A1			25-50		8-18
Peat		--	--	Organic	0	Org.					

Liquid limit	Plasticity index	Permeability	Available water capacity and volume	Reaction	Corrosivity concrete
--	weak	mod.	--	5.2-5.4	Moderate
--	--	mod.-rap.	4	5.8	Moderate
NP	NP	mod.-rap.	21-24	5.0-5.5	High
NP	NP	mod-rap.	5	5.0-5.5	High
NP	NP	mod.-rap.	13-20	5.0-5.5	High
weakly		rapid	--	4.8-7	Low
NP	NP	mod.-slow	13-15	5.0-5.5	High
NP	NP	mod.	--	5.0-5.5	High
NP	NP	mod.	13	5.0-5.5	High
NP	NP	mod.	--	7.2	Low
NP	NP	rapid	11-12	5.4	High
NP	NP	rapid	--	5.4	High
NP	NP	mod.	25	4.9-6.2	Moderate
NP	NP	mod.	--	4.9-6.2	Moderate
NP	NP	mod.	--	5.0-5.5	High
NP	NP	rapid	15-20	4.8-5.4	High
weakly		rap.-mod.	20	5.4-6.0	Moderate
NP	NP	mod.	--	6.8	Moderate
NP	NP	rapid	--	7.7	Low
NP	NP	rapid	--	5.0-5.4	High
NP	NP	rapid	--	4.0-5.0	High

	Depths to bedrock cm	Seasonal highwater table	Depth of horizon from surface, cm	Classification			Coarse fraction greater than 7.5 cm	Percentage, less than 7.5 cm passing sieve			
				USDA texture	Unified	Aasho		No. 4 4.7 mm	No. 10 2 mm	No. 40 0.42 mm	No. 200 0.74 mm
Poitras (sandy loam)	150-300	0-1	26	GRL	SM	A-4			64	55	39
Poitras (fine sandy loam)	150-300	0-1	20	GRSL	SM	A-4					
Poitras (silt loam)	100-300	0-1	20	GRL	ML-GM	A4-A1		72	64	58	50
Quisibis	38-80	100	22-38	L	SM	A-4			--	--	--
Rob	120-300	5	119	GRCL	CL-CL	A-4			Similar to Bellefleur		
Salmon	150-300	15	30-100	C	CL	A-6			92	86	54
Siegas	150-300	25	91-150	C-CL	GC-CL	A-6			64-92	57-83	50-72
Sirois	300	10	61	GR	GW	A-1			Similar to Grand Falls		
St. Armand	150-300	7	48-76	SICL	CL-ML	A-6	Tr		91-95	84-92	79-89
			76+	GR-SICL			2-5		64-92	57-83	50-72
Temiscouata	60-150	10	30-61	GRL	SP-SM	A-1			24-63	12-48	12-34
Thibault	150-300	100	135	GRSL	SM	A-2-4			80	70	42
Trafton	100-130	5	46	GRSL	GM	A-4			Similar to McGee		
Victoria	150-300	100	75	GRL-GRSL	GP-GM	A-1			39	28	21
Undine	30-50	100	30	SHSIL	ML	A-7			--	--	--
Waasis	150-300	Floods	84	SIL	ML	A-4			Same as Interval		
Wapske	100-300	0-15	91	LS	ML-SM	A-4			Similar to Maliseet		
Washburn	100-200	0-5	50-66	GRSICL	CL	A-6			90	88	62
Yellow Brook	100-200	0-5	50-66	L-GRCL	SM	A-2-4			Similar to Boston Brook		

Liquid limit	Plasticity index	Permeability	Available water capacity and volume	Reaction	Corrosivity concrete
13.8	weak	slow	12-17	5.6-6.4	Moderate
weakly		slow	11	5.6-6.4	Moderate
weakly		slow	--	5.6-6.4	Moderate
25	--	mod. rap.	7	5.0	High
24	7	slow	--	7.0-7.2	Low
24	17.5	mod.-slow	--	6.0-6.6	Low
24	17.5	mod.	6-26	6.0-7.0	Low
NP	NP	rapid	--	5.0	High
24	7	slow	--	5.4	High
24	6.5	slow	--	7.2	Low
NP	NP	slow	--	5.0	High
weakly		mod. rap.	18-19	5.0	High
NP	NP	mod. rap.	--	4.6-4.8	High
NP	NP	rapid	--	5.4	High
weakly		rapid	--	5.0	High
--	--	mod. slow	--	4.9-7.0	High-low
NP	NP	rapid	--	4.8-7.2	High-low
--	--	slow	--	7.2	Low
--	--	slow	--	5.0	High

Table 14. Interpretation of Engineering Properties of the Soils

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Bellefleur 0-8% slope	Moderate slow permeability	Slight Moderate	Slight-moderate drainage,	Moderate drainage	Slight Moderate slopes	Slight-moderate slopes	Moderate texture frost action	High
8-15	Severe slope and permeability	Severe	Severe slopes	Severe				
Big Spring	Severe shallow to bedrock	Severe soil texture, high water table	Severe high water table, shallow to bedrock	Severe drainage, high water table	Severe drainage, bedrock	Severe drainage	Severe drainage	High
Bottomland	Severe flooding, high seasonal water table	Severe flooding, soil texture	Severe flooding, gravel and stones	Severe drainage, flooding	Moderate-severe flooding, drainage	Moderate-severe flooding, drainage	Severe flooding	Moderate to high
Boston Brook	Severe high seasonal water table slow permeability	Moderate soil texture, coarse fragments Severe	Moderate drainage, severe slopes	Slight-moderate slope Severe slope	Slight-moderate slopes	Slight-moderate slopes	Moderate frost action	High
Bourgoin	Severe high seasonal water table slow permeability	Severe high water table	Severe texture drainage	Severe drainage, high water table	Severe drainage, depth to water table	Severe drainage, depth to water table	Severe drainage	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Poor texture, frost action	Unsuitable	Fair texture, depth	Good	Fair piping	Fine material may fill tile	Slow intake rates, medium water-holding capacity	Erodable material	Erodable, may wash before cover is established
Poor drainage, frost action	Poor	Poor drainage	Poor bedrock, shale	Fair-poor piping, shallow	Shallow to bedrock	Not needed	Not needed	Shallow erodable
Good subject to flooding, sometimes poorly drained	Fair	Fair depth, drainage	Poor seepage	Poor permeability	May or may not be needed outlets	Moderate intake rates, fair water-holding capacity	Not needed	Subject to flooding natural-water way
Poor frost action	Poor	Fair texture, gravel	Fair channery	Fair-good piping	Channery	Slow intake rate	Subject to erosion	Subject to erosion
Poor drainage frost action	Unsuitable	Poor texture, drainage	Good high water table	Good	High water table, compact subsoil	Slow intake	Not needed, compact subsoil	Compact subsoil high water table

Table 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for: Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Caribou	Moderate depth to bedrock	Moderate depth to shattered bedrock Severe	Slight-moderate >8%, <15% slope Severe slope	Slight-moderate slopes Severe	Severe depth to bedrock	Slight-moderate slopes	Moderate depth to bedrock, texture	Moderate
Carlingford	Severe high seasonal water table, depth to bedrock	Severe high seasonal water table, depth to shattered bedrock	Severe drainage	Severe drainage high water table	Severe depth to bedrock, drainage	Moderate-severe drainage	Severe depth to bedrock, texture, drainage	Moderate to high
Coté	Severe high water table, long periods	Severe soil texture, high water table	Severe drainage, texture	Severe drainage, high water table	Severe drainage, high water table	Severe drainage	Severe drainage	Moderate to high
Cyr	Severe high water table	Severe soil texture, high water table	Severe drainage, texture	Severe drainage, high water table	Severe drainage, high water table, permeability	Severe drainage	Severe drainage	Moderate to high
Dubé	Severe high water table	Severe high water table, depth to shattered bedrock	Severe drainage	Severe drainage, high water table	Severe drainage, depth to bedrock	Moderate-severe drainage	Severe drainage depth to bedrock	High
Ennishore	Severe high seasonal water table	Severe soil texture, high water table	Severe drainage	Severe drainage, high water table	Moderate-severe imperfect to poor drainage permeability	Severe drainage	Moderate-severe drainage	High
Flemming	Moderate seasonal water table 100 cm	Severe soil texture	Moderate water table	Slight slopes	Moderate texture	Moderate water table	Moderate texture	High
Glassville	Severe bedrock usually less than 122 cm	Severe soil texture, depth to bedrock, coarse fragments	Severe stones, depth to bedrock	Slight slopes, moderate slopes >100 cm bedrock <150 cm	Moderate-severe depth to bedrock stoniness, texture	Slight-moderate slopes	Moderate depth to bedrock	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Fair frost action	Poor	Good	Poor needs treatment	Good	Not Needed	Moderately slow intake rate, good water-holding capacity	Long slopes slopes subject to erosion	Subject to erosion
Poor frost action, drainage	Poor	Fair drainage	Poor needs treatment	Good	Moderately high water table	Low intake rate, good water-holding capacity	Foot of long slopes	Subject to erosion
Poor drainage	Fair	Poor drainage gravel	Poor sand and gravel strata, high water table	Fair permeability	High water rate	Rapid intake rate	Wet or very wet soils	High water table, subject to prolonged seepage
Poor drainage	Good	Poor drainage, gravel	Poor sand, and gravel, high water table	Poor permeability	High water table outlets	Rapid intake rate	Not Needed	High water table
Poor drainage	Poor	Poor drainage	Poor excessive seepage, shallow soil	Fair piping	Shallow to bedrock, uneven rock surface	Moderate intake rates, shallow to bedrock	Shallow to bedrock	Shallow to bedrock, moderately high water table
Fair drainage	Good	Poor drainage	Poor sand and gravel layers	Poor permeability	Sand and gravel, cut slopes, subject to seepage	Moderately low intake rates, good water holding capacity	Seepage	Seepage
Fair texture	Good at depth	Good	Poor needs treatment	Fair piping	Not needed	Moderate intake rate, good water-holding capacity in solum	Subject to erosion	Subject to erosion
Good-fair rockiness	Poor	Fair-poor stones, gravel	Poor gravelly channery	Fair piping	Not needed	Moderately high intake rates, fair water-holding capacity	Subject to erosion, bouldery, stony	Subject to erosion, rock outcrops

Table 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations 11	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Grand Falls	Moderate too rapid runoff	Severe soil texture	Severe texture	Slight moderate slopes	Severe texture, permeability	Severe permeability	Slight	Low
Green River	Severe shallow to bedrock	Severe depth to bedrock slope, coarse fragments	Severe depth to bedrock	Severe depth to bedrock	Severe depth to bedrock	Slight-moderate slope	Moderate depth to bedrock, texture	High
Harquail	Severe shallow to bedrock	Severe shallow to shattered bedrock	Severe depth to bedrock	Severe depth to bedrock	Severe depth to bedrock	Slight-moderate slope	Moderate depth to bedrock, texture	High
Holmesville (sandy loam)	Moderate-severe, slowly permeable layer at 50-60 cm Severe slopes	Moderate soil texture Severe slope	Moderate compact till Severe slope	Slight-moderate slopes Severe slopes	Slight slopes moderate slopes	Slight-moderate slopes	Moderate texture	High
Holmesville (fine sandy loam)	Moderate severe, slowly permeable layer at 50-60 cm Severe slope	Moderate soil texture severe slope	Moderate compact till Severe slope	Same	Same	Same	Same	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Good	Good	Fair gravel	Poor rapidly permeable	Poor permeability	Not needed	Moderately high intake rate, poor water-holding capacity	Loose substrata	Subject to erosion loose substrata
Fair-poor depth to bedrock	Unsuitable	Poor stones, bedrock	Poor shallow	Poor piping, shallow	Not needed	Moderately high intake rate, shallow to till and bedrock	Subject to erosion, shallow to compact material and bedrock	Subject to erosion, compact, subsoil bedrock
Poor texture, depth to bedrock	Unsuitable	Fair texture	Poor shallow	Fair shallow	Not needed	Moderate intake rate, fair water-holding capacity	Shallow to bedrock	Shallow to bedrock, erodes easily
Fair texture	Poor	Good-fair gravel and stones	Fair underlain by permeable bedrock in places	Fair piping	Not needed	Moderate intake rates, good water-holding capacity	Compact subsoil	Compact subsoil, subject to erosion
Fair texture	Poor	Good-fair gravel and stones	Same	Fair piping	Not needed	Same	Same	Same

Table 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill		Local roads and streets L1	Potential frost action
					Trench type L3	Area type L1		
Holmesville (silt loam)	Moderate-severe, slowly permeable layer at 50-60 cm Severe slope	Moderate soil texture Severe slope	Moderate compact till Severe slope	Same	Same	Same	Same	Same
Interval	Severe flooding	Severe flooding	Severe flooding 1 month per year	Severe flooding	Severe flooding	Severe flooding	Severe flooding, texture	High
Johnville (sandy loam)	Severe high water table, seasonal, slowly permeable layer at 50-60 cm	Severe high water table, soil texture	Severe high water table, compact till	Severe drainage, high water table	Severe-moderate drainage, water table	Moderate-severe drainage, high water table	Moderate-severe drainage, texture	High
Johnville (fine sandy loam)	Severe high water table, seasonal, slowly permeable layer at 50-60 cm	Severe soil texture, high water table	Severe high water table, compact till	Same	Same	Same	Same	High
Johnville (silt loam)	Severe high water table, seasonal, slowly permeable layer at 50-60 cm	Severe soil texture, high water table	Severe high water table, compact till	Same	Same	Same	Same	High
Kelly	Severe high water table for considerable part of year	Severe soil texture, high water table	Severe high water table	Severe drainage, high water table	Severe drainage, high water table, permeability	Severe high water table, drainage	Severe drainage	High
Maliseet (sandy loam)	Slight	Moderate-severe soil texture	Moderate side wall stability at certain moisture contents	Slight-moderate slope Severe slope	Moderate-severe texture permeability	Slight-severe texture permeability	Moderate texture	High
Maliseet (coarse sandy loam)	Slight maybe too rapid	Moderate-severe soil texture	Moderate side wall stability at certain moisture contents	Same	Same	Same	Same	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Fair texture	Poor	Good-fair gravel and stones	Same	Fair piping	Not needed	Same	Same	Same
Fair texture	Fair sometimes at depth	Good	Poor moderate permeability, subject to flooding	Poor-fair piping, compaction shear strength	Outlets, not always needed	Moderate intake rate, good water-holding capacity	Not needed	Subject to flooding
Fair-poor drainage	Poor	Fair-poor drainage, gravel and stones	Good	Good shear strength	Compact subsoil	Moderate intake rate, good water-holding capacity	Compact subsoil	Compact subsoil, subject to erosion
Fair-poor drainage	Poor	Same	Good	Same	Same	Same	Same	Same
Fair-poor drainage	Poor	Same	Good	Same	Same	Same	Same	Same
Poor drainage, texture	Fair at depth	Poor drainage	Fair underlain by sand, high water table	Poor piping shear strength compaction	High water table	Moderate intake rate, good water-holding capacity	Not needed	Wet, high water table
Good-fair texture	Good at depth	Good	Poor excessive seepage	Fair piping	Not needed	High intake rate, fair water-holding capacity	Permeable, subject to erosion	Subject to erosion
Good-fair texture	Good at depth	Good-fair texture	Same	Same	Same	Same	Same	Same

TABLE 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Martial	Moderate high water table for part of year	Severe high water table, soil texture	Severe high seasonal water table, drainage	Severe drainage, high water table	Severe drainage, high water table	Severe-moderate drainage, water table	Severe drainage	High
Martial (fine sandy loam)	Moderate high water table for part of year	Severe high water table, soil texture	Severe drainage, high seasonal water table	Same	Same	Same	Same	Moderate
McCluskey	Moderate high water table for part of year	Severe high water table, soil texture	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Moderate-severe drainage, water table	Moderate-severe drainage	Moderate
McGee	Slight-severe uneven bedrock	Severe soil texture	Slight-severe texture Moderate slope Severe slope	Slight-moderate slopes, bedrock >100 <150 cm Severe slopes bedrock 100	Moderate-severe excessive permeability	Slight-severe recessive permeability slope	Slight	Moderate
Monquart	Moderate-slight depth of bedrock	Moderate soil texture Severe slope	Slight Moderate slope Severe slope	Slight moderate slopes Severe slopes	Slight slopes Moderate slopes	Slight-moderate slopes	Slight	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Fair-poor drainage	Good at depth	Fair-poor drainage	Poor underlain by sand	Poor shear strength compaction, piping	Fine texture high water table	Moderate intake rate, good water-holding capacity	Not needed	Subject to erosion
Fair-poor drainage	Good at depth	Fair-poor	Same	Same	Same	Same	Same	Same
Fair-poor drainage	Fair	Poor drainage, gravel	Poor gravel and sand strata	Good	Moderately high water table	Moderate intake rate, fair water-holding capacity	Subject to erosion	Subject to erosion
Good	Fair	Fair-good gravel	Poor gravel and sand strata	Good-poor maybe permeable	Not needed	Moderate intake rate, fair water-holding capacity	Subject to erosion	Subject to erosion
Good	Poor	Good-fair gravel	Poor needs treatment	Fair piping	Not needed	Moderate intake rate, good water-holding capacity	Long slopes, subject to erosion	Subject to erosion

TABLE 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Muck	Severe organic, high water table	Severe organic, high water table in mineral soil	Severe shallow organic high water table	Severe organic high water table	Severe organic	Severe organic	Severe organic	High organic
Muniac	Slight-moderate maybe too rapid percolation	Severe soil texture	Slight-severe texture Moderate slope Severe slope	Slight Moderate slopes Severe slopes	Severe rapid permeability texture	Severe rapid permeability	Slight	Low
Nason	Moderate high water table for several months	Severe soil texture, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage high water table	Severe drainage	Moderate-severe drainage	Moderate
Peat	Deep organic	Severe organic	Severe organic	Severe organic	Severe organic	Severe organic	Severe organic	High
Poitras (sandy loam)	Severe high water table considerable part of year, slowly permeable at 50 cm	Severe high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Not suitable	Unsuitable	Good for amending organic content	Poor organic	Unsuitable	Shallow organic	High intake rate, high water-holding capacity	Not needed	Shallow organic
Good	Good	Fair gravel	Poor rapidly permeable gravel and sand	Poor permeable	Not needed	Moderately high intake rates, poor water-holding capacity	Loose substrata	Loose substrata subject to erosion
Fair-poor drainage	Fair	Poor drainage, gravel	Poor sand and gravel strata	Poor permeable, piping	Bouldery high water table	Moderate intake rate, fair water-holding capacity	Subject to erosion, seepage	Subject to erosion
Not suitable	Unsuitable	Good for amending, organic content	Poor Organic	Unsuitable	Organic	High intake rate, high water-holding capacity	Organic, not needed	Organic, saturated
Poor drainage	Poor	Poor drainage	Good high water table	Fair piping, shear strength	High water table, compact subsoil, hanging water table	Moderate intake rate, high water-holding capacity	Wet or very wet soils, compact subsoils	High water table, subject to prolonged seepage

Table 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for: Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Poitras (fine sandy loam)	Similar to above	Severe high water table	Severe drainage, high water table	Same	Same	Same	Same	High
Poitras (silt loam)	Similar to above	Severe high water table	Severe high water table, drainage	Same	Same	Same	Same	High
Quisibis	Severe shallow to bedrock	Severe depth to shattered bedrock, soil texture	Severe shallow to bedrock	Moderate depth to bedrock Severe slopes	Severe shallow to bedrock	Slight moderate slopes	Moderate depth to bedrock, texture	High
Rob	Severe high water table	Severe high water table, presence of sand layers	Severe high water table, side wall sloughs due sand lenses	Severe drainage high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, texture	High
Salmon	Severe high water table impermeable layer at 50 cm or less	Severe high water table	Severe high water table, drainage	Severe high water table, drainage	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, texture	High
Siegas	Severe slowly permeable layer at 50 cm or less	Slight Moderate slope Severe slope	Moderate compact till Severe slopes	Moderate water table, slopes Severe slopes	Slight slope Moderate slopes	Slight-moderate slopes	Moderate texture	Moderate to high
Sirois	Severe high water table considerable part of year	Severe high water table, soil texture	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table, permeability	Severe-drainage, high water table	Severe-moderate drainage	Moderate
St. Amand	Severe high water table, slowly permeable below 20 cm	Severe high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe-moderate drainage, high water table	Severe drainage, texture	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Poor drainage	Poor	Poor drainage	Same	Same	Same	Same	Same	Same
Poor drainage	Poor	Poor drainage	Same	Same	Same	Same	Same	Same
Poor texture, depth	Poor	Fair depth	Poor excessive seepage shallow to shattered bedrock	Poor piping, shear strength shallow	Not needed	Moderately high intake rate, fair water-holding capacity	Shallow to bedrock	Shallow to bedrock, erodes easily
Poor drainage, texture	Unsuitable	Poor drainage, consistence	Good high water table, impermeable	Fair shear strength piping, compaction	High water table, fine texture	Slow intake rate	Not applicable	Continuous flow, high water table
Poor drainage, texture	Unsuitable	Poor drainage, texture, consistence	Good	Good shear strength	Compact subsoil, fine material	Low intake rates, good water-holding capacity	Compact subsoil	Subject to erosion, seepage
Fair texture	Unsuitable	Poor depth texture	Good	Good shear strength	Compact subsoil	Low intake rates, good water-holding capacity	Compact subsoil	Compact subsoil
Poor drainage	Good	Poor drainage	Poor sand and gravel layers	Poor permeability	Sand and gravel cut slopes subject to erosion	Moderately slow intake rates, fair water-holding capacity	Seepage	Seepage
Poor texture, drainage	Unsuitable	Poor texture, drainage, consistence	Good	Poor shear, strength compaction, piping	High water table, fine material	Slow intake rate	Erodable	High water table, erodable

TABLE 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Temiscouata	Severe high water table, uneven bedrock	Severe high water table, soil texture, coarse fragments	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage	Severe drainage	High
Thibault	Slight bedrock may be problem	Moderate soil texture	Slight moderate slopes Severe slopes	Slight-Moderate slopes Severe slopes	Slight-moderate slopes	Slight-moderate slopes	Moderate texture	High
Trafton	Severe high water table several months of year	Severe high water table, soil texture	Severe high water table, drainage	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage	Moderate
Victoria	Slight	Severe soil texture (generally)	Slight-moderate slopes Severe slopes	Slight-moderate slopes Severe slopes	Slight-severe texture, rapid permeability	Slight-severe rapidly permeable Moderate slopes	Slight	Low
Undine	Severe bedrock within 60 cm of surface	Severe shallow to shattered bedrock	Severe shallow to bedrock	Severe shallow to bedrock	Severe shallow to bedrock	Slight-moderate slopes	Moderate depth to bedrock, texture	High

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Poor drainage	Fair shallow	Poor drainage, coarse fragments	Fair-Poor channery	Poor permeability, piping	Bouldery high water table	Moderately high intake rate, fair water-holding capacity	Shallow to bedrock, stony, bouldery	High water table
Good	Poor	Good-fair gravel	Poor needs treatment	Fair piping	Not needed	Moderate intake rate, good water-holding capacity	Subject to erosion	Subject to erosion
Poor drainage	Poor	Poor drainage gravel	Poor sand and gravel strata	Poor permeable	High water table, stony	Moderate intake rate, fair water-holding capacity	Not needed	High water table
Good	Good usually with depth	Good-fair gravel	Poor sand and gravel strata	Poor-fair permeable	Not needed	Moderate intake rate, fair-good water-holding capacity	Subject to erosion	Subject to erosion
Poor texture, depth	Unsuitable	Fair depth to bedrock	Poor shallow to shattered bedrock	Poor piping, compaction, depth	Not needed	Moderate intake rate, fair water-holding capacity	Shallow to bedrock, easily eroded	Shallow to bedrock, easily eroded

Table 14. Interpretation of Engineering Properties of the Soils (continued)

Soils	Degree and kind of limitations for							
	Septic tank absorption fields L1	Sewage lagoons L2	Shallow excavations L1	Dwellings with basements L1	Sanitary land fill: Trench type L3	Sanitary land fill: Area type L1	Local roads and streets L1	Potential frost action
Waasis	Severe flooding, high water table	Severe flooding, high water table	Severe flooding, drainage	Severe drainage, flooding	Severe flooding, drainage	Severe flooding, drainage	Severe flooding drainage	High
Wapske	Severe high water table	Severe high water table	Severe high water table, drainage	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage	High
Washburn	Severe high water table, slowly permeable	Severe high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, texture	High
Yellow Brook	Severe high water table, slowly permeable	Severe high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, high water table	Severe drainage, texture	High

L1 Soils in these categories must have slopes as follows; slight 0-8%, moderate 9-15%, severe more than 15%.

L2 Soils in these categories must have slopes as follows; slight 0-2%, moderate 2-7%, severe more than 7%.

L3 Soils in these categories must have slopes as follows; slight 0-15%, moderate 15-25%, severe more than 25%.

Suitability as a source of			Soil features affecting engineering practices					
Road fill L3	Sand and gravel	Topsoil	Ponds	Compacted dykes, levees, and other embankments	Agriculture drainage	Irrigation	Diversion terraces	Waterways
Poor drainage, texture	Unsuitable to good at depth	Fair-poor drainage	Poor subject to flooding	Poor shear strength piping, compaction	Flooding, fine texture	Moderate intake rate, good water-holding capacity	Not needed	Subject to flooding
Poor drainage	Fair with depth	Poor drainage	Poor sand layers below 30 cm	Poor piping compaction	High water table, unstable cut banks	Moderate intake rate, fair water-holding capacity	Not needed seepage	High water table
Poor texture, drainage	Unsuitable	Poor drainage	Good	Good shear strength	High water table	Moderate intake rate, good water-holding capacity	Not needed	High water table
Poor drainage	Unsuitable	Poor drainage	Fair-good	Fair piping	Slow internal drainage	Slow intake rate	Not needed, usually depressional or level	High water table

Table 15. Mechanical analyses of representative soil profiles as percentages of ovendry weights

Horizon	Depth	Gravel more than	Sand						Silt	Clay less than	Texture
			Very coarse	Coarse 1.0-0.5	Medium 0.5-0.25	Fine 0.25-0.1	Very fine 0.1-0.05	Total 2.0-0.05	0.05-0.002	0.002	
	cm	2 mm	2-1 mm	mm	mm	mm	mm	mm	mm	mm	
					Boston Brook						
Ae	0-5	26.8	3.5	1.0	1.0	2.0	6.8	14.3	56.3	29.4	SiCL
Bf1	5-13	47.1	12.7	8.4	5.8	8.4	6.7	42.0	40.4	17.6	L
Bf2	13-23	ND*	12.7	7.5	5.7	5.5	5.7	37.1	40.6	22.3	L
BC	23-38	52.7	19.6	8.7	5.6	5.1	4.8	43.8	30.9	25.3	GrL
C	38-122	68.2	13.4	7.4	5.0	5.5	5.5	36.8	28.5	34.7	GrCL
					Bourgoin						
Ah	0-2	11.0	4.5	0.5	3.7	4.2	3.0	15.9	35.9	48.2	C
Ahe	2-7	11.0	4.5	0.5	3.7	4.2	3.0	15.9	35.9	48.2	C
Aeg	7-30	7.5	2.3	1.3	2.7	4.8	4.5	15.6	32.9	51.5	C
Bg	30-40	7.9	4.1	4.3	10.0	13.6	8.6	40.6	30.5	28.9	CL
Cg	40-91	4.2	1.4	2.1	3.6	4.4	3.0	14.5	40.0	45.5	SiC
					Caribou						
Ah	0-5	ND	ND	ND	ND	ND	ND	26.8	49.9	23.3	SiL
Ae	Trace	ND	ND	ND	ND	ND	ND	21.5	54.2	24.3	SiL
Bhf	5-25	15.7	3.8	4.9	5.0	5.4	11.0	30.1	37.9	32.0	CL
Bf	25-35	22.2	4.3	5.1	6.7	7.6	8.6	32.3	44.4	23.3	L
Bt1	35-61	33.1	4.1	5.2	7.2	8.3	9.6	34.4	32.0	33.6	CL
Bt2	61-75	26.8	4.1	5.4	6.5	7.7	8.8	32.5	31.0	36.5	CL
C1	75-100	40.1	4.1	5.6	6.0	6.7	8.2	30.6	37.5	31.9	GrCL
C2	100-124	65.4	2.4	4.0	7.7	9.4	10.9	34.4	33.7	31.9	GrCL

Table 15. Mechanical analyses of representative soil profiles as percentages of ovendry weights (continued)

Horizon	Depth cm	Gravel more than 2 mm	Sand: Very coarse 2-1 mm	Sand: Coarse 1.0-0.5 mm	Sand: Medium 0.5-0.25 mm	Sand: Fine 0.25-0.1 mm	Sand: Very fine 0.1-0.05 mm	Sand: Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay less than 0.002 mm	Texture
						Carlingford					
Ah	0-5	4.9	3.3	1.5	3.8	6.3	8.0	22.9	57.8	19.3	SiL
Aegj	5-12	16.8	12.9	1.9	2.3	3.6	7.9	28.6	50.2	21.2	SiL
Btjgl	12-28	10.6	8.0	0.8	2.3	4.8	10.6	26.5	46.9	26.6	L
Btjg2	28-37	5.5	5.4	1.1	2.7	6.5	9.6	25.3	47.6	27.1	L
Cg	37-76	13.8	17.7	1.4	4.8	6.6	10.8	41.3	35.4	23.3	L
						Flemming					
Ae	0-2	0.0	0.1	0.1	0.2	5.5	8.6	14.5	59.3	26.2	Sil
Bhf	2-5	0.0	0.3	0.1	0.8	18.1	14.0	33.3	41.0	25.7	L
Bf1	5-7	0.0	0.2	0.1	0.9	26.5	16.0	43.8	34.8	21.4	L
Bf2	7-15	0.0	0.0	0.1	0.7	25.2	18.1	44.1	43.3	12.6	L
BC1	15-30	0.0	0.2	0.0	2.6	30.4	25.0	58.3	29.5	12.2	SL
BC2	30-44	0.0	0.2	0.2	4.0	39.7	21.9	65.9	22.5	11.6	SL
C1	44-81	0.0	0.1	0.7	1.3	15.4	21.2	38.8	34.0	27.2	L
C2	81-109	0.0	0.6	0.2	0.8	22.7	20.8	45.1	38.3	16.6	L
C3	109-121	0.0	0.0	0.0	0.8	20.9	18.8	40.5	47.9	11.6	L
IICg1	121-132	0.0	0.0	0.0	0.5	15.0	21.4	37.0	47.4	15.6	SiL-L
IICg2	132-166	0.0	0.2	0.4	4.6	28.9	16.3	50.4	38.0	11.6	L
IIIC	166+	0.0	2.1	4.3	7.1	18.6	11.5	43.7	41.7	14.6	L

Table 15. Mechanical analyses of representative soil profiles as percentages of ovendry weights (continued)

Horizon	Depth cm	Gravel more than 2 mm	Sand: Very coarse 2-1 mm	Sand: Coarse 1.0-0.5 mm	Sand: Medium 0.5-0.25 mm	Sand: Fine 0.25-0.1 mm	Sand: Very fine 0.1-0.05 mm	Sand: Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay less than 0.002 mm	Texture
						Glassville					
Ae	0-2	42.6	0.4	0.6	0.6	2.3	5.2	9.1	56.1	34.8	SiCL
Bhf1	2-5	44.7	4.6	4.0	2.3	4.3	3.8	17.8	55.7	25.5	SiL
Bhf2	5-13	54.4	6.2	6.4	3.4	5.8	4.0	25.7	46.9	27.4	CL
Bhf3	13-20	51.4	6.3	4.1	3.4	4.5	3.8	22.1	52.5	25.4	SiL
Bf	20-30	63.8	10.8	8.5	6.4	7.6	8.0	39.2	36.1	24.7	L
BC	30-58	63.8	16.1	13.3	6.6	6.6	4.7	49.3	29.5	21.2	L
C1	58-70	65.6	16.5	12.4	6.8	8.4	5.6	49.7	32.1	18.2	L
C2	70-110	57.4	12.7	10.2	9.1	9.7	7.1	48.8	29.4	21.8	L
						Holmesville					
Ae	0-5	0.8	0.8	2.7	5.7	9.9	22.8	41.9	42.8	15.3	L
Bhf1	5-6	ND	3.3	5.8	6.9	8.9	6.9	31.8	44.9	23.3	L
Bhf2	6-10	ND	2.7	4.7	4.4	6.6	7.8	26.2	50.1	23.7	SiL
Bf1	10-15	ND	5.0	7.1	7.4	10.8	12.1	42.4	42.6	15.0	L
Bf2	15-30	ND	5.3	8.3	9.5	12.9	13.6	48.6	37.7	13.7	L
BC	30-46	38.7	6.3	8.8	9.4	11.6	9.8	45.9	38.3	15.8	GrL
C	46-100	49.9	7.5	11.0	11.1	13.4	11.2	54.2	32.3	13.5	GrSL
Cg	100-127	27.3	2.8	3.9	6.6	10.3	12.2	35.8	35.6	28.6	GrCL

Table 15. Mechanical analyses of representative soil profiles as percentages of ovendry weights (continued)

Horizon	Depth cm	Gravel more than 2 mm	Sand: Very coarse 2-1 mm	Sand: Coarse 1.0-0.5 mm	Sand: Medium 0.5-0.25 mm	Sand: Fine 0.25-0.1 mm	Sand: Very fine 0.1-0.05 mm	Sand: Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay less than 0.002 mm	Texture
Johnville											
Aeg	0-5	ND	ND	2.2	4.6	8.2	7.5	22.5	53.6	23.9	SiL
Bfgj	5-10	ND	ND	1.6	5.4	6.9	5.8	19.7	53.4	26.9	SiL
BCg1	10-22	ND	ND	6.4	8.9	13.9	11.1	40.3	45.5	14.2	L
BCg2	22-56	ND	ND	4.0	8.8	10.8	10.6	34.2	49.5	16.3	L
Cg1	56-80	ND	ND	3.9	9.0	11.2	10.3	34.4	42.9	22.7	L
Cg2	80-121	ND	ND	2.9	7.6	11.3	10.5	32.3	42.0	25.7	L
C	121-152	ND	ND	4.4	6.6	10.8	9.3	31.1	41.1	27.8	CL
Maliseet											
Ae	0-5	0.0	0.0	4.3	6.6	20.4	17.8	49.1	41.2	9.7	L
Bf1	5-10	0.0	0.0	15.1	14.6	24.7	11.6	66.0	31.1	2.9	SL
Bf2	10-17	0.0	0.0	6.8	12.2	29.0	11.3	59.3	38.5	2.2	SL
BC	17-28	0.0	0.1	5.4	6.2	25.8	17.0	54.5	41.3	4.2	SL
C1	28-38	0.0	0.0	0.9	3.7	53.9	19.4	77.9	20.3	1.8	LS
C2	38-61	0.0	0.0	8.2	11.9	24.9	12.5	57.5	36.1	6.4	SL
C3	61-91	0.0	1.4	6.6	44.7	39.2	1.9	93.8	3.8	2.4	S
C4	91-132	0.0	0.0	0.4	3.0	30.6	17.4	51.4	48.2	0.4	SL
C5	132-167	0.0	0.1	0.5	2.8	28.8	30.6	62.8	33.8	3.4	SL

Table 15. Mechanical analyses of representative soil profiles as percentages of ovendry weights (continued)

Horizon	Depth cm	Gravel more than 2 mm	Sand: Very coarse 2-1 mm	Sand: Coarse 1.0-0.5 mm	Sand: Medium 0.5-0.25 mm	Sand: Fine 0.25-0.1 mm	Sand: Very fine 0.1-0.05 mm	Sand: Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay less than 0.002 mm	Texture
						Martial					
Aeg	0-20	0.0	0.4	0.3	0.7	10.7	13.5	25.8	43.4	30.8	CL
Bmgj	20-30	0.0	0.2	0.2	0.3	6.1	8.7	15.5	56.1	28.4	SiCL
Bg	30-46	0.0	0.1	0.4	0.3	0.6	1.1	2.5	63.4	34.1	SiCL
BCg	46-71	0.0	0.1	0.2	0.2	0.7	4.6	5.8	66.2	28.0	SiCL
Cg	71-87	0.0	0.0	0.0	0.1	5.2	21.2	26.6	57.4	16.0	SiL
IIC1	87-89	0.0	7.2	8.3	20.0	21.2	7.2	63.9	25.7	10.4	SL
IIC2	89-99	0.0	18.2	32.6	16.9	8.8	2.8	79.3	12.3	8.4	LS
IIC3	99-121	0.0	22.0	30.4	20.0	6.6	2.6	81.5	10.5	8.0	LS
						Monquart					
Ae	0-5	23.3	1.9	3.0	4.6	7.7	8.4	25.6	48.7	25.7	GrL
Bf1	5-15	24.0	2.5	4.0	6.7	9.5	10.6	33.3	40.4	26.3	GrL
Bf2	15-25	23.6	4.2	5.6	5.8	7.6	9.1	32.3	47.5	20.2	GrL
BC	25-66	39.9	8.6	9.9	13.0	15.7	15.2	62.4	24.0	13.6	GrSL
C1	66-107	45.7	7.0	9.0	13.1	16.5	13.9	59.5	30.5	10.0	GrSL
C2	107-152	45.1	7.5	10.5	11.9	14.9	12.4	57.2	30.3	12.5	GrSL
C3	152-163	30.9	3.7	5.9	6.6	8.4	9.7	34.3	35.0	30.7	GrCL

Table 15. Mechanical analyses of representative soil profiles as percentages of ovendry weights (continued)

Horizon	Depth cm	Gravel more than 2 mm	Sand: Very coarse 2-1 mm	Sand: Coarse 1.0-0.5 mm	Sand: Medium 0.5-0.25 mm	Sand: Fine 0.25-0.1 mm	Sand: Very fine 0.1-0.05 mm	Sand: Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay less than 0.002 mm	Texture
Poitras											
Aeg	0-25	57.7	5.9	7.2	6.8	8.5	8.5	36.9	44.3	18.8	GrL
Bg	25-55	15.1	4.6	6.1	11.4	14.8	14.1	57.0	35.7	13.3	L
Cg1	55-80	28.1	3.8	5.0	9.0	12.6	11.0	41.4	37.6	21.0	GrL
Cg2	80-106	28.3	3.1	4.2	7.8	11.4	12.3	38.8	43.3	17.9	GrL
Cg3	106-132	36.8	2.8	4.4	7.4	10.3	11.9	36.8	46.0	17.2	GrL
Cg4	132+	45.2	5.1	10.6	13.5	15.6	11.0	55.8	30.1	14.1	GrSL
Siegas											
Ae1	0-2	19.3	1.1	2.5	4.4	6.0	6.7	20.7	50.5	28.8	CL
Bhf	2-5	12.0	2.6	4.8	5.4	7.5	7.9	28.2	35.8	36.0	CL
Bfj	5-11	12.5	2.1	3.0	3.8	5.1	6.9	20.9	49.2	29.9	CL
Ae2	11-17	7.1	2.4	4.2	6.3	8.2	8.1	29.2	43.8	27.0	CL
Bt	17-25	12.6	1.7	2.9	5.6	7.8	7.8	25.8	39.9	34.3	CL
Btgj	25-38	13.1	1.1	2.9	4.5	6.5	6.4	21.4	36.5	42.1	C
Btg	38-91	19.0	2.2	3.2	5.3	7.2	6.8	24.7	37.2	38.1	C
CKg	91-121	61.3	3.6	5.7	6.5	6.5	7.9	30.2	44.6	25.2	GrL
Cg	121-155	51.9	4.2	7.4	11.2	10.2	11.0	44.0	29.2	26.8	L

*ND - not determined.

Table 16. Physical properties of representative soil profiles

Horizon	Depth cm	Percent of Volume				Bulk density gm/cc	Percent of ovendry weight		
		Large pores at 60 cm, H_2O	Small pores at 60 cm, H_2O	Total pores	Gravel		Maximum water-holding capacity	Moisture equivalent	Wilting point
					Boston Brook				
L-H	5-0	48.0	31.4	79.4	0.0	0.16	512	119	ND
Ae	0-5	16.0	36.3	52.3	15.4	1.24	43	33	5.1
Bf1	5-13	20.5	45.2	65.7	19.4	0.99	7	46	24.8
Bf2	13-23	ND	ND	ND	ND	ND	ND	37	12.0
BC	23-38	19.6	35.5	55.1	26.5	2.83	43	30	8.9
C	38-122	16.4	23.5	39.9	45.1	2.70	25	25	ND
					Bourgoin				
L-H	9-0	43.8	52.7	96.5	0.0	.16	602	142	ND
Ah	0-2	38.7	47.1	85.9	0.0	.42	254	75	ND
Ahe	2-7	15.7	58.4	74.1	3.3	.69	110	56	ND
Aeg	7-30	7.1	44.1	51.2	4.2	1.39	38	31	ND
Bg	30-40	6.5	29.5	36.0	6.1	1.79	20	21	ND
Cg	40-91	5.1	34.5	39.6	2.8	1.75	23	27	ND
					Caribou				
L-H	2.5-0	50.1	23.9	74.0	ND	0.26	368	96	ND
Ah	0-5	35.8	26.3	62.1	ND	0.70	123	43	5.1
Ae	Trace	ND	ND	ND	ND	ND	ND	ND	ND
Bfh	5-25	29.0	42.0	71.0	5.8	0.82	76	37	14.0
Bf	25-35	30.1	33.2	63.3	6.9	1.06	59	31	8.7
Bt1	35-61	23.0	26.1	49.1	16.8	1.46	41	25	8.6
Bt2	61-75	11.7	28.0	39.7	19.0	1.64	43	25	11.7
C1	75-100	11.5	29.1	40.6	21.2	1.56	40	23	11.6
C2	100-124	16.8	29.3	46.2	42.3	1.60	45	23	ND
					Carlingford				
L-H	5-0	28.0	49.0	77.0	0.0	0.47	165	75	ND
Ah	0-5	17.9	49.3	67.2	3.8	0.64	104	52	21.5
Aegj	5-12	17.4	42.5	59.9	7.5	0.91	66	29	6.0
Btjg1	12-28	15.5	41.6	57.1	5.4	1.11	51	26	6.0
Btjg2	28-37	7.4	39.8	47.2	3.3	1.37	31	25	4.8
Cg	37-70	8.4	44.1	52.5	8.4	1.23	43	24	6.5
					Flemming				
L-H	3.5-0	46.5	26.7	73.2	0.0	0.36	ND		
Ae	0-2	42.3	33.7	76.0	0.0	0.64	ND	30.8	10.8
Bhf	2-5	39.4	35.6	75.0	0.0	0.59	ND	26.5	22.5
Bf1	5-7	39.4	42.4	81.8	0.0	0.59	ND	29.1	15.4
Bf2	7-15	34.2	35.6	69.8	0.0	0.79	ND	15.6	6.5
BC1	15-30	22.9	41.2	64.1	0.0	0.96	ND	13.3	6.0
BC2	30-44	21.9	33.2	55.1	0.0	1.22	ND	11.8	4.2
C1	44-81	13.8	37.9	51.7	0.0	1.37	ND	19.4	3.5
C2	81-109	7.1	38.8	45.9	0.0	1.56	ND	16.8	3.3
C3	109-121	5.7	39.9	45.6	0.0	1.59	ND	16.9	3.4
IICg1	121-132	5.8	37.4	43.2	0.0	1.69	ND	18.0	3.2
IICg2	132-166	7.9	36.4	44.3	0.0	1.60	ND	13.3	2.1
IIIC	166+				ND		ND	13.7	3.6

Table 16. Physical properties of representative soil profiles (continued)

Horizon	Depth cm	Percent of volume				Bulk density gm/cc	Percent of ovendry weight		
		Large pores at 60 cm, H_2O	Small pores at 60 cm, H_2O	Total pores	Gravel		Maximum water-holding capacity	Moisture equivalent	Wilting point
Glassville									
L-H	5-0	47.1	39.9	87.0	0.0	0.13	ND		
Ae	0-2	35.7	31.5	67.2	16.7	0.87	ND	30.9	8.6
Bhf1	2-5	35.0	35.2	70.2	15.5	0.79	ND	34.8	26.9
Bhf2	5-13	31.5	32.9	64.4	20.1	0.89	ND	29.9	25.2
Bhf3	13-20	31.0	35.0	66.0	19.5	0.90	ND	28.8	25.0
Bf	20-30	27.8	23.5	51.3	33.0	1.29	ND	22.0	14.1
BC	30-58	14.6	18.6	33.2	44.0	1.77	ND	11.9	5.9
C1	58-70	11.8	16.5	28.3	48.9	1.90	ND	11.3	5.7
C2	70-110	15.6	16.9	32.5	40.0	1.79	ND	8.6	5.2
Holmesville									
L-H	5-0	56.2	26.0	82.2	ND	0.13	627	74	ND
Ae	0-5	37.0	28.2	65.2	ND	0.76	87	27	7.3
Bhf1	5-6	38.1	37.4	75.5	ND	0.66	122	21	ND
Bhf2	6-10	32.3	38.6	70.9	ND	0.67	94	26	17.1
Bf1	10-15	18.0	39.1	57.3	ND	1.04	56	28	9.9
Bf2	15-30	13.9	33.3	47.2	ND	1.33	36	20	4.9
BC	30-46	10.9	26.5	37.4	23.8	1.63	23	17	3.9
C	46-100	5.8	19.8	25.6	39.6	1.98	13	14	1.6
Cg	100-127	3.4	24.7	28.1	20.8	1.96	15	19	5.2
Johnville									
L-H	7-0	40.4	46.5	86.9	0.0	.16	309	ND	ND
Ahe	Trace								
Aeg	0-5	29.7	38.3	69.0	4.8	1.10	60	36	8.1
Bfgj	5-10	26.1	35.9	62.0	32.9	1.38	65	37	15.4
BCg1	10-22	6.4	39.5	45.9	26.4	1.40	49	20	9.3
BCg1	22-56	4.0	26.3	30.3	34.7	1.83	29	24	6.1
Cg1	56-80	7.3	19.9	27.2	28.6	1.98	25	19	3.8
Cg2	80-121	5.9	19.1	25.0	22.9	1.83	24	21	4.9
C	121-152	4.4	25.8	30.2	19.5	1.93	37	20	6.1
Maliseet									
L-H	2.5-0	24.1	55.1	79.2	0.0	0.12			
Ae	0-5	35.0	23.1	58.1	5.7	1.12	63.0	23.0	3.8
Bf1	5-10	37.1	35.3	72.4	9.2	0.67	86.0	26.0	15.6
Bf2	10-17	36.0	32.7	68.7	5.7	0.92	78.0	20.0	4.8
BC	17-28	35.7	21.0	56.7	4.2	1.09	64.0	16.0	1.8
C1	28-38	29.5	21.9	51.4	10.4	1.26	42.0	10.0	1.2
C2	38-61	29.2	13.4	42.6	4.3	1.44	34.0	7.0	1.3
C3	61-91	21.6	18.8	30.4	16.4	1.74	29.0	10.0	1.0
C4	91-132	7.0	34.4	41.4	0.9	1.48	39.0	3.0	1.2
C5	132-167	ND	ND	ND	ND	1.50	33.0	8.0	1.3

Table 16. Physical properties of representative soil profiles (continued)

Horizon	Depth cm	Percent of volume				Bulk density gm/cc	Percent of ovendry weight		
		Large pores at 60 cm, H_2O	Small pores at 60 cm, H_2O	Total pores	Gravel		Maximum water-holding capacity	Moisture equivalent	Wilting point
					Martial				
L-H	15-0	44.0	18.6	62.6	0.0	0.12	ND		
Aeg	0-20	28.5	33.8	62.3	0.0	1.09	ND	25.5	5.4
Bmgj	20-30	11.0	39.7	50.7	0.0	1.29	ND	26.8	5.8
Bg	30-46	8.2	36.3	44.5	0.0	1.61	ND	28.5	7.2
BCg	46-71	6.7	33.2	39.9	0.0	1.73	ND	22.7	5.6
Cg	71-87	5.1	34.2	39.3	0.0	1.77	ND	13.9	1.7
IIC1	87-89						ND	11.7	1.5
IIC2	89-99	19.8	13.2	33.0	0.0	1.87	ND	3.5	1.9
IIC3	99-121	24.5	12.6	37.1	0.0	1.72	ND	2.8	1.8
					Monquart				
L-H	5-0	31.0	33.5	64.5	0.0	0.89	94	43	ND
Ae	0-5	30.4	31.5	61.9	10.4	0.96	60	32	5.7
Bf1	5-15	45.6	37.6	83.2	6.1	0.65	112	45	14.3
Bf2	15-25	26.6	40.4	67.0	9.6	0.85	73	32	11.7
BC	25-66	18.2	28.5	46.7	24.9	1.52	30	18	4.4
C1	66-107	12.4	25.2	37.6	32.9	1.73	25	19	2.6
C2	107-152	9.6	24.8	34.4	31.3	1.73	22	15	3.4
C3	152-163	7.6	30.6	38.2	23.0	1.77	34	22	8.9
					Poitras				
L-H	5-0	51.1	26.5	77.6	0.0	.12	54	137	ND
Aeg	0-25	9.5	26.6	36.1	42.4	1.81	38	23	16.8
Bg	25-55	3.7	29.0	32.7	10.7	1.82	23	18	4.1
Cg1	55-80	6.8	25.0	31.8	22.2	1.90	30	19	4.7
Cg2	80-106	5.9	24.8	30.7	23.2	1.92	33	21	4.2
Cg3	106-132	6.8	26.4	33.2	29.1	1.95	32	21	6.9
Cg4	132+	4.9	21.1	27.0	37.4	2.01	22	13	3.6
					Siegas				
L-H	2-0	50.4	34.8	85.2	0.0	0.42	141	45	ND
Ae1	0-2	34.0	33.3	67.2	3.9	1.66	60	34	9.4
Bhf	2-5	34.5	39.7	74.2	3.6	0.75	97	42	14.9
Bf	5-11	25.7	44.2	69.9	3.7	0.89	72	37	8.5
Ae2	11-17	7.8	35.8	43.6	4.7	1.64	37	25	5.2
Bt	17-25	8.1	28.2	36.3	10.5	1.68	37	23	8.0
Btgj	25-38	8.4	27.8	36.2	9.4	1.80	41	24	11.0
Btg	38-91	8.2	27.5	35.7	13.1	1.75	42	23	9.4
CKg	91-121	9.8	18.4	28.2	47.3	2.12	33	19	5.0
Cg	121-155	6.9	28.2	35.1	42.3	1.89	40	25	6.7

Table 17. Chemical properties of representative soil profiles based on ovendry weights

Horizon	Depth cm	pH	% Total C	% Total N	Cation exchange capacity, meq/100 g	Exchangeable cations, meq/100 g			Base saturation %	Free Iron		Free aluminum		HF-soluble carbon %	Soluble phosphorus ppm
						Ca	Mg	K		Oxalate %	Dithionite %	Oxalate %	Dithionite %		
									Boston Brook						
L-H	5-0	4.6	44.90	0.21	140.20	17.20	3.74	4.22	17.9	0.22	ND*	0.64	ND	0.19	ND
Ae	0-5	4.6	0.77	0.09	16.05	1.79	0.47	0.47	17.0	0.90	ND	0.32	ND		
Bf1	5-13	4.7	4.85	0.30	45.30	1.75	0.18	0.73	5.8	3.38	ND	0.59	ND	2.37	ND
Bf2	13-23	4.8	3.34	0.18	23.75	0.72	0.05	0.33	4.6	1.08	ND	1.32	ND	1.66	ND
BC	23-38	5.4	1.34	0.11	14.97	1.27	0.23	0.24	11.6	0.68	ND	1.20	ND	0.61	ND
C	38-122	5.5	0.57	0.07	12.53	4.35	0.15	0.43	39.3	0.64	ND	1.10	ND	0.23	ND
									Bourgoin						
L-H	9-0	4.5	34.80	2.18	125.20	9.15	4.50	4.15	14.2	1.36	ND	0.51	ND	ND	ND
Ah	0-2	4.3	20.10	0.92	54.60	3.28	1.29	4.60	16.7	0.53	ND	0.68	ND	16.54	ND
Ahe	2-7	4.7	6.62	0.42	21.42	1.79	0.66	0.83	15.3	0.58	ND	0.91	ND	2.00	ND
Aeg	7-30	5.1	0.75	0.09	9.93	0.57	0.21	0.62	14.0	0.22	ND	0.68	ND	0.39	ND
Bg	30-40	5.4	0.18	0.06	8.64	1.34	0.55	0.80	31.1	0.44	ND	0.42	ND	0.12	ND
Cg	40-91	6.2	0.34	0.08	7.20	3.90	1.31	0.58	80.4	0.22	ND	0.18	ND	0.23	ND
									Caribou						
L-H	2.5-0	6.8	30.70	1.13	86.82	23.16	3.54	1.28	32.2	ND	ND	ND	ND	ND	ND
Ah	0-5	5.0	8.00	0.19	29.73	9.16	1.67	0.14	35.8	0.94	ND	0.28	ND	ND	27.84
Ae	Trace	4.9	0.30	0.06	11.79	3.08	0.33	0.02	29.1	0.09	ND	0.13	ND	0.05	7.52
Bhf	5-25	4.9	5.32	0.10	28.98	3.16	0.41	0.06	12.5	2.71	ND	1.15	ND	3.39	31.26
Bf	25-35	5.0	2.13	0.09	19.27	1.28	1.40	0.06	14.2	0.78	ND	0.87	ND	1.53	9.07
Bt1	35-61	5.2	0.64	0.06	11.64	0.80	0.30	0.06	10.0	0.27	ND	0.68	ND	0.17	5.90
Bt2	61-75	5.1	0.09	0.05	10.40	1.76	--	0.08	17.7	0.26	ND	0.23	ND	0.03	33.08
C1	75-100	5.7	0.09	0.04	9.96	5.44	--	0.07	55.3	0.18	ND	0.19	ND	0.03	20.42
C2	100-124	6.2	0.39	0.03	9.49	5.72	--	0.07	61.0	0.38	ND	0.33	ND	0.11	9.85

Table 17. Chemical properties of representative soil profiles based on ovendry weights (continued)

Horizon	Depth cm	pH	% Total C	% Total N	Cation exchange capacity, meq/100 g	Exchangeable cations, meq/100 g			Base saturation %	Free iron		Free aluminum		HF-soluble carbon %	Soluble phosphorus ppm
						Ca	Mg	K		Oxalate %	Dithionite %	Oxalate %	Dithionite %		
								Carlingford							
L-H	5-0	6.4	15.25	0.79	51.12	32.00	1.80	1.88	69.8	0.66	ND	0.66	ND	ND	ND
Ah	0-5	6.5	7.70	0.51	31.14	20.40	1.20	1.13	73.0	0.84	ND	1.30	ND	2.11	ND
Aegj	5-12	6.6	0.85	0.11	16.67	5.80	0.42	1.01	43.4	0.42	ND	0.76	ND	0.36	ND
Btjgl	12-28	6.6	0.97	0.08	11.25	3.80	0.26	0.56	41.1	0.45	ND	0.49	ND	0.53	ND
Btjg2	28-37	6.5	0.39	0.07	14.17	3.14	0.23	0.79	29.4	0.42	ND	0.33	ND	0.10	ND
Cg	37-70	6.5	0.35	0.10	13.00	4.30	0.30	0.50	39.2	0.68	ND	0.39	ND	0.25	ND
								Flemming							
L	3.5-3	4.7	54.03	1.28	55.61	9.09	5.30	4.84	35.0	ND	ND	ND	ND	10.98	ND
F	3-1	5.0	47.60	2.10	88.02	22.65	4.50	2.14	33.0	ND	ND	ND	ND	19.28	ND
H	1-0	4.2	45.03	2.21	103.39	6.18	2.33	1.56	10.0	ND	ND	ND	ND	6.62	ND
Ae	0-2	4.1	3.20	0.31	17.20	0.98	0.84	0.21	12.0	0.15	0.20	0.31	0.32	0.01	ND
Bhf	2-5	4.2	6.24	0.49	28.00	0.76	0.50	0.10	5.0	1.76	3.14	0.59	0.60	2.23	ND
Bfl	5-7	4.3	4.89	0.43	22.40	0.33	0.31	0.08	3.0	1.45	2.95	0.69	0.87	1.84	ND
Bf2	7-15	4.9	2.57	0.13	11.50	0.09	0.06	0.04	2.0	0.55	0.88	0.69	0.88	0.50	ND
BCl	15-30	5.0	1.42	0.12	9.80	0.26	0.07	0.05	4.0	0.40	0.56	0.51	0.83	0.31	ND
BC2	30-44	5.3	0.99	0.09	6.50	0.38	0.07	0.05	7.0	0.25	0.70	0.53	0.80	0.32	ND
Cl	44-81	5.1	0.26	0.08	4.30	0.12	0.03	0.04	4.0	0.22	0.41	0.34	0.39	0.08	ND
C2	81-109	5.2	0.27	0.07	4.50	0.23	0.13	0.07	10.0	0.22	0.46	0.39	0.38	0.11	ND
C3	109-121	5.1	0.23	0.07	4.70	0.16	0.11	0.06	7.0	0.21	0.41	0.29	0.29	0.11	ND
IICgl	121-132	5.1	0.14	0.06	3.60	0.15	0.11	0.07	9.0	0.05	0.05	0.24	0.30	0.05	ND
IICg2	132-166	5.1	0.17	0.06	3.10	0.14	0.08	0.05	9.0	0.05	0.03	0.21	0.29	0.05	ND
IIIC	166+	5.1	0.31	0.06	3.60	0.24	0.18	0.08	14.0	0.24	0.54	0.29	0.40	0.14	ND

Table 17. Chemical properties of representative soil profiles based on ovendry weights (continued)

Horizon	Depth cm	pH	% Total C	% Total N	Cation exchange capacity, meq/100 g	Exchangeable cations, meq/100 g			Base saturation %	Free iron		Free aluminum		HF-soluble carbon %	Soluble phosphorus ppm
						Ca	Mg	K		Oxalate %	Dithionite %	Oxalate %	Dithionite %		
									Glassville						
L	5-4	4.6	48.9	1.15	106.3	17.52	9.70	6.72	31.93	ND	ND	ND	ND	7.56	ND
F	4-2	4.8	46.2	2.37	115.4	19.86	4.84	3.50	24.44	ND	ND	ND	ND	11.17	ND
H	2-0	4.1	14.8	2.08	89.5	5.82	2.47	1.84	11.31	ND	ND	ND	ND	4.13	ND
Ae	0-2	4.2	4.2	0.26	20.6	1.99	0.70	0.15	13.79	0.15	0.10	0.26	0.32	1.10	ND
Bhf1	2-5	4.2	9.5	0.48	47.6	1.19	0.46	0.07	3.61	4.10	4.40	1.10	0.96	4.76	ND
Bhf2	5-13	4.5	7.8	0.36	46.8	0.36	0.15	0.06	1.22	4.20	4.90	1.60	1.21	3.21	ND
Bhf3	13-20	4.6	5.8	0.30	39.6	0.20	0.08	0.05	0.83	4.65	4.90	1.68	1.22	2.58	ND
Bf	20-30	4.8	3.1	0.17	18.2	0.08	0.03	0.03	0.77	1.16	1.40	1.14	1.08	1.63	ND
BC	30-58	5.0	1.6	0.09	10.2	0.07	0.02	0.02	1.18	0.50	1.07	0.90	0.94	0.59	ND
C1	58-70	5.1	0.6	0.06	7.7	0.06	0.03	0.04	1.69	0.47	0.62	0.70	0.50	0.20	ND
C2	70-110	5.1	0.4	0.07	7.2	1.32	0.04	0.06	19.72	0.50	0.47	0.69	0.47	0.20	ND
									Holmesville						
L-H	5-0	3.7	41.30	1.46	186.87	4.40	1.50	0.26	3.3	ND	ND	ND	ND	ND	ND
Ae	0-5	3.5	2.43	0.13	9.77	1.44	0.37	0.09	19.4	.05	ND	.23	ND	.09	.28
Bhf1	5-6	3.9	8.72	0.31	61.34	1.10	0.45	0.09	2.7		ND	1.00	ND	3.01	ND
Bhf2	6-10	4.2	6.38	0.27	48.17	0.88	0.42	0.06	2.8		ND	1.20	ND	2.54	ND
Bf1	10-15	4.6	3.24	0.14	23.84	0.76	0.31	0.01	4.5	1.30	ND	1.50	ND	1.18	2.51
Bf2	15-30	4.7	1.39	0.06	10.08	0.82	0.20	0.01	10.2	0.47	ND	0.75	ND	0.57	2.73
BC	30-46	4.8	0.51	0.05	6.93	0.84	0.16	0.01	14.6	0.30	ND	0.49	ND	0.35	1.67
C	46-100	5.2	0.21	0.05	3.48	1.08	0.12	0.04	35.6	0.19	ND	0.25	ND	0.16	0.55
Cg	100-127	5.5	0.12	0.05	5.49	3.30	0.74	0.05	74.5	0.19	ND	0.21	ND	0.12	1.56

Table 17. Chemical properties of representative soil profiles based on ovendry weights(continued)

Horizon	Depth cm	pH	% Total C	% Total N	Cation exchange capacity, meq/100 g	Exchangeable cations, meq/100 g			Base saturation %	Free iron		Free aluminum		HF-soluble carbon %	Soluble phosphorus ppm
						Ca	Mg	K		Oxalate %	Dithionite %	Oxalate %	Dithionite %		
									Johnville						
L	7-6	4.2	52.70	1.86	34.88	14.08	5.16	1.43	59.3	ND	ND	ND	ND	ND	ND
F	6-4	4.0	50.90	1.79	113.07	10.24	1.92	1.18	11.8	ND	ND	ND	ND	ND	ND
H	4-0	4.0	47.00	1.30	108.33	10.08	6.64	0.90	16.3	ND	ND	ND	ND	ND	ND
Aeg	0-5	3.8	2.14	0.13	13.05	0.80	0.60	0.12	11.7	.08	ND	0.38	ND	1.04	10.46
Bfgj	5-10	4.3	4.40	0.26	31.72	0.56	0.04	0.08	3.1	1.83	ND	0.54	ND	0.15	10.40
BCg1	10-22	4.8	1.21	0.10	12.22	0.56	0.01	0.03	4.9	0.50	ND	0.45	ND	0.45	5.05
BCg2	22-56	4.8	1.54	0.12	14.02	0.44	0.00	0.03	3.4	0.42	ND	0.53	ND	0.53	11.23
Cg1	56-80	4.9	0.24	0.05	5.20	0.36	0.00	0.03	7.5	0.17	ND	0.33	ND	0.15	20.47
Cg2	80-121	5.0	0.12	0.05	5.75	0.48	0.00	0.06	9.4	0.19	ND	0.29	ND	0.12	39.97
C	121-152	5.0	0.15	0.05	6.20	0.64	0.00	0.06	11.3	0.24	ND	0.21	ND	0.11	45.35
									Maliseet						
L-H	2.5-0	4.3	35.80	1.31	85.94	10.40	1.64	0.90	15.1	ND	ND	ND	ND	ND	ND
Ae	0-5	3.9	0.42	0.08	10.31	32.00	0.30	0.06	6.6	0.01	ND	0.20	ND	ND	24.4
Bf1	5-10	4.9	3.97	0.26	28.51	0.20	0.16	0.08	1.5	2.41	ND	1.51	ND	2.11	ND
Bf2	10-17	5.4	1.22	0.11	11.03	ND	ND	ND	ND	0.31	ND	0.99	ND	0.62	7.6
BC	17-28	5.4	0.18	0.04	4.92	0.56	0.04	0.05	13.2	0.03	ND	0.30	ND	0.06	8.9
C1	28-38	5.9	0.09	0.03	2.81	0.56	0.02	0.02	21.3	0.07	ND	0.12	ND	0.02	10.0
C2	38-61	5.5	0.12	0.04	3.25	0.56	--	0.02	17.8	0.02	ND	0.08	ND	0.05	17.6
C3	61-91	5.9	0.12	0.03	1.93	0.48	--	0.02	25.8	0.08	ND	0.10	ND	0.01	11.7
C4	91-132	5.6	0.15	0.02	4.50	0.72	--	0.03	16.6	0.07	ND	0.15	ND	0.03	14.5
C5	132-167	5.6	0.06	0.02	2.70	ND	ND	ND	ND					0.04	20.1

Table 17. Chemical properties of representative soil profiles based on ovendry weights (continued)

Horizon	Depth cm	pH	% Total C	% Total N	Cation exchange capacity, meq/100 g	Exchangeable cations, meq/100 g			Base saturation %	Free iron		Free aluminum		HF-soluble carbon %	Soluble phosphorus ppm
						Ca	Mg	K		Oxalate %	Dithionite %	Oxalate %	Dithionite %		
									Martial						
L	15-14	3.7	52.54	0.79	59.96	2.26	5.65	3.61	19.2	ND	ND	ND	ND	7.39	ND
F	14-5	3.4	47.20	1.48	128.98	1.31	0.80	1.47	2.8	ND	ND	ND	ND	7.69	ND
H	5-0	3.2	42.07	1.26	125.39	0.55	0.60	1.08	1.8	ND	ND	ND	ND	4.70	ND
Aeg	0-20	4.2	1.27	0.07	12.65	0.04	0.04	0.06	0.9	0.11	0.37	0.23	0.31	0.04	ND
Bmgj	20-30	4.5	1.18	0.13	14.73	0.04	0.03	0.03	0.7	0.40	0.81	0.33	0.60	0.32	ND
Bg	30-46	4.7	0.69	0.08	11.77	0.04	0.03	0.06	1.1	0.58	1.13	0.36	0.75	0.13	ND
BCg	46-71	4.9	0.84	0.07	7.04	0.08	0.06	0.06	2.8	0.40	0.70	0.38	0.65	0.40	ND
Cg	71-87	4.8	0.12	0.04	3.10	0.10	0.04	0.04	5.8	0.16	0.41	0.28	0.34	0.02	ND
IIC1	87-89	4.7	0.15	0.03	2.68	0.04	0.02	0.02	3.0	0.28	0.72	0.23	0.33	0.07	ND
IIC2	89-99	4.8	0.27	0.03	3.10	0.05	0.02	0.02	2.9	0.35	1.13	0.30	0.34	0.18	ND
IIC3	99-121	4.9	0.21	0.03	1.45	0.10	0.02	0.02	9.7	0.46	0.50	0.45	0.39	0.13	ND
									Monquart						
L-H	5-0	5.1	8.35	0.39	17.55	7.12	0.20	0.12	42.4	ND	ND	ND	ND	ND	8.49
Ae	0-5	4.4	0.91	0.09	13.53	1.28	0.14	0.01	10.6	0.22	ND	0.30	ND	0.06	3.60
Bf1	5-15	4.5	3.50	0.19	23.88	1.36	0.10	0.01	6.2	3.42	ND	1.05	ND	1.62	24.31
Bf2	15-25	4.9	3.10	0.18	28.34	0.40	0.13	0.01	1.9	1.70	ND	1.50	ND	1.38	7.41
BC	25-66	5.0	0.49	0.07	8.52	0.48	0.04	0.01	6.2	0.51	ND	0.68	ND	0.18	8.58
C1	66-107	4.9	0.15	0.04	4.64	0.19	0.11	0.00	6.5	0.27	ND	0.71	ND	0.06	1.60
C2	107-152	5.4	0.12	0.04	4.32	1.00	0.10	0.01	25.6	0.24	ND	0.28	ND	0.12	1.39
C3	152-163	6.0	0.16	0.06	7.10	0.64	0.40	0.07	15.6	0.34	ND	0.31	ND	0.16	2.72

Table 17. Chemical properties of representative profiles based on ovendry weights (continued)

Horizon	Depth cm	pH	% Total C	% Total N	Cation exchange capacity, meq/100 g	Exchangeable cations, meq/100 g			Base saturation %	Free iron		Free aluminum		HF-soluble carbon %	Soluble phosphorus ppm
						Ca	Mg	K		Oxalate %	Dithionite %	Oxalate %	Dithionite %		
								Poitras							
L-H	5-0	4.2	41.40	1.35	222.88	6.80	2.80	1.27	39.8	ND	ND	ND	ND	ND	ND
Aeg	0-25	4.7	0.85	0.09	13.79	0.52	0.04	0.05	4.9	0.10	ND	0.30	ND	0.20	13.0
Bg	25-55	5.5	0.30	0.03	5.36	0.52	0.02	0.05	17.0	0.21	ND	0.50	ND	0.14	13.6
Cg1	55-80	5.4	0.12	0.03	4.80	0.48	0.01	0.06	11.5	0.09	ND	0.18	ND	0.05	37.4
Cg2	80-106	5.5	0.03	0.03	5.36	0.80	0.01	0.06	16.2	0.22	ND	0.11	ND	0.01	44.6
Cg3	106-132	5.5	0.21	0.03	6.57	0.68	0.00	0.06	11.3	0.23	ND	0.24	ND	0.12	40.1
Cg4	132+	5.6	0.15	0.03	4.92	0.68	0.00	0.06	15.0	0.22	ND	0.21	ND	0.05	26.2
								Siegas							
L-H	2-0	5.5	13.00	0.65	36.61	14.00	2.30	0.24	45.2	ND	ND	ND	ND	ND	ND
Ae1	0-2	5.1	1.28	0.11	13.17	1.10	0.48	0.01	12.1	0.14	ND	0.31	ND	0.22	26.0
Bhf	2-5	4.6	5.64	0.37	36.67	1.10	0.50	0.05	4.4	1.94	ND	0.97	ND	2.32	28.8
Bfj	5-11	4.7	1.45	0.17	17.76	1.34	0.30	0.04	9.5	0.88	ND	0.70	ND	1.20	28.8
Ae2	11-17	5.3	0.30	0.05	5.65	2.02	0.17	0.03	39.3	0.16	ND	0.35	ND	0.16	24.0
Bt	17-25	5.5	0.19	0.05	6.99	3.02	0.31	0.03	48.1	0.16	ND	0.24	ND	0.07	21.7
Btgj	25-38	6.6	0.13	0.05	9.66	8.30	0.96	0.03	96.2	0.21	ND	0.24	ND	0.05	8.4
Btg	38-91	7.1	0.06	0.05	6.45	7.78	0.71	0.03	Salt	0.17	ND	0.20	ND	0.06	4.9
CKg	91-121	8.0	0.09	0.05	10.52	10.48	0.15	0.03	Salt	0.11	ND	0.21	ND	0.03	2.2
Cg	121-155	6.2	0.12	0.07	10.86	4.62	0.23	0.03	44.9	0.24	ND	0.14	ND	0.05	11.3

* ND - not determined