BIO-PHYSICAL LAND INVENTORY

Churchill – Nelson Rivers Study Area

North–Central Manitoba

by

G. J. Beke, H. Veldhuis and J. Thie

Canada–Manitoba Soil Survey

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Canada-Manitoba Soil Survey
University of Manitoba
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I. ABSTRACT

A bio-physical land inventory was conducted in north-central Manitoba to provide basic data on the nature and form of surficial deposits, soils, vegetation, and water bodies in a manner suitable for the interpretation or evaluation of land for forestry, wildlife, recreation, and engineering. The area designated for land inventory consisted of three major areas in the Churchill-Nelson Rivers system, which were expected to be affected by man-made changes in water levels.

The collection of terrain, vegetation, and water body information was done by a team consisting of two pedologists and two forest ecologists. The information gathered at representative and ecologically-significant sites included: identification and description of surficial deposits; description of vegetation communities and vegetation history; and identification, description and sampling of soil profiles. In addition to this, the team also concerned itself with:

1. The nature and occurrence of permafrost in organic and mineral deposits;
2. The nature of surface drainage patterns;
3. The size, shape, and shoreline attributes of water bodies;
4. The collection of relevant meteorological data;
5. The chemical and physical analysis of soil samples;
6. The compilation of suitable land type maps for use by other study sectors.

The inventory resulted in the compilation of three Land System maps, one for each project area, at a scale of 1:250,000. In addition, 7 Land Type maps were compiled at a scale of 1:50,000, and 82 soil profiles were analysed for their physical and chemical properties.

The survey areas, particularly the Southern Indian Lake and Rat-Burntwood Rivers areas, were found to have a relatively fragile ecological balance owing to the discontinuous presence of permafrost, the slow rate of vegetative growth, and the predominance of stratified lacustrine deposits. The silt-textured laminae of these deposits were found highly susceptible to water erosion, and had a low permeability and a high liquifaction potential. In addition, the extensive organic deposits of the survey areas were found to have a high potential for lake eutrification.

II. SUMMARY AND CONCLUSIONS

A bio-physical land inventory has been conducted in the Churchill-Nelson Rivers study area. This area is located in the Province of Manitoba between the 53° and the 58° parallel.

The study area has a continental climate, characterized by short, cool summers and long, cold winters. Mean annual ranges of temperature are very large; being of the order of 70° to 75° F. The mean annual temperature of the area is less than 32° F. Precipitation is moderate to light; the mean annual amount ranging between 16 and 18 inches. Approximately two-thirds of the precipitation occurs in the summer months.

The terrain of the study area varies from very weakly to moderately broken. Very weakly to weakly broken terrain predominates and occurs discontinuously throughout the area. The areas of moderately broken terrain are found primarily in the vicinity of the settlements of Cross Lake and Southern Indian Lake as well as in the lower reach area of the Rat river system. This terrain generally consists of exposed bedrock or is bedrock-controlled.

Lacustrine materials are the dominant deposits of the study area. These deposits generally consist of relatively homogeneous clay-size materials in the Outlet Lakes project area. However, the lacustrine deposits in the Rat-Burntwood Rivers and Southern Indian Lake project areas consist mainly of stratified silts and clays. The topography of lacustrine terrain is often bedrock

controlled. Low relief, depressional lacustrine terrain is characterized by organic accumulations. These peat deposits are very extensive in the study area. They consist of Sphagnum moss peat, forest peat, or fen peat, or a combination of these materials. The thickness of such peat deposits may exceed ten feet. Glacio-fluvial deposits of sands and gravels are found throughout the area; although, their occurrence is rather infrequent. Calcareous, loam- to clay-loam glacial till deposits are present in minor amounts in the northern-eastern portion of the Southern Indian Lake project area. Glacier-modified lacustrine clay deposits occur in the southern portion of the Outlet Lakes project area. Acid, loam-textured till deposits are found along the western edge of the study area and occur usually at elevations greater than 1,000 feet above mean sea level.

Permafrost occurs throughout the study area, but varies in thickness and extent. The Southern Indian Lake project area is situated in the region of discontinuous permafrost. Average thickness of the permafrost in this area is about 55 feet. Processes of cryoturbation are active in this region as evidenced from the common occurrence of soil hummocks. The remainder of the study area is in the region of localized permafrost. Thickness of permafrost in this region varies from about 50 feet at its northern limit to less than 1 foot at the southern one. The thickness of the active layer varies from less than 2 feet to greater than 4 feet, depending on soil and topographic conditions. In general, the ice content is less than 50 per cent in mineral materials and greater than 65 per cent in organic accumulations.

Soil development in the study area varies considerably, depending mainly on the nature of the parent material and the presence or absence of permafrost and/or cryoturbation. In general, soils classified as Gray Luvisols predominate on moderately-well drained lacustrine deposits. Brunisolic soil development is normally associated with the glacio-fluvial materials. Regosolic soils are found on disturbed glacio-fluvial deposits and on very strongly calcareous lacustrine sediments, which may be cryoturbated. Gleysolic and, particularly, Organic soils are found in the poorly to very poorly drained landscape positions. The Organic soils present belong primarily to the Mesisol great soil group; Fibrisols and Humisols being less extensive. Gleysolic soils in the southern part of the study area are mostly Rego Gleysols,while Low Humic Eluviated Gleysols and even Humic Eluviated Gleysols occur in the northern-most part. All the soils present may contain permafrost. The active layer in soils with thick organic surface horizons is generally about 18 inches thick, but varies greatly in soils that have thin or lack organic surface horizons.

Vegetation occurring on mesic sites in the study area is dominated by black spruce forests; excepting the mixed forests occurring near the southern boundary. On going from north to south, the black spruce forests change from an open forest with a ground vegetation of lichen and low prostrate shrubs to a closed forest with a continuous ground cover of mosses. Tamarack is the most important tree of subseral communities in the northern part of the study area while jack pine is most important in the southern part.

Saturated sites have muskeg (black spruce) and bog vegetation.

Relatively unaltered materials of the study area are more susceptible to water erosion than similar materials affected by soil formation. Clay-textured materials are least susceptible to water erosion. Runoff water on sloping mineral deposits normally will result in sheet erosion but is likely to accentuate gully erosion on terrain having a hummocky micro-relief. Wave action on unaltered lacustrine deposits causes soilfall or sliding in stratified deposits and slumping in clay-textured materials.

In general, field permeabilities of the relatively unaltered lacustrine deposits are estimated to be less than 2.0 inches per hour. This estimate should be decreased when dealing with stratified lacustrine deposits. Structural changes, occuring in altered soil materials, should increase the permeability estimates.

Engineering test data show that plasticity and shrink-swell potential are highest for materials classified as clay. Some of these clay-textured materials are in a finely divided state, as indicated by the high plastic limit and low plasticity index. In general, materials affected by soil formation have a higher shrink-swell potential and lower plasticity index than their unaltered material. Liquid limits are lowest for silt-textured lacustrine deposits, occurring at a moisture content between 15 and 20 per cent.

The eutrification potential of soil materials, as measured by extraction of soil phosphorus with bicarbonate, is highest for organic materials and mineral materials having high organic carbon con-

tents. In general, the eutrification potential decreases with increase in depth and with decrease in degree of alteration of the material.

The inventory reported on herein covers an area of approximately 8.5 million acres. Three Land System maps at a scale of 1 : 250,000 have been compiled, one for each project area. In addition, Land Type maps have been prepared for those portions of the study area expected to be affected by future hydro-development projects. The areas which have been land-typed comprise approximately 1.2 million acres, which is presented by means of seven maps at a scale of 1 : 50,000. Estimates of areas affected by inundation could not be provided owing to lack of precise information on water levels and dimensions of forebay areas.

From the foregoing information the following conclusions and recommendations have been derived:

1. The environmental conditions of the study area are comparable to those of that portion of the Mackenzie River valley situated between Fort Vermillion, Alberta and the 64° parallel; approximately midway between Wrigley and Fort Norman, N.W.T.
2. The regional vegetation primarily reflects climatic and, to a lesser extent, topographic conditions. Soil and parent material have a local affect on vegetation as evidenced from growth and density data as well as species variability. In general, the growth rate of tree species decreases with increase in latitude.
3. Lacustrine materials are the dominant surficial deposit of the study area. The

stratified lacustrine deposits, which predominate in the Rat-Burntwood Rivers and Southern Indian Lake project areas, are highly sensitive to environmental disturbance owing to the high erodibility, low permeability, and high liquifaction potential of the silt-textured laminae.

4. All materials in the northern half of the study area, excepting well-drained glaciofluvial deposits, are highly sensitive to those disturbances which affect the energy balance of the permafrost.
5. Maintenance of an organic cover on mineral materials is essential for preventing sheet and gully erosion as well as the melting of permafrost.
6. Land flooding should seriously affect the nutrient balance in the lakes and rivers as the mildly alkaline water is expected to extract large quantities of phosphorus, in particular, from the extensive organic deposits.
7. The relatively fragile balance in the environment of the study area necessitates due caution and concern in management decisions and practices.

III. COMPREHENSIVE REPORT

INTRODUCTION

A bio-physical land inventory was conducted in the Outlet Lakes, Rat-Burntwood Rivers, and Southern Indian Lake areas. The aim of the survey was to obtain information on the physiography, surficial deposits, soils, and vegetation of these areas in order to differentiate and classify ecologically-significant segments of the land surface. This inventory is expected to serve as the ecological basis for land-use planning involving future management of lands for water, recreation, fisheries, wildlife, and forestry.

Approximately 9 million acres were covered by this bio-physical land inventory. Rapid coverage of such a large area required extensive use of aerial photographs and air photo interpretation techniques combined with limited ground truthing. By using this approach, emphasis was placed on the classification and mapping of patterns of soil, landform, vegetation, and water.

The areas investigated are illustrated in Figure 1. Generally speaking, they extend from the northern tip of Lake Winnipeg at latitude N53° 51' northward to the vicinity of the 58th parallel. This area comprises a large portion of the area in North-Central Manitoba originally covered by glacial Lake Agassiz.

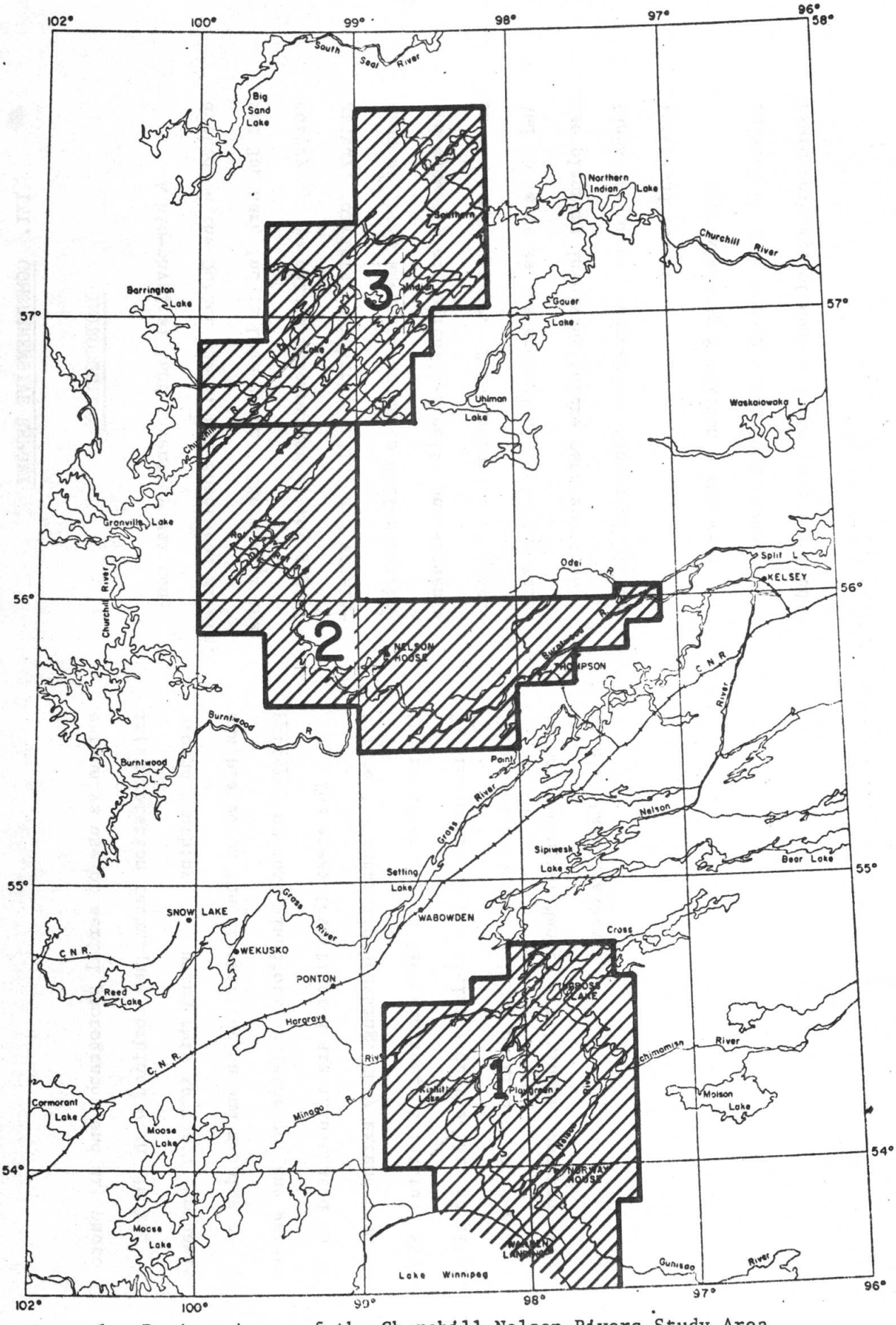

Figure 1. Project Areas of the Churchill-Nelson Rivers Study Area.
Key: 1. Outlet Lakes; 2. Rat-Burntwood Rivers; 3. Southern Indian Lake.

GENERAL DESCRIPTION OF THE AREA

A. Location and Extent

The Churchill-Nelson Rivers study area extends from the northern tip of Lake Winnipeg to the northern tip of Southern Indian Lake. It is situated within the confines of the 53rd and 58th parallels and the 96th and 100th meridians.

The study area is sub-divided into three project areas identified as: Outlet Lakes, Rat-Burntwood Rivers, and Southern Indian Lake (Figure 1). The Outlet Lakes area is located immediately north of Lake Winnipeg, between latitudes 53° and 55° N and between longitudes 97° and 99° W. It covers an area of approximately 3,800 square miles. The Rat-Burntwood Rivers area is located between latitudes 55° 30' and 56°40' N and between longitudes 96°50' and 100° W. It covers an area of approximately 5,000 square miles. The Southern Indian Lake area is situated between latitudes 56°40' and 57°45' N and between longitudes 98° and 100° W. It covers an area of approximately 4,100 square miles.

All three project areas have been mapped through interpretation of aerial photographs aided by supporting field checks. A Land System map at a scale of 1:250,000 has been prepared for each project area. Land Type maps of the to-be-flooded portions of the Outlet Lakes, Rat-Burntwood Rivers, and Southern Indian Lake project areas have been prepared at a scale of

1:50,000. The total area which has been land-typed encompasses about 1.2 million acres.

B. Transportation and Settlements

The southern half of the Churchill-Nelson study area is crossed approximately in a diagonal SW to NE manner by the Hudson Bay Railway and Provincial Road 391. A secondary road was recently completed which leads from Road 391 to the Jenpeg hydro development site. Another secondary road was recently completed which leads from the city of Thompson, where Road 391 terminates, to the town of Lynn Lake. This town is located WNW of Thompson, outside the study area.

Travel within the study area, away from the railroad line and roads, is mainly by aircraft and boat. Most air-travel is conducted by small aircraft equipped with floats which utilize the many lakes within the area as landing sites, and have their principal bases at Norway House, Thompson, and Wabowden. Facilities for land-flying aircraft are present at Norway House, Jenpeg, Thompson, Leaf Rapids, and Southern Indian Lake Settlement. Only the landing facilities at Thompson have a hardtop surface. Scheduled air services are available at Norway House and Thompson. Water traffic during the ice-free season is mainly by small crafts; with Norway House being serviced by a scheduled line.

The principal settlements within the area and their populations according to the 1971 Census of Canada are listed below:

Thompson	19,001
Norway House	494

Wabowden	809
Cross Lake	168
Nelson House	---
Southern Indian Lake	590

Thompson is located along the Burntwood River, about 400 air miles north of Winnipeg. It is a modern, new community, carved out of virgin bushland only some eleven years ago and incorporated as Manitoba's newest city on July 20, 1970. This city is the terminus of Provincial Road 391 and is connected with the Hudson Bay railway line by a spur from Sipiwesk. Thompson constitutes the centre of major mining operations at Moak, Mystery, Chisel, Ghost and Stall lakes. It is the principal centre of the study area and is emerging as the administrative and regional centre for Northern Manitoba. A number of provincial and federal offices are now located there and it is the head office site of the Norman Regional Corporation, an organization promoting the economic development of the North.

Norway House is located on the south shore of Little Playgreen Lake, about 25 miles north of Warren's Landing (old site of Norway House) at the north end of Lake Winnipeg. It is the northern centre for the administration of health and welfare services, and is the site of a large, modern hospital. Also situated here are schools, two missions, stores and trading posts, a hotel, police detachment and forestry station. It is the trading centre for an Indian Reserve (population 1703).

Wabowden is a railway centre on the Hudson Bay Railway. It is located at the western edge of the surveyed section at Mile 136.5, in Township 68, Range 8 west of the Principal Meridian. This village is served by a hotel, churches, and a school.

Also situated here are a Royal Canadian Mounted Police detachment, a forestry station, and a fishery.

Cross Lake is located in Township 65, Range 3 west of the Principal Meridian. It is the site of a large Catholic Mission and is the trading centre for an Indian Reserve (population 1490). There are stores, a school and a forestry station located in the village.

Nelson House is situated on the northern shore of Footprint Lake in Township 78, Range 9 west of the Principal Meridian. It is the trading centre for an Indian Reserve and has two missions, a store and a school. A branch-road from the recently-completed Thompson-Lynn Lake secondary road provides land access to this settlement.

Southern Indian Lake is located in Township 90, Range 10 west of the Principal Meridian. It has a trading post, hospital and school.

The most recent settlement to be established in the study area is the mining town of Leaf Rapids. It is situated at Leaf Rapids on the Churchill River in Township 85, Range 16 west of the Principal Meridian. It is expected to grow rapidly to become a town of several thousand inhabitants with the development of the mine at Ruttan Lake. A hotel and a fish filletting plant are situated here. Access to the settlement is provided by the recently-completed Thompson-Lynn Lake road.

C. Physiography

The term 'physiography' is taken to describe the physical features of the land according to its

formative history; structure being the primary environmental control in such a classification. Constructive geological forces or prevailing structure constitutes the basis for delineating the upper levels (divisions and provinces) of the classification. The lower levels of classification are based on the destructive forces that produce the landform.

The study area is situated for the greater part in the Superior and Churchill provinces of the Canadian Shield physiographic division; a lesser portion being situated in the Manitoba Lowlands province of the Interior Plains division (Figure 2). The contact between the Canadian Shield and the Interior Plains division is located in the southwestern portion of the study area.

The Canadian Shield portion of the study area is underlain dominantly by granitic bedrock, with wide belts of gneissic and volcanic bedrock. In general, granitic bedrock is characterized by lower and more rounded slopes than gneissic bedrock; although, the slope frequency is high in both cases. The topography[1/] in the Shield portion varies from nearly level to rolling; undulating and rolling topography being most common. The topography is mainly controlled by bedrock, but a thick clay mantel often produces subdued relief. Muskegs cover most depressions and many slopes. Innumerable lakes of all sizes dot the landscape. The larger lakes are normally linked by streams interrupted by rapids and falls.

The Manitoba Lowlands portion of the study area is underlain by Ordovician dolomite or

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1/ Terminology according to that outlined in The System of Soil Classification for Canada. 1970. Canada Department of Agriculture, Ottawa.

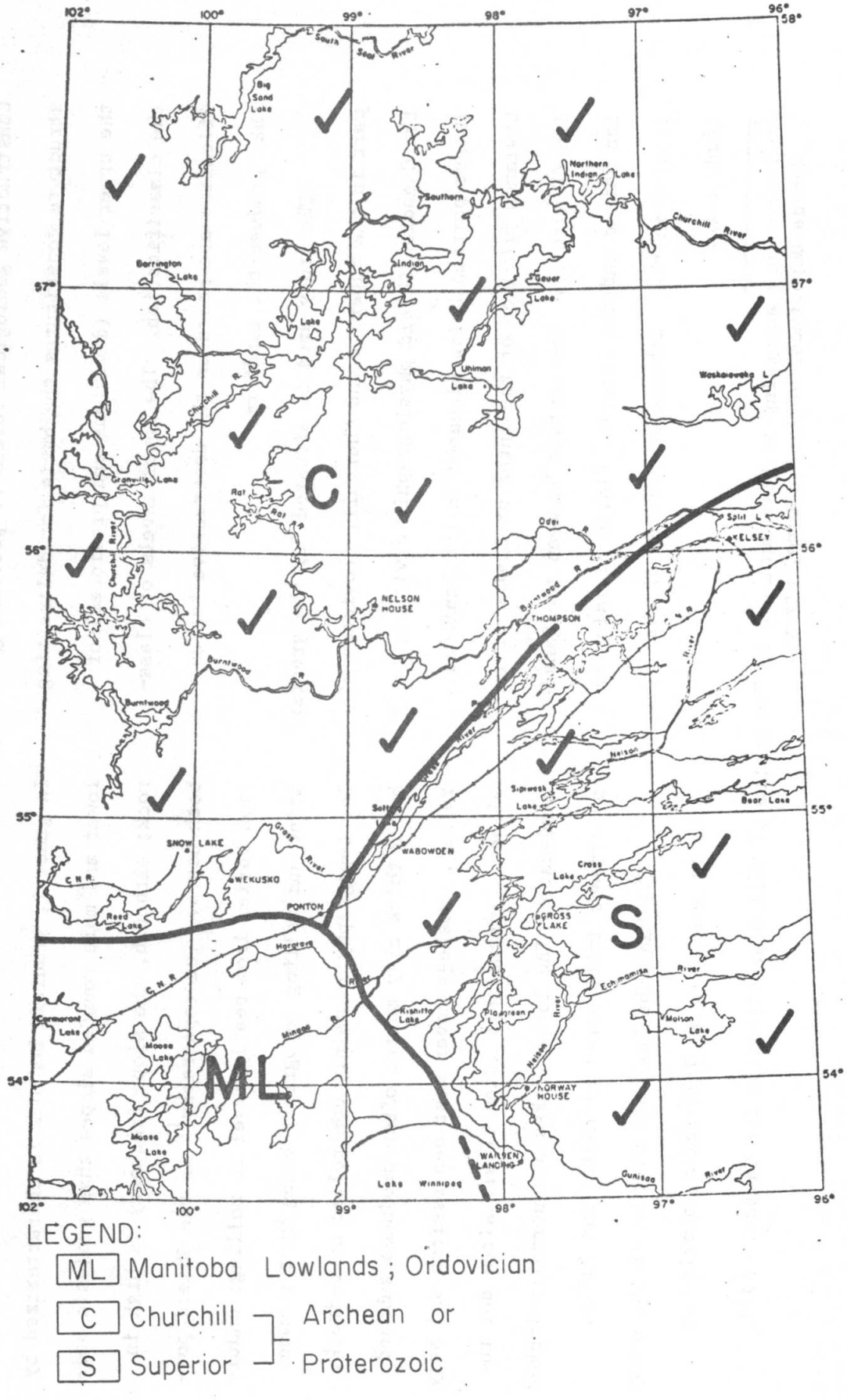

Figure 2. Physiographic Provinces and Rock Formations of the Study Area.

dolomitic limestone. This bedrock is aligned in flat beds that dip gently to the south. It has a nearly level to gently undulating topography. Lakes, when present, often drain through bogs.

D. Surficial Deposits

The entire area was glaciated during the Pleistocene epoch. An overall positive slope of the land in front of the glacier ensured the continued presence of a proglacial lake of varying extent, known as Glacial Lake Agassiz. In time, as the lake found lower outlets, the land surface gradually became exposed and organic materials began to accumulate in depressions.

Glacial landforms in the study area include ground moraine, end moraines, and numerous esker-kame complexes. Most of these landforms have been modified and subdued, to a greater or lesser extent, owing to their submersion in Glacial Lake Agassiz and, subsequently, to processes of erosion and organic deposition. As a consequence, these landforms, in particular the morainal ones, are often difficult to delineate or observe.

The till material of the morainal landforms in the southern half of the study area is composed mainly of highly calcareous clay. It consists of overridden lacustrine clay, owing to readvance of glacier ice across Lake Agassiz sediments, and contains relatively few stones and boulders. An exception to this occurs at the southeastern edge of the map area where the till of the "Sipiwesk" end moraine is composed mainly of boulders. A thin mantle of basal till occurs locally in the west-central portion of the study area. It has a sandy texture and is composed mainly of Precambrian materials. A calcareous clay loam till is found locally in the north and northeastern portion

of the study area.

Glacio-fluvial deposits are of local occurrence, and tend to be aligned in a northeast to southwest direction. They consist of sand, gravel and cobbles of Precambrian origin mainly, and are best sorted at their southern extreme. The greater part of the esker-kame complexes have been lake-modified, as evidenced from surface sorting or the presence of a coating of lacustrine clay as well as the weakly calcareous reaction of the granular materials. Most esker-kame deposits in the southern half of the map areas also show evidence of sorting due to wave action along their eastern flank.

Unmodified Lake Agassiz sediments are the dominant deposit of the study area. These lacustrine sediments mainly have a clay texture and are highly calcareous. The surface sediments are homogeneous and sparingly stony. They are normally underlain by varved clay which may contain a few rafted stones. The varved clay usually comprises the basal unit of the lacustrine clay sequence, resting on till or bedrock, seldom on sand. The thickness of the fine-grained lacustrine deposits varies from up to 75 feet in the valleys to less than 3 feet on ridges and upper slopes. Stratified lacustrine deposits occur at higher elevations, particularly in the vicinity of glacio-fluvial deposits. Beach deposits are of local significance, particularly in the southern portion of the study area. They consist of very highly calcareous silt and moderately calcareous sand.

Organic deposits occur extensively in the study area. They are the result of vegetative debris accumulating, particularly in poorly drained

locations. The thickness of these deposits ranges from one foot to about 9 feet. Two broad types of organic deposits occur in the area: the mesic peats and the fibric peats. Mesic peat consists of moderately decomposed material, having an unrubbed fiber content of 33 to 66 per cent on a volume basis. Fibric peat comprises relatively undecomposed organic material, having an unrubbed fiber content greater than 66 per cent by volume. Permafrost occurs primarily in fibric peat deposits where it is encountered at about 16 inches beneath the surface.

E. Climate

The study area has a continental climate, characterized by short, cool summers and long, cold winters. In relation to worldwide climatic conditions, the area is within the Dfc[1/] region; the cold-snowy forest (taiga) climates. This represents the extreme in continental climates. The climate is dominated by cold air masses during most of the winter with occasional invasions of warm air from the south. Mean annual ranges of temperature are the greatest of any climate. Precipitation is moderate to light. Summer is the season of greatest precipitation, since the extreme cold of the winter means little available moisture.

Climatic data available for the area are presented in Tables I, II, and III[2/]. The mean monthly temperature shows the greatest range between the months of January and July. The greatest mean range of about 80° F occurs at Brochet; although, all other recording stations have a mean

1/ W. Koppen and R. Geiger. 1936. Handbuch der Klimatologie. Bond I, Teil C. Gebruder Borntraeger, Berlin.

2/ Environment Canada, Atmospheric Environment Service. Temperature and precipitation (Prairie Provinces), 1941-1970: means and extremes.

TABLE I. MEAN MONTHLY AND ANNUAL TEMPERATURE (1941-1970).

Station	Years Recorded	Mean Monthly Temperatures (°F)												Mean Annual Temperature
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Brochet	22 yrs.	-20.3	-11.8	0.5	21.2	37.2	51.5	59.6	57.2	45.0	32.0	8.9	-9.1	22.7
Flin Flon	40 yrs.	- 7.2	0.2	13.3	32.3	46.8	58.0	64.9	61.8	49.9	38.4	17.1	0.2	31.3
Gillam	18 yrs.	-15.4	-10.0	2.4	20.4	37.0	49.9	58.9	55.9	44.1	32.3	10.5	-6.9	23.3
Norway House	Adjusted 36 yrs.	-11.7	- 4.4	7.7	29.1	43.8	56.1	63.0	60.6	49.2	37.4	14.3	-3.4	28.5
Thompson	6 yrs. *	-16.4	- 8.8	6.2	25.8	40.9	53.6	58.2	56.8	45.4	30.3	10.4	-4.7	24.0
Wabowden	27 yrs.	-11.3	- 4.4	9.6	28.0	43.1	55.1	62.3	59.1	47.8	36.4	14.3	-3.5	28.0

* Years recorded from 1967 to 1972.

TABLE II. MEAN MONTHLY MINIMUM AND MAXIMUM TEMPERATURE (1941-1970).

Station	Years Recorded	Mean Monthly Temperatures (°F)												Yearly Average	
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
		Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min	Max
Brochet	22 yrs.	-24.9 -11.1	-23.1 -0.6	-12.3 13.3	9.9 32.4	27.1 47.2	41.9 61.1	51.0 68.3	49.1 65.2	38.9 51.1	26.4 37.5	1.5 16.2	- 0.8 -17.3	31.7	13.6
Flin Flon	40 yrs.	-14.7 0.3	- 8.9 9.3	2.9 23.7	22.5 42.1	36.4 57.2	48.2 67.6	55.4 74.3	52.8 70.8	42.2 57.5	31.9 45.0	11.3 22.9	- 6.4 6.8	22.8	39.9
Gillam	18 yrs.	-24.1 - 6.7	-20.8 1.3	- 9.8 14.9	9.4 31.5	26.7 47.3	37.9 61.8	46.9 70.8	44.9 66.8	35.8 52.6	25.2 39.5	4.0 17.7	-15.7 1.5	13.4	33.3
Norway House	Adjusted 36 yrs.	-22.5 - 0.8	-16.0 7.3	- 6.9 22.3	17.7 40.5	31.0 56.6	43.6 68.5	52.7 73.3	49.8 71.3	38.3 59.5	29.3 45.5	5.3 23.3	-12.8 6.1	17.5	39.5
Thompson	6 yrs. *	-25.4 - 7.3	-21.3 3.8	- 8.5 20.9	12.6 38.9	28.0 53.7	40.7 66.4	45.6 70.7	61.4 69.6	36.0 54.8	23.7 39.9	1.4 19.4	-12.6 1.8	15.1	36.0
Wabowden	27 yrs.	-19.8 - 2.9	-15.0 6.2	- 2.6 21.8	16.9 39.2	31.9 54.2	44.1 65.9	51.6 73.0	48.7 69.3	39.1 56.4	28.9 43.8	7.4 21.3	-11.3 4.4	18.3	37.7

* Years recorded from 1967 to 1972

TABLE III. MEAN MONTHLY AND ANNUAL PRECIPITATION (inc.). (1941-1970).

Station	Years Recorded	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Yearly
Brochet	22-23 yrs.	0.76	0.49	0.77	0.82	1.41	1.89	2.67	2.03	2.35	1.50	1.15	0.94	16.78
Flin Flon	17 yrs+	0.81	0.78	0.90	0.72	1.44	2.66	2.93	2.58	2.09	1.17	1.06	0.90	18.04
Gillam	18-19 yrs.	0.56	0.47	0.67	0.63	1.12	1.97	3.01	2.56	2.29	1.37	1.05	0.70	16.40
Norway House	22 yrs+	0.64	0.77	0.83	1.10	1.71	3.24	2.64	2.24	1.75	0.69	1.30	1.15	18.06
Thompson	6 yrs*	0.81	0.43	0.64	1.08	1.90	3.08	2.92	3.12	2.78	2.68	1.28	1.49	22.21
Wabowden	25-28 yrs.	0.76	0.62	0.72	0.94	1.52	2.56	2.98	2.58	2.33	1.31	1.07	0.95	18.34

* years recorded from 1967-1972.

range between 70 and 75° F. All recording stations have a mean annual temperature of less than 32°F, ranging from 22.7°F to 31.3°F. The mean monthly precipitation (Table III) for the stations on record is highest in the month of July. Excepting the Thompson record, the mean annual precipitation varies from 16 to 18 inches. Approximately two-thirds of the yearly precipitation falls during the summer months, between May to the end of September. On the average, less than one inch of precipitation occurs in each of the winter months. With respect to the Thompson readings, they reflect the relatively short time-period over which the recordings were made.

F. Soils

The soils of the study area are situated within two zones of the Luvisolic soil region (Figure 3). These zones are delineated on the basis of presence or absence of permafrost. Most mineral as well as organic soils in the northern-most zone contain permafrost, whereas the permafrost in the southern zone is confined mainly to the organic soils. The thickness of permafrost varies from 1 foot at the southern edge to about 75 feet at the northern edge of the map area.[1,2]

Soils belonging to the Organic Soil Order[3] are well represented in the study area. The mineral soils present belong primarily to the Luvisolic, the Brunisolic, and the Gleysolic

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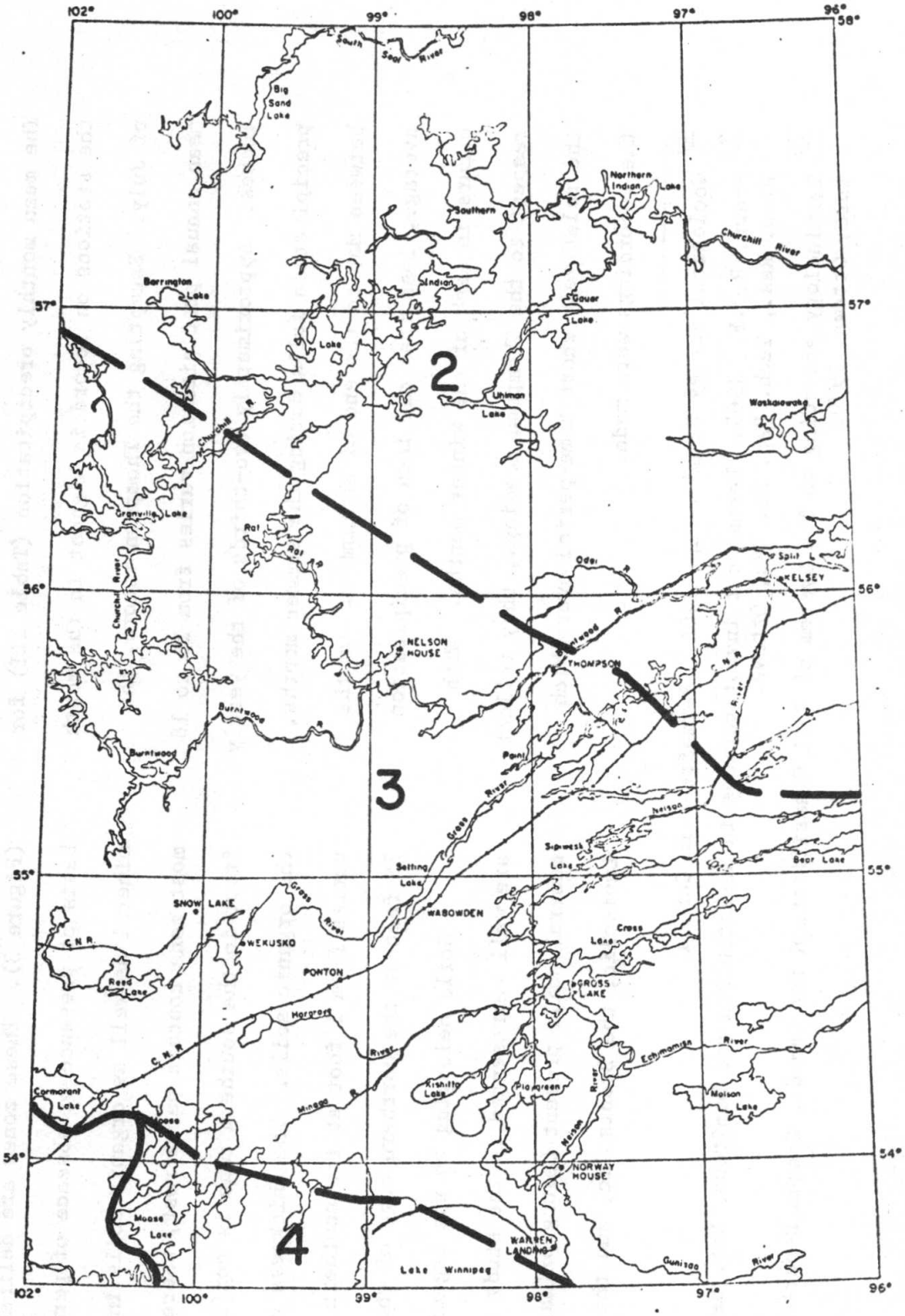
1/ Geological Survey Canada. Map 1246A. Permafrost in Canada.

2/ Brown, R.J.F. 1965. Permafrost investigations in Saskatchewan and Manitoba. Nat. Res. Coun., Div. Bldg. Res., Tech. Pap. No. 193, Ottawa.

3/ Terminology according to The System of Soil Classification for Canada. Canada Department of Agriculture, Ottawa, 1970.



Legend:

2 Discontinuous Cryic Luvisolic Brunisolic and Widespread Cryic Organic Soil

3 Luvisolic Brunisolic and Discontinuous Cryic Organic.

4 Luvisolic Brunisolic and Localized Cryic Organic.

Figure 3. Soil Zonations for the Study Area.

Orders. The development and nature of the major soil profiles in the study area are discussed briefly below. Their subgroup classification and series designation are presented in Table IV according to parent material.

Gray Luvisol soils have developed under forest vegetation on parent material that is mildly to moderately alkaline in reaction. These soils are characterized by an eluvial (Ae) horizon and illuvial, textural B horizons in which silicate clay is the main accumulation product. Under virgin conditions, the soils have organic (L-H) surface horizons. Imperfectly and well-drained soils belonging to this Soil Great Group occur predominantly on the clay till and the lacustrine deposits.

Dystric Brunisol soils have developed under forest vegetation on neutral to midly alkaline, coarse-textured parent materials. They are characterized by organic (L-H) surface horizons, a weakly expressed eluvial (Aej) horizon and weakly expressed illuvial Bm horizons in which sesquioxides are the main accumulation product. These soils are primarily associated with the modified glacio-fluvial deposits. Some Eutric Brunisols occur within the study area. Such soils have similar profile expressions as the afore-mentioned Dystric Brunisols, but their Bm horizons consists of weak illuvial concentrations of silicate clay, if any. They have developed on mildly to moderately alkaline parent materials and, in the study area, tend to be associated with beach deposits.

Regosolic soils are well and imperfectly drained soils which lack or have very weakly expressed horizon development. In the study area they have organic (L-H) surface horizons under

TABLE IV. KEY TO SOIL SUBGROUPS[1] AND SERIES OF THE CHURCHILL-NELSON RIVER STUDY AREA

A. Soils Developed on Clay Till and Lacustrine Deposits.

1. Moderately to strongly calcareous clay till and lacustrine clay deposits.

a) Well drained:

Orthic Gray Luvisol	- Sipiwesk series
Solodic Gray Luvisol	- Wabowden series
Cryic* Solodic Gray Luvisol	- Torrance series
Cryic Degraded Eutric Brunisol	- Notigi series

b) Imperfectly drained:

Gleyed Solodic Gray Luvisol	- Roe Lake series
Gleyed Cryic Solodic Gray Luvisol	- Mulchay series
Gleyed Cryic Degraded Eutric Brunisol	- Barrington series
Gleyed Cryic Orthic Regosol, Peaty phase	- Orr Lake series
Gleyed Cryic Orthic Gray Luvisol	- Mynarski series

c) Poorly drained:

Rego Gleysol, Peaty phase	- Medard series
Cryic Rego Gleysol, Peaty phase	- Partridge Breast series
Low Humic Eluviated Gleysol, Peaty phase	- La Perouse series
Cryic Low Humic Eluviated Gleysol, Peaty phase	- Muskwesi series
Cryic Humic Eluviated Gleysol, Peaty phase	- Odei series

* These soils are affected by cryoturbation.

[1] The System of Soil Classification for Canada 1970. Canada Dept. of Agriculture. Queen's Printer.

A. 2. Moderately to very strongly calcareous stratified lacustrine silt and clay deposits[1].

a) Well drained:

Orthic Gray Luvisol	- Pipun series
Cryic* Orthic Gray Luvisol	- Baldock series
Orthic Eutric Brunisol	- Mystery series
Cryic* Orthic Regosol	- Warnews series

b) Poorly drained:

Rego Gleysol, Peaty phase	- Button series

3. Moderately to very strongly calcareous stratified lacustrine silt and clay deposits underlain by bedrock.

a) Well drained:

Orthic Gray Luvisol	- Drunken Lake series
Degraded Eutric Brunisol	- Costello series
Cryic* Degraded Eutric Brunisol	- Witchai series
Orthic Dystric Brunisol	- Anson series

4. Moderately to very strongly calcareous stratified lacustrine silt and clay deposits underlain by non-calcareous, bouldery loamy sand to sandy loam till.

a) Well drained:

Orthic Gray Luvisol	- Apussigamasi series

B. Soils Developed on Glacial Till

1. Non-calcareous, bouldery loamy sand to sandy loam till derived from Precambrian granitic and volcanic rock.

[1]Soils developed on stratified silt and sand (Minago Association) as described in Soil Survey Rep. No. 10 have been included in the Pipun Association for correlative purposes.

B. 1. a) Well drained:

Degraded Dystric Brunisol - Telford series

Cryic Degraded Dystric Brunisol - Lynn Lake series

2. Non-calcareous, bouldery loamy sand to sand loam till underlain by Precambrian bedrock.

a) Well drained:

Lithic Degraded Dystric Brunisol - Moss Lake series

3. Strongly calcareous, bouldery loam to clay loam till.

a) Well drained:

Cryic* Orthic Gray Luvisol - Missi Falls series

C. Soils Developed on Glacio-Fluvial Deposits

1. Non- to weakly calcareous glacio-fluvial sand and gravel.

a) Well drained to rapidly drained:

Degraded Dystric Brunisol - Clarke series

Orthic Regosol - Kame Hills series

D. Soils Developed on Organic Deposits

1. Moderately well decomposed forest peat overlying moderately to highly clacareous lacustrine clay.

a) Thin to thick (16 - 52") forest peat or thin (<24") Sphagnum peat over forest peat:

Cryic Terric Mesisol - Issett series

Terric Mesisol - Cousins Lake series

Cryic Terric Humisol - Leven series

Cryic Mesisol - Nekik Lake series

Terric Fibric Mesisol - Atik series

D. 1. b) Very thick (>52") forest peat or thin (<24") sphagnum peat overlying forest peat:

Typic Mesisol	- Hargrave series
Cryic Mesisol	- Uhlman series
Cryic Humisol	- Paimusk series
Cryic Fibrisol	- Wuskwatim series
Typic Mesisol	- Pemichagamau series

2. Moderately well decomposed fen peat overlying moderately to highly calcareous lacustrine clay.

a) Thin to thick (16 - 52") fen peat or thin (<24") sphagnum peat over fen peat.

Terric Mesisol	- Reed Lake series
Terric Fibric Mesisol	- Reed Lake complex

b) Very thick fen peat (>52") or thin (<24") sphagnum peat overlying fen peat.

Typic Mesisol	- Rock Island series

3. Relatively undecomposed sphagnum peat overlying moderately to highly calcareous lacustrine clay.

a) Thin to thick (24 - 64") sphagnum peat overlying forest and/or fen peat.

Terric Mesic Fibrisol	- Chocolate series
Cryic Sphagno-Fibrisol	- Cormorant Lake series
Cryic Terric Sphagno-Fibrisol	- Gauer Lake series

3. b) Very thick (>64") organic deposits developed from thick (24 - 51") sphagnum peat overlying forest and/or fen peat or from very thick (>51") sphagnum peat.

Mesic Fibrisol	- Kiskitto series
Sphagno-Fibrisol	- Rusty Lake series

4. Relatively undecomposed sphagnum peat overlying Precambrian bedrock.

   a) Thin to thick (24 - 64") sphagnum peat overlying forest and/or fen peat.

Cryic Sphagno-Fibrisol	- Wapisu series

virgin conditions. They are of limited extent and are associated with certain extremely calcareous lacustrine deposits. In addition, recent dredge-spoil deposits would be classified as Regosolic soil.

Gleysolic soils have developed under hydrophytic vegetation and are saturated with water and under reducing conditions continuously or during some period of the year. They may have organic surface horizons (OF, OM, OH) of fibric moss or mixed peat and may have A and B horizons. As a result of the reducing conditions, their mineral matrix colours are of low chroma which may contain distinct or prominent mottles of high chroma. These soils are prominent in the study area, having developed on all the geological deposits present.

Organic soils are accumulations of organic residues which are saturated for most of the year. They consist mainly of three kinds of organic material: forest peat, Sphagnum moss peat, and herbaceous peat.

The term 'Cryic' signifies soils which are affected by cryoturbation processes. This is manifested either by a hummocky micro-relief, or the presence of permafrost, or both. This definition is more general than the one presented in The System of Soil Classification for Canada (1970), where the term 'Cryic' is restricted to soils containing permafrost within 40 inches of the mineral surface. In order to distinguish between these conditions, soils having a hummocky micro-relief with or without permafrost are differentiated from soils containing permafrost, as per C.S.S.C. (1970) definition, by an asterisk behind the term 'Cryic'.

Cryic soils having a hummocky micro-relief with or without permafrost are most readily observed in imperfectly or better drained locations. The soil hummocks have a diameter of about three feet and consist of a mound and a groove portion. The mound portion constitutes approximately 75 per cent of the hummock area and normally lacks an organic surface horizon when well drained. The groove portion of the hummock does contain an organic (L-H) surface horizon and the mineral soil material is less compacted than that of the hummock mound. The upper limit of permafrost, if any, in well drained soils is at about 6 feet from the land surface.

Cryic soils with permafrost are characterized by domed conditions, the presence of fibrous sphagnum peat or moderately decomposed forest peat and the presence of permafrost normally within two feet from the land surface. Such domes or palsas[1/] may be elevated more than ten feet above the surrounding land surface. They develop when accumulating peat and living vegetation provide sufficient insulation for the frozen layer to increase in volume. As the thickness of the frozen layer, and thus the height of the palsa, increases, an unstable situation arises: the surface moss layer cracks and the sides slump. This partial destruction of the insulative cover changes the energy balance, causing the frozen layer to melt, in part or completely, with concurrent collapse of the palsa.

G. Vegetation

The study area is situated within one major

1/ Zoltai, S.C. and C. Tarnocai. 1971. Properties of a wooded palsa in Northern Manitoba. Arctic-Alpine Res. 3:115-129.

vegetation belt or zone, designated as the Northern[1] or Boreal[2] Forest Region and defined by the prevalence of particular communities on approximately comparable topographical sites. This Region is characterized by primarily coniferous forests with a general admixture of broad-leaved trees, such as trembling aspen, balsam poplar, and white birch. Ritchie[3] recognizes three climatically-significant vegetation zones within the study area (Figure 4); namely, the Northern Transition, the Northern Coniferous Forest, and the Mixed Forest zone. On a regional basis, these zones are presently designated, respectively, as zone 2, 3, and 4.

The Northern Transition zone is characterized by a number of key species (Table V) and by the following conditions[4] :

1. Open black spruce forests with a ground vegetation of lichen and low prostrate shrubs and with a discontinuous stratum of medium shrubs on moist to fresh sites;
2. White spruce forests on favourable and dry sites (floodplains and eskers); jack pine forest occurring on dry sites only in the southern parts;
3. Muskeg (black spruce) and bog vegetation on saturated sites;
4. Tamarack is the most important tree of subseral

1/ Porsild, A.E. 1958. Geographical distribution of some elements in the flora of Canada. Geogr. Bull. (Can.) No. 11: 57-77.

2/ Rowe, J.S. 1959. Forest Regions of Canada. Dept. North. Affairs Nat. Resour., For. Branch Bull. 123.

3/ Ritchie, J.C. 1962. A geobotanical survey of Northern Manitoba. Arctic Instit. North. Amer., Tech. Pap. No. 9.

4/ c.f. Ritchie, J.C. 1959. The vegetation of Northern Manitoba III. Studies in the Subarctic. Arctic Instit. North Amer., Tech. Pap. No. 3.

communities, on moist to fresh sites, forming stands in association with willows, alder, and black spruce.

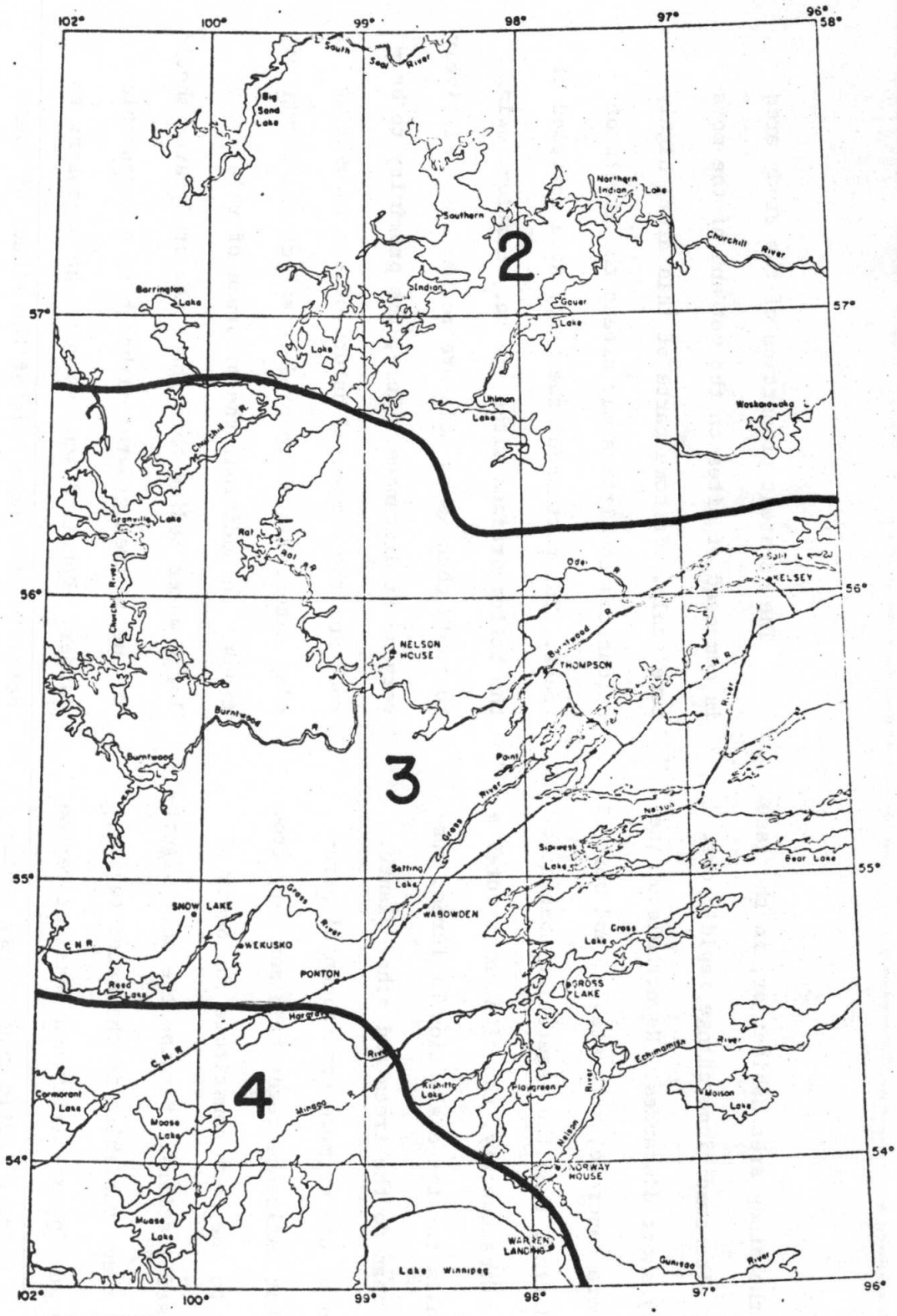
Key species of Northern Coniferous Forest zone are listed in Table VI. This zone is characterized[1/] by:

1. Closed black spruce forests with a continuous ground cover of mosses but lacking other tree or tall shrub stratum on moist to fresh sites;
2. White spruce occurrence is sporadic and limited to the more favourable sites;
3. Muskeg (black spruce) and bog vegetation on saturated sites;
4. Jack pine forests on dry sites (eskers, outcrops);
5. A seral type sequence on moist to fresh sites of birch-willow shrub → open pine forest → open pine forest with spruce → mixed black spruce → white birch forest → closed black spruce forest.

Key species of the Mixed Forest zone are listed in Table VII. This zone is characterized by:

1. Mixed white spruce-trembling aspen forests on moist to fresh sites;
2. Muskeg (black spruce, tamarack and locally eastern white cedar) and swamp and meadow vegetation on saturated sites;
3. Jack pine, aspen, or, in the southern parts, bur oak on dry sites;
4. Scrub aspen and jack pine are important trees in subseral communities.

1/ c.f. Ritchie, J.C. 1956. The vegetation of Northern Manitoba. I. Studies in the Southern Spruce Forest zone. Can. Jour. Bot. 34: 523-561.



LEGEND

2. Northern Transition
3. Northern Coniferous Forest
4. Mixed Forest

FIGURE 4. Vegetation zonations for the study area zone.

In the study area habitat or, in the case of trees, site conditions change rapidly over relatively short distances. Nevertheless, the site is more concrete, more stable, and more readily defined than the vegetation that occupies it. Consequently, the site constitutes a better basis for the evaluation of forest communities than do the trees and other plants. Selection of one or more environmental parameters that influence vegetation and vary from locality to the next constitute the basis of site classifications. Perhaps the most significant of these variables is the water regime; although soil permeability and nutrient regime, as well as micro-climatic conditions, cannot be discounted.

The greatest proportion of the study area is composed of sites on the wet end of the moisture scale. In some parts of this area, highly calcareous conditions may affect the growth of trees. The portion of the study area composed of the better-drained sites is very complex, owing to rapid changes in moisture regime over relatively very short distances. Here, the proximity to bedrock and the compacted nature of the lacustrine clay material are expected to affect the growth of trees. In addition, the presence of relatively large water bodies throughout the study area should influence tree growth; although in a favourable manner. Detailed studies would be necessary to determine the magnitude of the effect of these various conditions.

The regional climate favours the growth of frost-hardy species. An analysis of climatic data by Ouellet and Sherk[1/] indicates that the winter survival of ornamental trees and shrubs has a probability ranging from less than P_e = .55 in the northern portion to less than P_e = .85 near the southern limit of the study area for trees and shrubs having a hardiness class rating of 91-100. This hardiness class represents those evaluated trees and shrubs which are most winter-hardy. Even though the macroclimatic conditions in the study area are quite severe, the ability of plants to survive or thrive is highly influenced by microclimatic variations. Such small-scale climatic variations are reflected by differences in species composition between south- and north-facing slopes as well as between proximity and distance away from large bodies of water.

1/ Ouellet, C.E. and L.C. Sherk. 1967. Woody ornamental plant zonation III. Suitability map for the probable winter survival of ornamental trees and shrubs. Can. Jour. Plant Sci. 47: 351-358.

TABLE V. KEY SPECIES OF THE NORTHERN TRANSITION ZONE

Kind	Common Name	Scientific Name
Tree	Black spruce	Picea mariana
	White spruce	Picea glauca
	Jack pine	Pinus banksiana
	Tamarack	Larix laricina
	White birch	Betula papyrifera var. neoalaskana
Shrub	Dwarf birch	Betula glandulosa
	Willow	Salix myrtillifolia
	Willow	Salix arctica
	Baked appleberry	Rubus chamaemorus
	Crowberry	Empetrum hermaphroditum
	Rock cranberry	Vaccinium vitis-idaea
	Wild Rosemary	Andromeda polifolia
		Ledum decumbens
Grass, etc.	Tufted bog-cotton	Eriophorum angustifolia
	Cotton grass	Eriophorum spissum
	Sedge	Carex spp.
	Rush	Juncus albescens
Fern, etc.	Water-horsetail	Equisetum fluviatile linnaeanum
Moss	Sphagnum	Sphagnum fuscum
	Sphagnum	Sphagnum recurvum
	Moss	Drepanocladus spp.
	Moss	Cinclidium arcticum
Lichen	Reindeer moss	Cladonia alpestris
	Reindeer moss	Cladonia rangiferina
	Lichen	Stereocaulon paschale spp. evolutoides
	Lichen	Icmadophila ericetorum
Forb	False asphodel	Tofieldia pusilla

TABLE VI. KEY SPECIES OF THE NORTHERN CONIFEROUS ZONE

Kind	Common Name	Scientific Name
Tree	Black spruce	Picea mariana
	White spruce	Picea glauca
	Jack pine	Pinus banksiana
	White birch	Betula papyrifera
	Balsam fir	Abies balsamea
	Trembling aspen	Populus tremuloides
	Balsam poplar	Populus balsamifera
	Tamarack	Larix laricina
	White birch	Betula papyrifera var. neoalaskana
Shrub	Labrador tea	Ledum groenlandicum
	Red Osier	Cornus stolonifera
	Andromeda	Andromeda polifolia
	Leather leaf	Chamaedaphne calyculata
	Bog laurel	Kalmia polifolia
	Bramble	Rubus ideaus var. strigosus
	Baked-appleberry	Rubus chamaemorus
	Bearberry	Arctous rubra
	Rock-cranberry	Vaccinium vitis-idaea
	Sour-top blueberry	Vaccinium myrtilloides
	Mountain alder	Alnus crispa
	Willow	Salix bebbiana var. perrostrata
	Small cranberry	Vaccinium oxycoccus
Forb	Three toothed cinquefoie	Potentilla tridentata
	Wild lily of the valley	Maianthemum canadense
	Wild sarsaparilla	Aralia nudicaulus
	False Solomon's seal	Smilacina trifolia
	Buckbean	Menyanthes trifoliata
	Sweet coltsfoot	Petasites palmatus
Grass, etc.	Hairgrass	Agrostis scabra
	Blue-joint	Calamagrostis canadensis
	Sedge	Carex spp.
	Cotton-grass	Eriophorum spissum
Fern, etc.	Stiff club-moss	Lycopodium annotinum
	Wood horsetail	Equisitum sylvaticum
Moss	Schreber's moss	Pleurozium schreberi
	Moss	Hylocomium splendens
	Plum moss	Hyphnum crista-castrensis
	Sphagnum	Sphagnum warnstorfianum
	Sphagnum	Sphagnum fuscum
	Acuteleaf sphagnum	Sphagnum capillaceum
	Moss	Drepanocladus aduncus
	Moss	Tomenthypnum spp.

TABLE VI (continued)

Kind	Common Name	Scientific Name
Lichen	Reindeer moss	Cladonia alpestris
	Reindeer moss	Cladonia rangiferina
	Haircap moss	Polytrichum commune
	Lichen	Stereocaulon paschale

TABLE VII. KEY SPECIES OF THE MIXED FOREST ZONE

Kind	Common Name	Scientific Name
Tree	White spruce	Picea glauca
	Black spruce	Picea mariana
	Tamarack	Larix laricina
	Trembling aspen	Populus tremuloides
	Balsam poplar	Populus balsamifera
	Balsam fir	Abies balsamea
	White birch	Betula papyrifera
	Jack pine	Pinus banksiana
	Bur oak	Quercus macrocarpa
	American elm	Ulmus americana
	Green ash	Fraxinus pennsylvanica var. subintegerrima
	Manitoba maple	Acer negundo var. interius
	Eastern white cedar	Thuja occidentalis
Shrub	Alder	Alnus rugosa
	Black currant	Ribes americanum
	Bearberry	Arctostaphylos uva-ursi
	Blueberry	Vaccinium angustifolium
	Blue fly honeysuckle	Lonicera villosa
	Bog laurel	Kalmia polifolia
	Bog myrtle	Myrica gale
	Buch honeysuckle	Diervilla lonicera
	Common juniper	Juniperus communis
	Creeping juniper	Juniperus horizontalis
	Twin flower	Linnaea borealis
	Dewberry	Rubus pubescens
	Dwarf birch	Betula glandulosa
	Gooseberry	Ribes oxyacanthoides
	Hazel	Corylus rostrata
	High bush cranberry	Viburnum trilobum
	Labrador tea	Ledum groenlandicum
	Leather leaf	Chamaedaphne calyculata
	Pussy willow	Salix discolor
	Prickly rose	Rosa acicularis
	Red Osier	Cornus stolonifera
	Rock cranberry	Vaccinium vitis-idaea
	Sandbar willow	Salix interior
	Shrubby potentilla	Potentilla fruticosa
	Wild rosemary	Andromeda polifolia

TABLE VII (continued)

Kind	Common Name	Scientific Name
Forb	Baneberry	Actaea rubra
	Beggar ticks	Bidens frondosa
	Bishop's cap	Mitella muda
	Bluebeard lily	Clintonia borealis
	Bluewood aster	Aster cordifolius
	Bunch berry	Cornus canadensis
	Canada anemone	Anemone canadensis
	False Solomon's seal	Smilacina stellata
	Fireweed	Epilobium angustifolium
	Marsh five finger	Potentilla palustris
	Marsh marigold	Caltha palustris
	Pink wintergreen	Pyrola asarifolia
	Pitcher plant	Sarracenia purpurea
	Sundew	Drosera rotundifolia
	Tall meadow rue	Thalictrum dasycarpum
	Cow parsnip	Heracleum lanatum
	Water Plantain	Alisma triviale
	Wild columbine	Aquilegia canadense
	Wild lily of the valley	Maianthemum canadense
	Wild mint	Mentha arvensis
	Wild sarsaparilla	Aralia nudicaulis
Grass, etc.	Arrow grass	Triglochin maritima
	Baltic rush	Juncus balicus
	Blue joint	Calamagrostis canadensis
	Cattail	Typha latifolia
	Common bulrush	Scirpus validus
	Cotton grass	Eriophorum angustifolium
	Spike rush	Eleocharis acicularis
	Wild rice	Zizania aquatica
Fern, etc.	Club moss	Lycopodium clavatum
	Spike moss	Selaginella rupestris
	Horse tail	Equisitum sylvaticum
	Bracken	Pteridium aquilinum
Moss	Broom moss	Dicranum scoparium
	Hair-cap moss	Polytrichum commune
	Nodding pohlia	Pohlia nutans
	Ribbed bog moss	Aulacomnium palustre
	Schreber's moss	Pleurozium schreberi

METHODS

A. The Land Classification System

The bio-physical system of land classification was selected for this study. The hierarchy of this system was outlined by Lacate (1969)[1/] and adapted to Manitoba conditions by Zoltai, Oswald, and Tarnocai (1969)[2/]. In the course of this study, the system has been further modified with respect to the coding system and the cartographic presentation.

Land Regions (Level 1)

Land Regions are defined as areas of land characterized by a distinctive regional climate as expressed by vegetation (Lacate, 1969). The Land Region is usually a large aeral extent and is inevitably more or less heterogeneous. It is often an aggregation of several distinctive contiguous landscapes.

Land Districts (Level 2)

Land Districts are defined as areas of land within Land Regions characterized by a distinctive pattern of relief, geology, geomorphology, and associated vegetation (Lacate, 1969). Land Districts are distinguished primarily on the basis of major physiographic and/or geologic patterns which characterize the landscape as a whole.

Land System (Level 3)

A Land System is defined as an area of land throughout which there is a recurring pattern of landform, soils, and vegetation (Lacate, 1969).

1/ Lacate, D.S. 1969. Guidelines for bio-physical land classification (Progress Report). Can. Dept. For. and Rural Dev., 46 pp.

2/ Zoltai, S.C., E.T. Oswald, and C. Tarnocai. 1969. Land classification for land evaluation: Cormorant Lake Pilot Project. Can. Dept. For. and Rural Dev.,Inf. Rep. MS-X-20, 31 pp.

Land Type (Level 4)

A land type is defined as an area of land on a particular landform segment, having a fairly homogeneous combination of soil and chrono-sequence of vegetation (Lacate, 1969). Land Types are grouped into Land Systems where they recur in a recognizable pattern.

In this study, Land Types have been presented mainly in terms of complexes, owing to the complexity of the terrain and limited time for completion of the study.

Landscape Unit

The Landscape Unit was introduced as a land classification level by Zoltai, Oswald, and Tarnocai (1969), and considered as a level of the classification system for the Outlet Lakes project area of the Churchill-Nelson Rivers study area. It was an attempt to integrate the land and water portion of the landscape.

Landscape Units are defined by their land or water characteristics, or a combination of these. They are comprised of patterns of land types and water types grouped together to provide a convenient unit for resource management and multiple land use planning. Thus, landscape units are broad patterns of land and water, grouped into areas, using physiographic criteria.

The legend format has undergone considerable change from that advised by Lacate (1969). The Land Regions are identified by numerical codes corresponding to those used in climatic zonation. Land District codes are alphabetic, representing the initials of their names. Landscape Units are coded as consecutive numerals. The codes for Land Systems have been restricted to the identification

of geological materials and relief classes.

In the Land System code, the letter "P" has been replaced by "B, T, S, or F" to facilitate the identification of the various organic landforms and associated materials. Dominance of these materials is indicated when placed before the numeral, whereas it signifies subdominance when following the numeral, even though it occupies large areas. A lower case letter following the numeral indicates the petrography of the dominant mineral soil or the presence of permafrost. Lower case letter codes for permafrost may also be associated with the capital letter codes of organic materials. A code placed between brackets indicates the occurrence of minor amounts (less than 15 per cent) of materials important to management practices.

B. Sampling

Vegetation samples were taken at most sites (Figure 5) for identification and cross-exmination purposes. The specimens were placed in plastic bags at the time of sampling and transferred to a plant press upon arrival at base-camp.

A number of soil samples, representative of site conditions and soil pattern, were sampled in each of the project areas (Figure 6) for chemical and physical characterization. The soils were sampled according to horizon sequence within the soil pedon. In addition to these horizon samples, soil ped samples were taken for bulk density and dispersibility from horizons showing good structure. These soil ped samples were wrapped in plastic wrap and transported in styrene cups to prevent breakage.

All mineral soil samples were air-dried upon

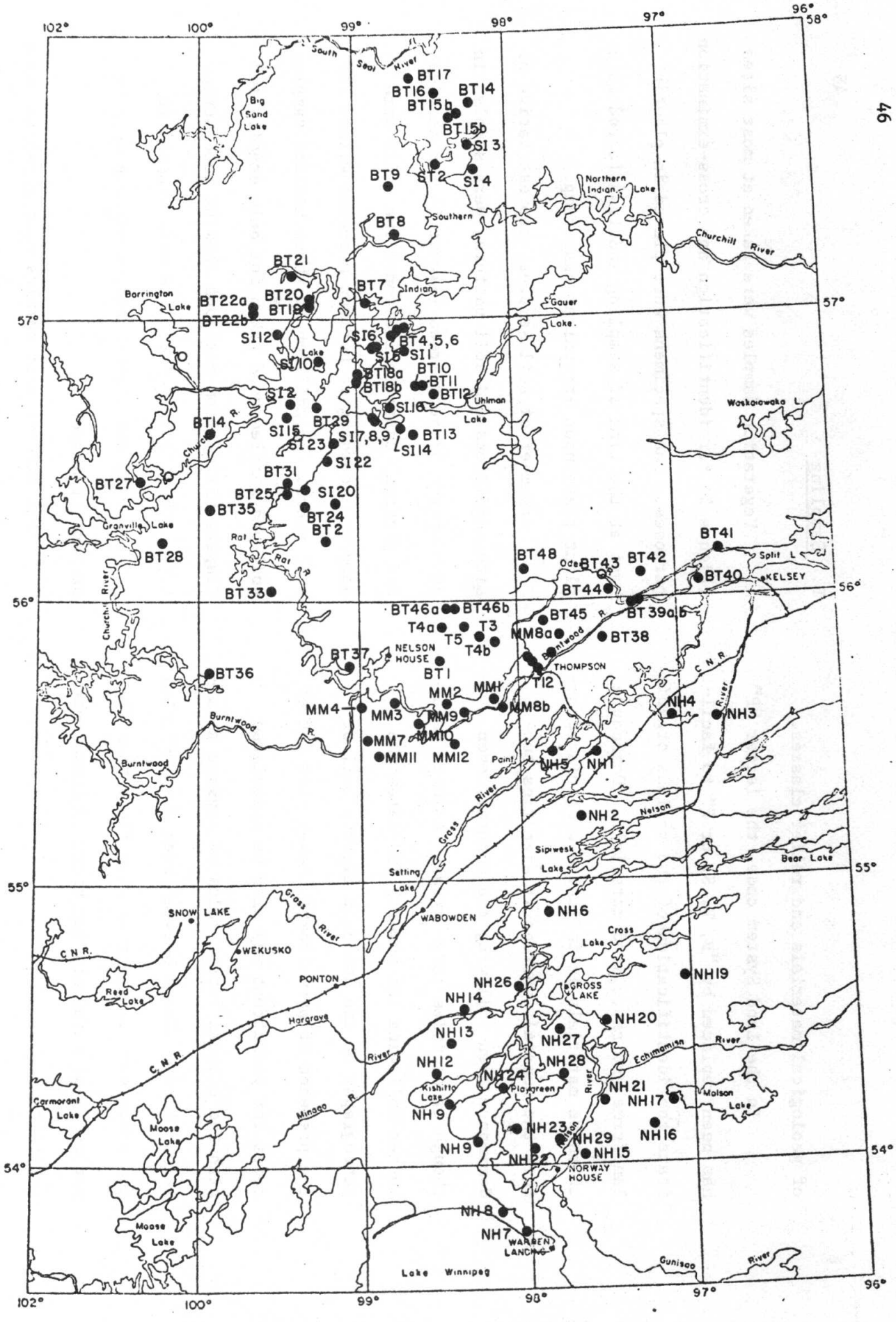


Figure 5. Location and designation of sites in the study area.

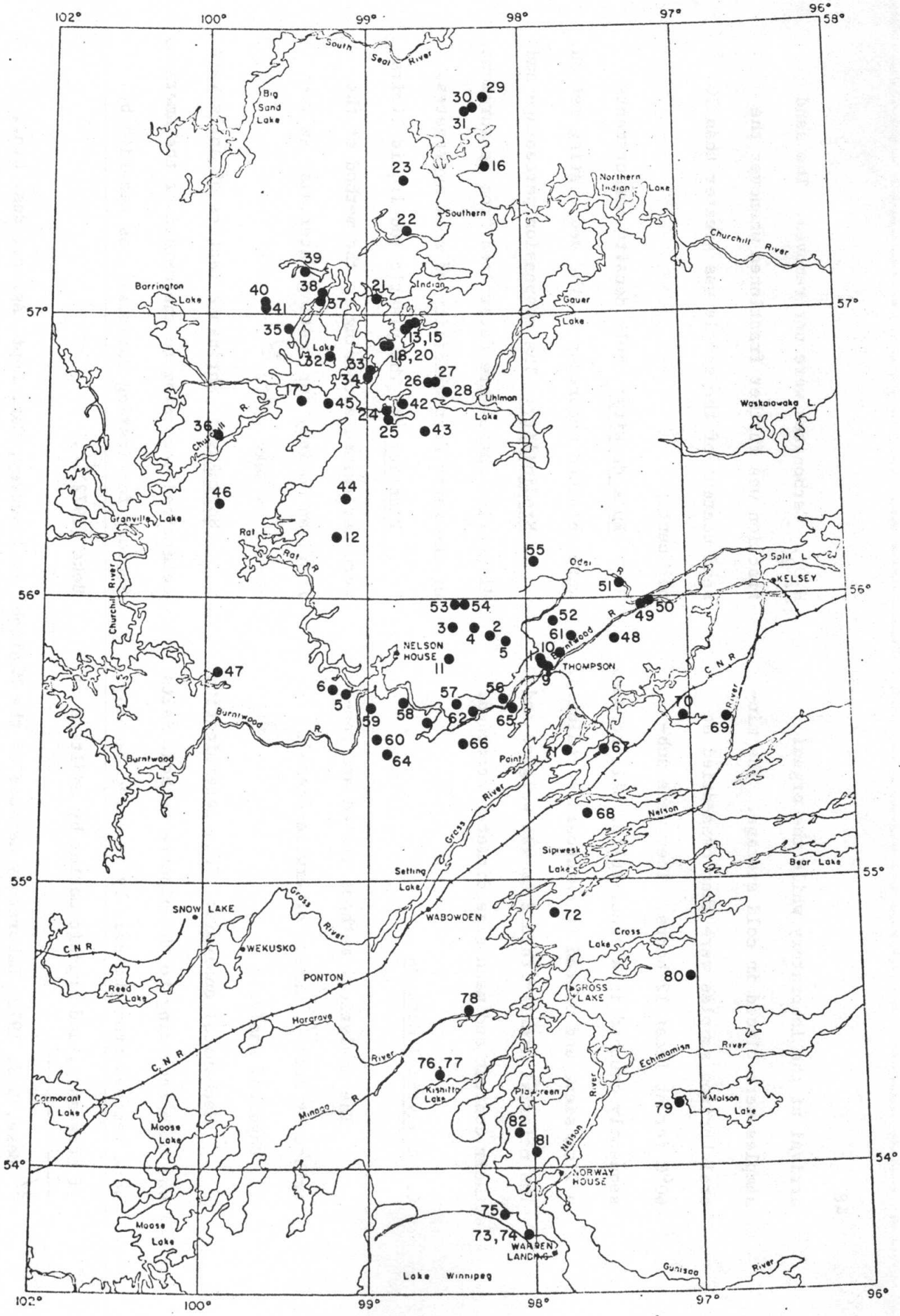


Figure 6. Location and identification number of the soils sampled in the study area.

arrival at the laboratory while the organic samples were placed in cold storage. The mineral horizon samples were then oven-dried at 60°C for at least 12 hours. They were subsequently crushed in a steel-roller mill to pass a 2 mm sieve and stored in cardboard containers. The material greater than 2 mm was weighed and their content and mean size diameter recorded.

C. Analytical Methods

The analytical methods listed are described by Beke[1/], unless otherwise stated.

1. Physical Analyses

Mechanical analysis: This determination was made according to the pipette method. Salts were removed from the soil by repeated washings, if necessary, and organic matter by addition of H_2O_2. Carbonates were not removed. The sand fraction was further fractioned whenever the sand content of the sample was greater than 10 per cent.

Bulk density: Bulk density measurements were obtained according to the ped-coating method.

Erodibility: The suspension percentage and dispersion ratio were determined from measurement of the water dispersibility of soil aggregates.

Plasticity: The plastic and liquid limits were determined according to the method of the American Society for Testing Materials, as recorded by Beke (1972)[1/].

Shrinkage: Shrinkage factors of soils were determined according to the method of the American Society for Testing Materials, as recorded by Beke (1972)[1/].

1/ Beke, G.J. 1972. Laboratory methods of the Manitoba Soil Survey, Can. Dept. Agric., Res. Stn., Pedology Unit, Internal Rep.

2. Chemical Analyses

pH: Soil reaction was determined on a 1:1 soil to solution ratio using a Radiometer pH meter equipped with a glass and a calomel electrode. The pH of mineral samples was determined with $CaCl_2$, while KCl was used for organic samples.

Conductivity: The electrical conductivity of the soil solution was determined on saturation extracts using a pipette-type conductivity cell and a conductivity bridge.

$CaCO_3$ equivalent and Calcite and Dolomite content were determined by a manometric method. The samples were ground to pass a 32-mesh sieve prior to analysis.

Organic carbon: A modification of the sulphuric acid heat-of-dilution method was used for the determination of organic carbon. The samples were ground to pass a 60-mesh sieve prior to analysis.

Total nitrogen: A modification of the Kjeldahl method was used for the determination of total nitrogen. The catalyst used was a commercial product known as Kelpak No. 2. A boric acid solution was used to collect the distilled ammonia. The ammonium-N content was determined using standardized H_2SO_4.

Exchangeable cations and exchange capacity: Exchangeable cations were extracted from the mineral soil samples with 1N ammonium acetate adjusted to pH 7.0. Exchangeable potassium and sodium were determined with a Perkin-Elmer model 303 Atomic Absorption Spectrophotometer. Calcium and magnesium were determined titrimetrically using standardized E.D.T.A. The cation exchange capacity was determined by extraction of absorbed ammonia with 1N NaCl and subsequent distillation

of the extract.

The cation exchange capacity of organic samples was determined by extraction of absorbed chlorine with barium acetate followed by titration of the extract. Exchangeable cations were extracted from the organic sample with 1N ammonium acetate and determined in a similar manner as for mineral soils.

Exchange acidity was determined by leaching the soil with barium acetate followed by titration of the leachate with standardized sodium hydroxide.

$NaHCO_3$-soluble phosphorus: Soil phosphorus was extracted with sodium bicarbonate and determined colorimetrically using acid molybdate (Jackson, M.L., 1958. Soil Chemical Analysis. Prentice-Hall, Inc., Englewood Cliffs, N.J., U.S.A.).

Fiber analyses: Both the unrubbed and rubbed fiber contents were determined on a volume basis. The volume of pre-treated organic material retained after washing in a 100 mesh sieve was measured in a half-syringe and reported to the nearest per cent.

Pyrophosphate: The sodium pyrophosphate solubility of organic material was determined by measuring the absorbance of the extract with a spectrophotometer.

Ash: The organic material was ashed at a low temperature (400°C) and weighed.

BIO-PHYSICAL RELATIONSHIPS

A. Land Regions, Districts, and Landscape Units

The land Regions, Land Districts and Landscape Units recognized in the study area are presented in Table VIII. Approximate locations of the Land Regions and Land Districts are illustrated in Figure 7. The general characteristics of these Bio-physical Land Classification levels are described below. Detailed descriptions of the Land Districts delineated in the Southern Indian Lake and Rat-Burntwood Rivers project areas and of the Landscape Units recognized in the Outlet Lakes project area are presented in Appendix I.

1. Land Regions

Boreal-Arctic Land Region (2): Regional vegetation on gently sloping, medium and fine textured materials is open black spruce forest with a ground cover of lichen and low prostrate shrubs. White spruce occurs on flood plains, sand plains and bedrock outcrops; jack pine occurring on the dry sites only in the southern parts. Discontinuous permafrost occurs throughout the Region; common occurrence of wooded mineral and peat palsas as well as mineral soil hummocks. Land sub-Region 2a represents the typic condition of this Land Region while sub-Region 2b is transitional to the Boreal Land Region.

Boreal Land Region (3): Regional vegetation on gently sloping, medium and fine textured materials is closed black spruce forest with a continuous ground cover of mosses. White spruce and trembling aspen are restricted to lake shores and

TABLE VIII. LAND REGIONS, DISTRICTS AND LANDSCAPE UNITS IN THE STUDY AREA

LAND REGION	LAND DISTRICT	LANDSCAPE UNITS (#)	PROJECT AREA
2. Boreal-Arctic	K.H. Kame Hills		Southern Indian Lake
	L.P. Long Point		
	S.B. South Bay		
3. Boreal	I.L. Issett Lake		Rat-Burntwood Rivers
	R.L. Rat Lake		
	N.L. Notigi Lake		
	N.H. Nelson House		
	W.W. Wuskwatin Lake		
	L.L. Leftrook Lake		
	A.L. Apeganau Lake		
	P.H. Partridge Crop Hill		
	H.L. Hunter Lake		
	P.L. Paint Lake		
	M.Y. Mystery Lake		
	M.L. Molson Lake	18	Outlet Lakes
	W.L. Wabisi Lake	08, 13, 14, 15, 16	
	C.L. Cross Lake	25, 26, 27, 28, 29, 30, 31 32, 33, 34, 35, 36	
	O.L. Outlet Lakes	05, 06, 07, 09, 17, 19, 20, 21, 22, 23, 24	
4. Mixed Boreal	H.M. Hargrave	01, 02, 03, 04	
	M.P. Montreal Point	10, 11, 12	

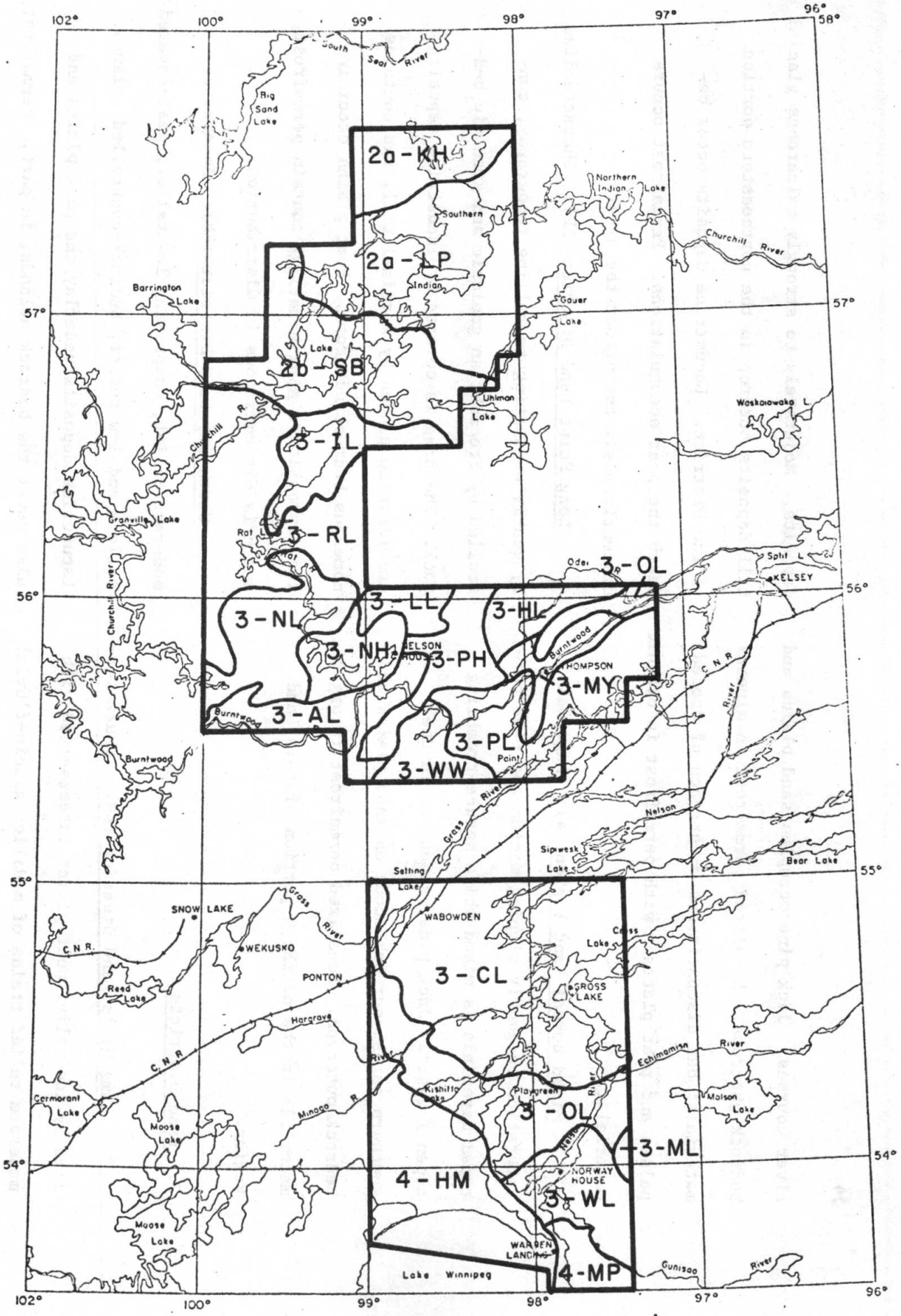


Figure 7. Land Regions and Land Districts of the Study Area.

river courses. Jack pine occupies sand plains and bedrock outcrops. Localized permafrost in mineral materials; but discontinuous occurrence of wooded palsas and peat plateaux with permafrost in organic materials.

Mixed Boreal Land Region (4): Regional vegetation on gently sloping medium and fine textured materials is mixed white spruce-trembling aspen forests. Jack pine, aspen, or in the southern parts, bur oak occur on sand plains and bedrock outcrops. Localized permafrost in organic materials in the northern portion of this Land Region.

2. Land Districts

Kame Hills Land District (KH): Characterized by low relief peat plains interspersed with moderate relief trains of modified glacio-fluvial deposits. Moderately to strongly calcareous glacial till deposits outcrop in the northeastern portion of the District. Lacustrine deposits occur beneath the peat accumulations. Permafrost occurs discontinuously throughout the area.

Long Point Land District (LP): Characterized by gently undulating to rolling topography, controlled by Precambrian gneissic and granitic bedrock. The area is covered by lacustrine deposits, underlain in places by morainal till, and contains numerous bedrock outcrops. Peat plains occur in the depressions. Most materials contain permafrost, which is discontinuous in distribution.

South Bay Land District (SB): An area of moderate relief, comprising low relief, peat-covered valleys and low relief, bedrock-controlled uplands. Lacustrine deposits underlay the peat plains and also cover the bedrock uplands, in part. Permafrost

occurs discontinuously in all materials, excepting esker-kame deposits.

Issett Lake Land District (IL): Characterized by low relief lacustrine and peat plains interspersed with Precambrian bedrock outcrops. The organic deposits are thick and are underlain by lacustrine materials. Permafrost is of local occurrence in the mineral deposits and occurs discontinuously in the organic materials.

Rat Lake Land District (RL): An area of moderate relief comprising low relief, bedrock-controlled uplands and low relief valleys. The valleys contain deep lacustrine deposits which may be covered by thin to thick organic accumulations. Permafrost is of local extent in the mineral deposits; but is discontinuous in thin to thick organic materials.

Notigi Lake Land District (NL): Characterized by gently to strongly rolling topography, controlled by frequently exposed Precambrian gneissic or granitic bedrock. Lacustrine deposits, with or without organic-material overlays, occur in valleys and depressions. Peat accumulations frequently contain permafrost, which is of local extent in the mineral materials.

Nelson House Land District (NH): Characterized by gently undulating to rolling topography, controlled by Precambrian bedrock. The area is covered by lacustrine materials but contains numerous bedrock outcrops. Peat plains occur in the depressions. Permafrost occurs frequently in peat accumulations; being of local extent in mineral deposits.

Wuskwatim Lake Land District (WW): Character-

ized by low relief plains of peat and lacustrine deposits, controlled slightly by Precambrian bedrock. Bedrock outcrops occur infrequently. Lacustrine clay and silt occur beneath the peat accumulations. Permafrost occurs extensively in peat deposits and locally in mineral materials.

Leftrook Lake Land District (LL): Characterized bv low relief plains of stratified lacustrine and peat deposits interspersed with bedrock-controlled uplands. Lacustrine materials occur beneath the peat accumulations. Permafrost occurs in mineral materials but is more extensive in organic accumulations.

Apeganan Lake Land District (AL): Characterized by low relief plains of lacustrine and peat deposits. Bedrock is exposed or close to the land surface in isolated portions of this Land District. Lacustrine materials occur beneath the peat accumulations. Permafrost occurs extensively in the peat accumulations and, to a lesser extent, in the mineral deposits.

Partridge Crop Hill Land District (PH): Characterized by very gently undulating to rolling topography of sandy end-morainic and glacio-fluvial deposits, lacustrine deposits, organic accumulations, and bedrock outcrops. The topography of the lacustrine deposits is largely bedrock-controlled. Peat deposits are underlain by lacustrine materials. Permafrost occurs discontinuously in the peat accumulations.

Hunter Lake Land District (HL): Characterized by low relief lacustrine and peat plains with isolated Precambrian granitic and gneissic bedrock outcrops. Lacustrine materials occur beneath the peat deposits. Permafrost occurs discontinuously in the peat accumulations and locally in the mineral materials.

Paint Lake Land District (PL): Characterized by low relief plains of lacustrine and peat deposits with

infrequent bedrock outcrops. The lacustrine deposits are thick and have a very gently undulating to gently rolling topography. Peat deposits are underlain by lacustrine materials. Permafrost occurs locally in mineral materials and discontinuously in peat accumulations.

Mystery Lake Land District (MY): An area of moderate relief, characterized by gently undulating to gently rolling lacustrine deposits and undulating to rolling glacio-fluvial materials. Precambrian bedrock outcrops occur infrequently. Organic accumulations of varying thickness overlay the lacustrine deposits. Permafrost occurs discontinuously in the peat accumulations and less extensively in the mineral deposits.

Molson Lake Land District (ML): Characterized by rolling topography, controlled by Precambrian bedrock. The area is covered by discontinuous lacustrine clay and some cobbly morainal till. Bedrock outcrops are numerous. Peat Plains occur in the depression. Permafrost occurs locally to discontinuously in the organic accumulations.

Wabisi Lake Land District (WL): Characterized by undulating to rolling topography, controlled by peat plains and Precambrian granitic bedrock outcrops with isolated occurrences of modified, glacio-fluvial deposits. The peat plains are generally underlain by lacustrine clay. Permafrost is of local to discontinuous occurrence in the peat accumulations.

Outlet Lakes Land District (OL): Characterized by low relief peat plains with isolated Precambrian granitic bedrock outcrops and trains of modified glacio-fluvial deposits. Lacustrine clays occur beneath the peat accumulations. Permafrost

occurs discontinuously to locally in the peat accumulations and locally in mineral deposits.

Cross Lake Land District (CL):

Characterized by undulating to gently rolling topography, controlled by Precambrian gneissic or granitic bedrock. The area is covered by lacustrine clay, underlain in places by fine-textured morainal till, and contains numerous bedrock outcrops. Peat plains occur in the depressions. Permafrost occurs discontinuously to locally in the peat accumulations and locally in mineral deposits.

Hargrave Land District (HL):

Characterized by low relief peat plains with few, low relief, lacustrine and modified glacio-fluvial outcrops. A nearly continuous layer of lacustrine clay occurs underneath the peat material. In a large proportion of the area, the lacustrine clay is underlain, in turn, by fine-textured morainal till. Permafrost is of local extent in peat accumulations.

Montreal Point Land District (MP):

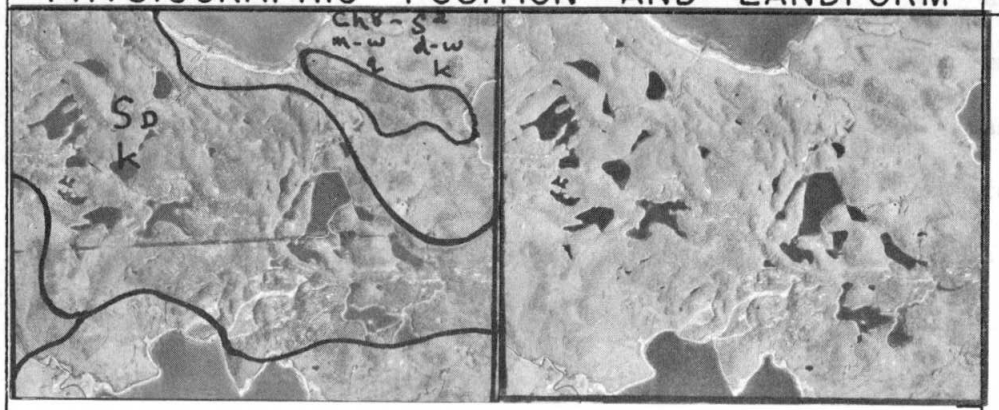
Characterized by low relief peat plains with isolated Precambrian granitic rock outcrops. A nearly continuous layer of lacustrine clay is present beneath the peat material, overlying fine-textured morainal till in part of the area. Permafrost occurs locally in peat accumulations.

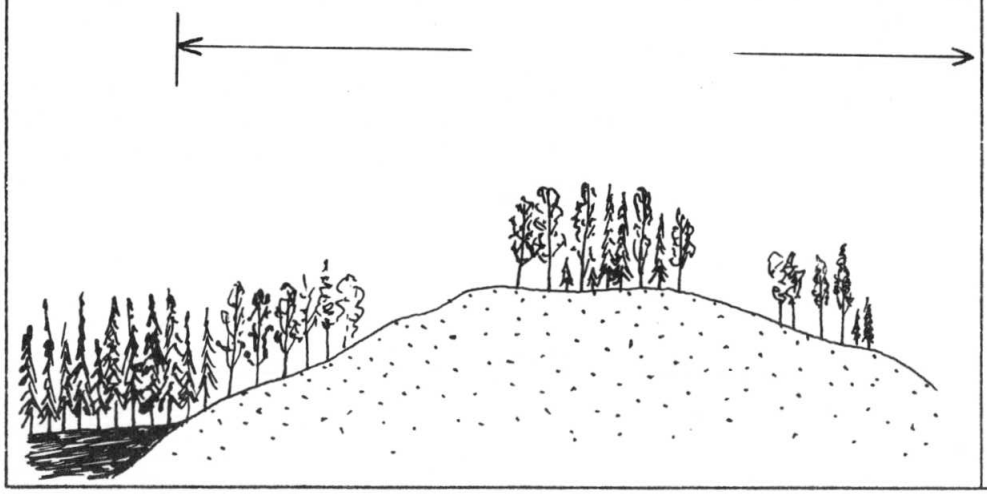
B. Description of Ecosystems

This section describes and illustrates the attributes of the principal ecosystems occurring in the study area. In instances, the delineated ecosystems cover a range of conditions and, hence, would constitute ecosystem complexes. The attributes are discussed under the headings: physiographic position and landform, soil characteristics, and biotic characteristics. In addition, an evaluation is provided of the sensitivity of each ecosystem to enviornmental disturbance.

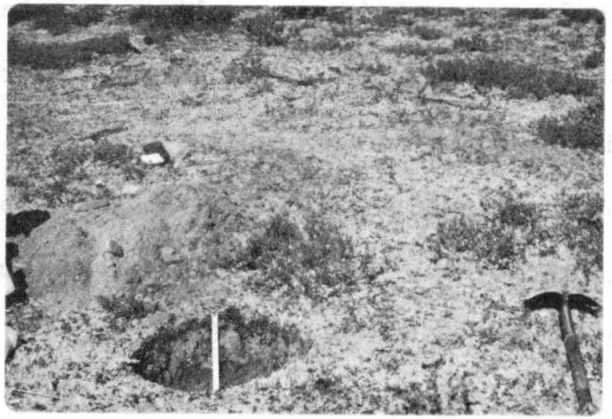
ECOSYSTEM	GLACIO-FLUVIAL SAND, DRY	MAPPING S1
ECOREGION 2 a	BLACK SPRUCE, JACKPINE - LICHEN	SYMBOL d

PHYSIOGRAPHIC POSITION AND LANDFORM





SOIL CHARACTERISTICS



Orthic Regosols and Degraded Dystric Brunisols developed on sand textured, lake modified glacio-fluvial and beach deposits. The Orthic Regosols occur in the blowout areas of esker-kames as well as recently formed beaches (c.f. BT 6). The degraded Dystric Brunisols are characterized by a distinct, light gray, strongly acid Ae horizon and a friable, yellowish-brown Bm horizon having a weak concentration of iron, aluminum, and organic matter (c.f. sites BT4 and 9).

BIOTIC CHARACTERISTICS

MAPPING SYMBOL S1 d

FOREST COVER

Varies considerably as result of fire history, wind erosion, exposure etc. Stands of Jack pine, Black spruce and occasionally White spruce can be found. They vary from very open, with lichen covered wind eroded soil surfaces, to semi-open stands (Jack pine, Black spruce). White birch may occur sporadically.

UNDERSTORY AND GROUNDCOVER

On top of ridges: Arctostaphylos uva-ursi, Empetrum hermaphroditum, Cladonia spp., Vaccinium vitis-idaea, V. myrtilloides, V. uligonosum. Bare, windblowm areas are very common. Lichen and organic debris occur in variable quantities. Slopes of the landform are often steep and, depending on exposure have a varied kind of vegetation; e.g. Polytrichum commune, Ledum groenlandicum, Geocaulon lividum, Alnus crispa and a variety of Lichen spp.

SUCCESSION

As result of fire Jack pine forms in many cases, pure or mixed stands on these sites. When undisturbed for long periods Black spruce will form the forest cover.

Mixture of Jack pine and Black spruce. Note the barren sandy exposures.

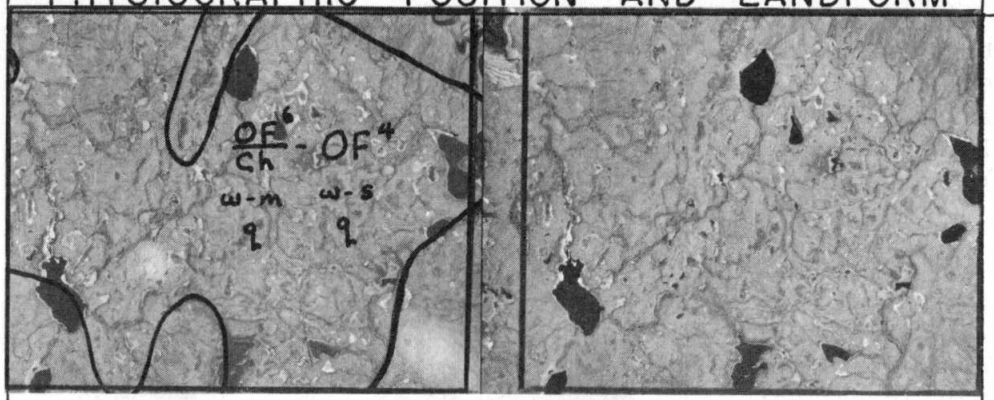
Jack pine stand being invaded by Black spruce.

SENSITIVITY

The material of these landforms is very well suited for road building and other construction purposes because of its granular texture and rapid internal drainage. Ecosystems like these are not too sensitive to erosion and flooding. Trees will easily be uprooted and good sandy beaches will form provided the slope below the water level is not too steep. Formation of stable shorelines will not take too long a time.

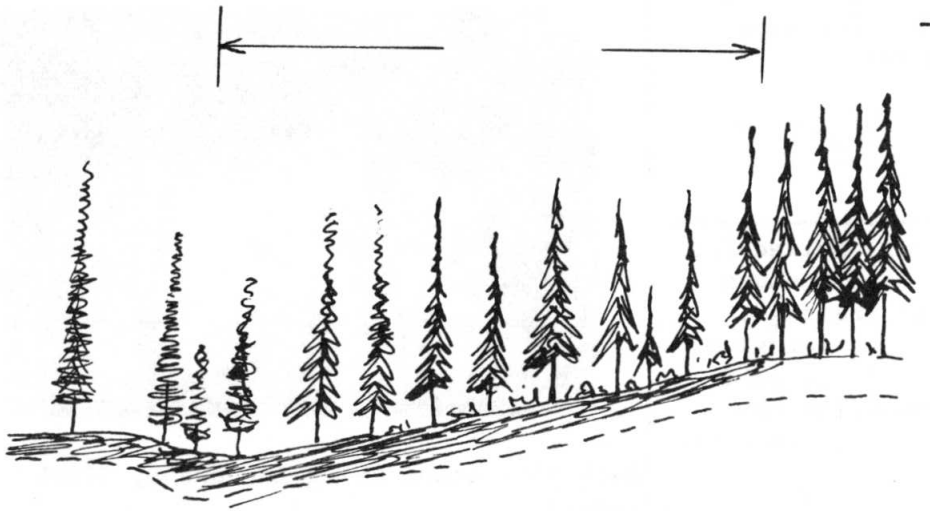
ECOSYSTEM	SHALLOW ORGANIC OVER LACUSTRINE, MOIST, PERMAFROST	MAPPING SYMBOL $\frac{OF}{Ch}$, $\frac{OM}{Ch}$ m - w
ECOREGION 2 a	BLACK SPRUCE-SPHAGNUM-FEATHERMOSS	

PHYSIOGRAPHIC POSITION AND LANDFORM



PERMAFROST

Depth of active layer from 3½-2 feet. Shallower under sphagnum hummocks. A large amount of ice crystals in peat and underlying mineral soil. Ice lenses very common, especially in clay.



SOIL CHARACTERISTICS

Cryic Humic Eluviated Gleysols characterized by a 6 to 24 inches thick O horizon and underlain by a dark colored granular Aehg and dull colored Btg horizons. Permafrost (z) occurs within 40 inches of the mineral surface. These soils are moderately fine textured, having developed on moderately to very strongly calcareous lacustrine deposits. Sites BT7, 8, 17 and 48 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL $\frac{OF}{Ch}$, $\frac{OM}{Ch}$ m - w

FOREST COVER

Composed of very open Black spruce. Stands are not merchantable, even at maturity, which may be reached after 120-170 years. Basal area per acre may be about 40-20 square feet. Heights of trees vary from 5-25 feet. Stands can be considered a class 7 according to C.L.I. rating.

UNDERSTORY AND GROUNDCOVER

Occasional willow and alder, up to 5 feet tall, may occur but more common is Betula glandulosa, and occasionally Chamaedaphne calyulata. Some bS-regeneration in the form of seedlings or as result of layering are found. Other species found are: Ledum groenlandicum, Vaccinium vitis-idaea, V. uligonosum, V. oxycoccos, Empetrum hermaphroditum, Rubus chamaemorus, Kalmia polifolia, Petasites palmatus, Sphagnum fuscum, S. decumbens, S. rubrum, Cladonia alpestris, C. rangiferina, Dicranum fuscum, D. scorparium, D. rugosum, Polytrichum commune, Pleurozium schreberi and Peltigera aphthosa. Ledum decumbens may be found on some sites in the most northern part of the region.

SUCCESSION

After a fire the forest stand usually regenerates back to Black spruce. Also the sphagnum is not alway completely burned. A large proportion of Willow and some ericaceous shrubs may appear.

Open uneven aged Black spruce. Note the tamarack in the foregound.

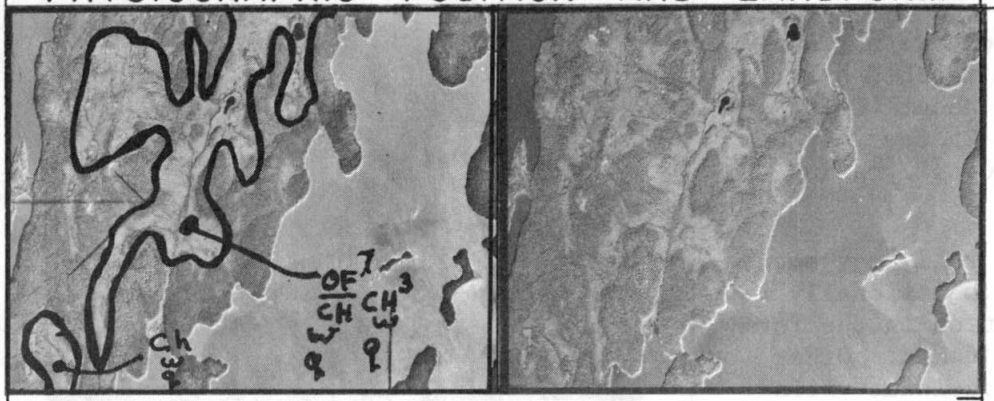
Shoreline in organic over clay. These shorelines are not stable and erode continuously. Some leaning trees can be noted.

SENSITIVITY

Highly sensitive to flooding, erosion and construction. Flooding and construction will likely cause the melting of the permafrost, which may result in collapsing and slumping.
New stable shorelines will take a long time to develop.

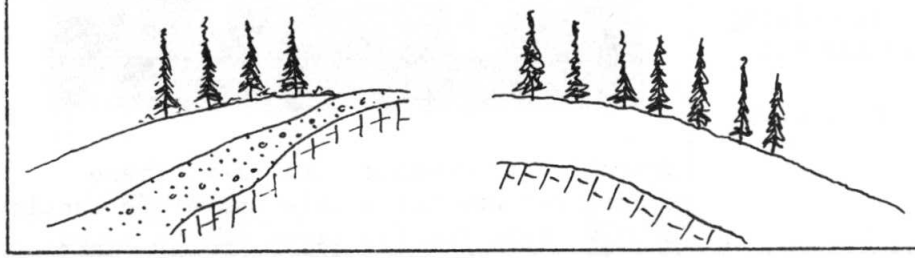
ECOSYSTEM	LACUSTRINE AND CALCAREOUS TILL, FRESH AND MOIST, PERMAFROST	MAPPING SYMBOL Ch f-m
ECOREGION 2 a + b	BLACK SPRUCE-FEATHERMOSS-WHITE BIRCH	

PHYSIOGRAPHIC POSITION AND LANDFORM

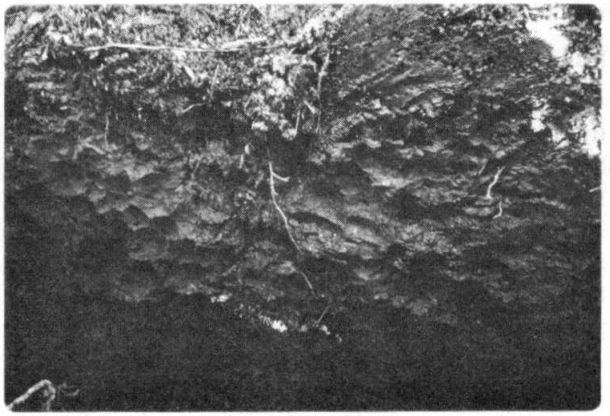


PERMAFROST

Depth of active layer 3 to 4 feet. Thickness of permafrost layer not known, but expected to be relatively thin. Amount of ice less than 50%.



SOIL CHARACTERISTICS



Cryic* Gray Luvisols, Cryic* Eutric Brunisols, or Cryic* Orthic Regosols characterized by a hummocky micro-relief. Soil hummocks measure about three feet in diameter and consist of a mount and a groove portion. These soils may or may not contain permafrost or bedrock within 40 inches from the surface. They have developed on moderately to very strongly calcareous, medium and fine textured lacustrine and till materials. Sites SI17, BT15, 18, 39, 46 and 47 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL Ch f-m

FOREST COVER

Black spruce occurs in most of these ecosystems. White birch may be introduced after fire as a component, but Black spruce usually constitutes part of the stand. Mature stands of Black spruce are semi closed; heights of trees may reach 30-35 feet, diameters are from 4-4.5 inches. Density about 100 square feet per acre (total), with 70 square feet per acre merchantable; crown closure varies considerably.

UNDERSTORY AND GROUNDCOVER

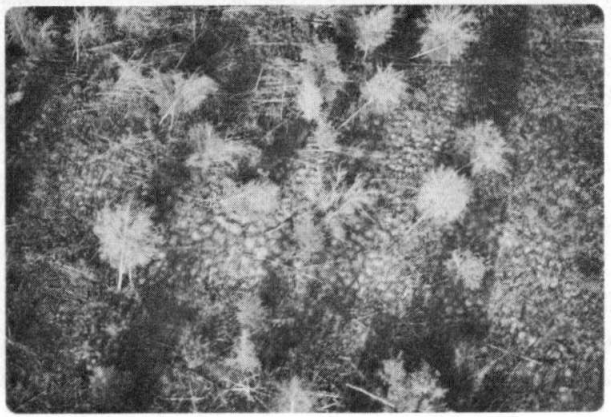
Alnus crispa and Willow occur commonly in open parts of the stands. Heights vary from 3-10 feet. Other common vegetation consists of the feathermosses: Pleurozium schreberi and Hylocomium splendens and the lichen Cladonia rangiferina and C. alpestris. Hyphnum and Dicranum spp., Petasites palmatus, Ledum groenlandicum, Vaccinium vitis-idaea, V. myrtilloides, V. uligonosum, Equisetum sylvatium and Peltigera aphthosa occur less frequently.

SUCCESSION

After fire, a mixture of Black spruce and White birch is most common. A quickly repeated burn may result in White birch being the dominant forest cover, mixed often with Salix spp., Alnus crispa and Black spruce. The proportion of Ledum groenlandicum may also increase. Herbs found can be Petasites palmatus, Ribes glandulosum, Epilobium angustifolium, Viburnum edule and Rosa spp.

SENSITIVITY

Flooding and likely construction will cause the permafrost to melt, resulting in some collapsing if permafrost present. Erosion will cause the slumping of the mounts. Where bedrock is close to the surface, a new shoreline is likely to develop in relatively short time otherwise erosion may continue for a considerable period of time.

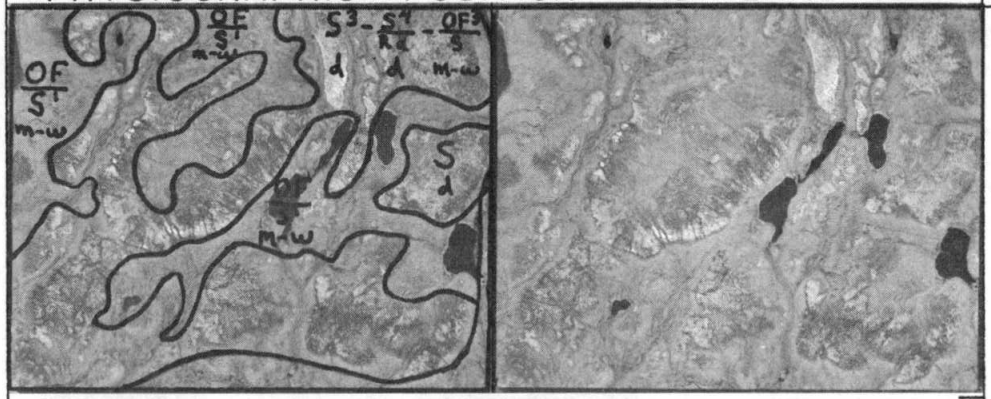


Burnt over area. Note the light colored mounts.

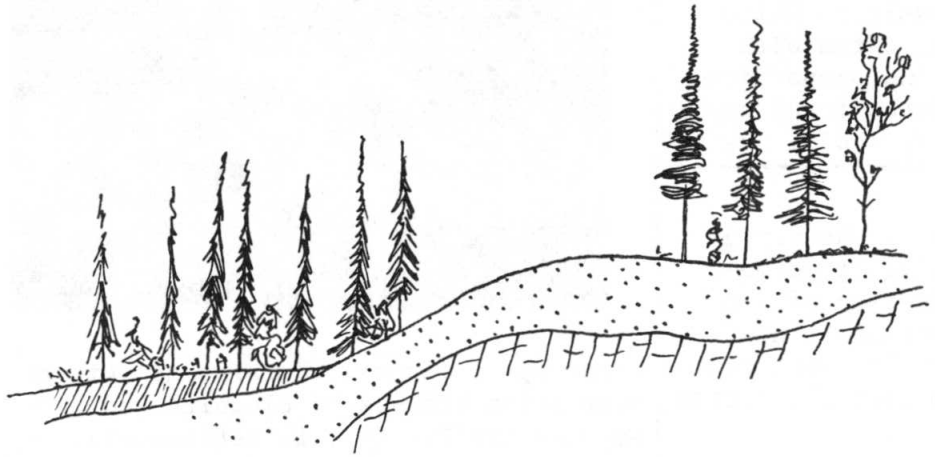
Close up of mounts. The area is void of vegetation because of cleaning and pedestrian traffic (S.I.L. settlement).

ECOSYSTEM	SANDY TILL; DRY - FRESH BLACK SPRUCE - LICHEN	MAPPING S; S/R
ECOREGION 2a, b & 3		SYMBOL d-f

PHYSIOGRAPHIC POSITION AND LANDFORM



Zone 2a



SOIL CHARACTERISTICS

Degraded Dystric and Eutric Brunisol soils characterized by a thin L-H horizon, and underlain by weakly to moderately developed granular, light gray Ae and granular, reddish brown Bm horizons. These soils are bouldery, loamy sand textured, non-calcareous, and shallow; Precambrian bedrock occurring usually within 20 inches of the surface. Descriptions and analyses of sites BT 14, BT 21, and SI 20 are representative of these areas.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL S; S/R d-f

FOREST COVER

Open Black spruce, lichen stand in zone 2a, and semi-closed stand of Black spruce and Jack pine with some Trembling aspen and White birch in the middle (2b) and southern (3) zone. Tree growth varies with zone and within a zone. Heights of trees from 20-40 feet, with diameters of about 4.5" on the average and basal areas as low as 30 square feet per acre. No seedlings or shurbs were observed on the sampled sites in the northern zone.

UNDERSTORY AND GROUNDCOVER

In zone 2a Cladonia alpestris, C. rangiferina and other lichen form extensive coverages. Associated with them are Vaccinium spp. like V. myrtilloides, V. vitis-idaea and V. Uligonosum, and in small proportions Geocaulon lividum, Empetrum hermaphroditum and Ledum groenlandicum. In the middle (2b) and south (3) zone an increasing amount of shrubs like Alnus crispa, White birch and species mentioned under (2a).

SUCCESSION

After fire, Black spruce may regenerate again. When Jack pine seed is available a Jack pine fire regeneration will develop and the stand will transfer to Black spruce with time.

Zone 2a
Open Black spruce with thin litter, lichen and Vaccinium spp. ground cover.

Zone 3
Note the much heavier shrub component of the system.

SENSITIVITY

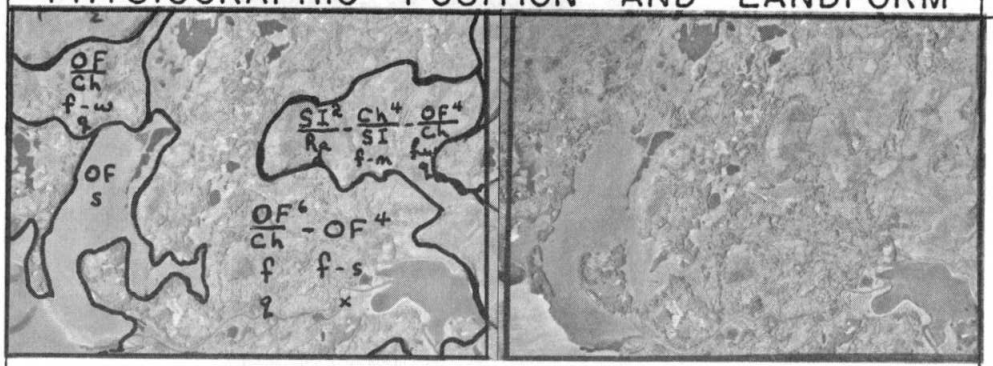
These areas are marginally suitable for residential building, but provide a good source for road building material.
These areas are of low sensitivity to disturbance in the form of flooding and erosion. Good beaches may be formed because of shoreline erosion, provided the original slopes are not too steep.

ECOSYSTEM SHALLOW ORGANIC over LACUSTRINE, DOMED PERMAFROST
BLACK SPRUCE - FEATHERMOSS

ECOREGION 2b, 3

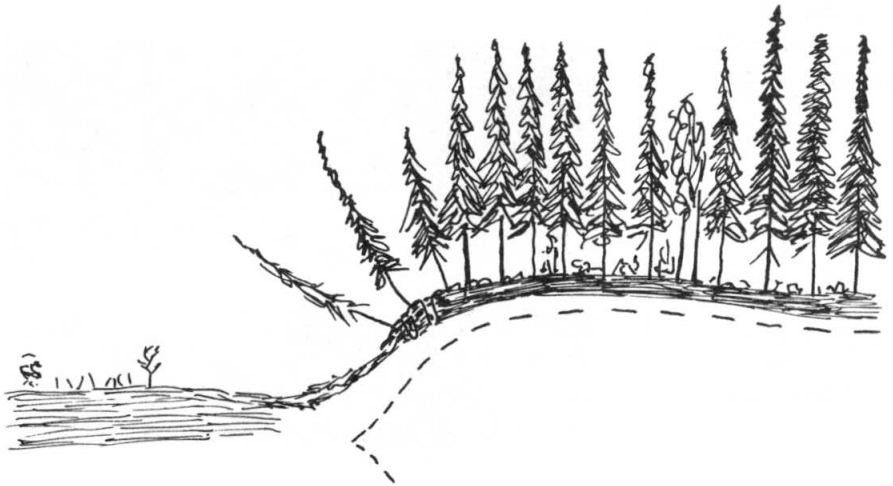
MAPPING SYMBOL OF/Ch f-m

PHYSIOGRAPHIC POSITION AND LANDFORM

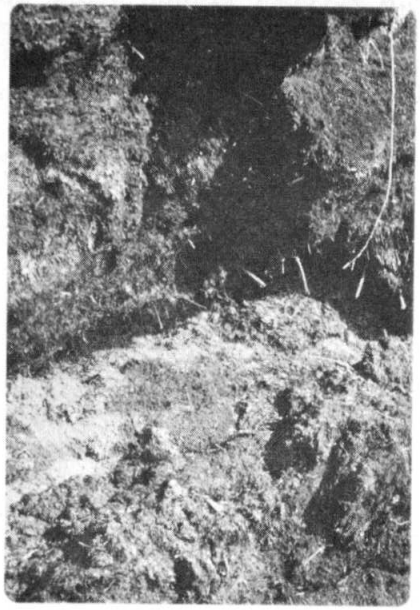


PERMAFROST

As result of permafrost the landform is domed (palsa). Depending on thickness of the organic layer the uppermost layer of the permafrost occurs either in the mineral or in the organic and mineral soil.
The ice content is generally less than 50 per cent.



SOIL CHARACTERISTICS



Gleyed Cryic Orthic Regosol, -Orthic Gray Luvisol, Cryic Fibrisol, -Mesisol, and -Humisol soils characterized by a domed macro relief, the presence of a surface organic horizon more than 12 inches thick, and permafrost normally within two feet of the land surface. The domes or palsas may be eluviated over ten feet above the surrounding land surface.
Sites BT 1, 43, 44, 45, SI 18, 22, and NH 3 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL: OF/Ch f-m

FOREST COVER

Black spruce occurs on most of these landforms. In some cases, White spruce can be found, but often mixed with Black spruce. When disturbed by fire, White birch and Trembling aspen may form the forest cover or part of the cover. Tree growth can be fairly good to good, with three heights of 30-60 ft. at 100+ years of age. Diameters will be from 5-7" (in the case of White spruce 12+ inches) and basal areas may be as high as 140 square feet per acre.

UNDERSTORY AND GROUNDCOVER

Tall shrubs like Salix spp. and Alnus crispa may occur. Ledum groenlandicum occurs in various proportions. Cornus canadensis can form an extensive groundcover. Other species forming part of the system are: Rubus chamaemorus, Viburnum edule, Vaccinium vitis-idaea, Geocaulon lividum, Mitella nuda, Linnaea borealis, Pyrola virens, Moneses uniflora, Equisetum spp., Pleurozium schreberi, Hylocomium splendens, Hyphnum crista-castrensis, Dicranum spp., Cladonia spp.

SUCCESSION

After fire, Trembling aspen and/or White birch may form the tree cover, provided that the fire does not cause the melting of permafrost. Shrubs like alder will increase in proportion too. Black spruce and/or White spruce (in some areas) will form the climax and Black spruce especially will establish itself very soon.

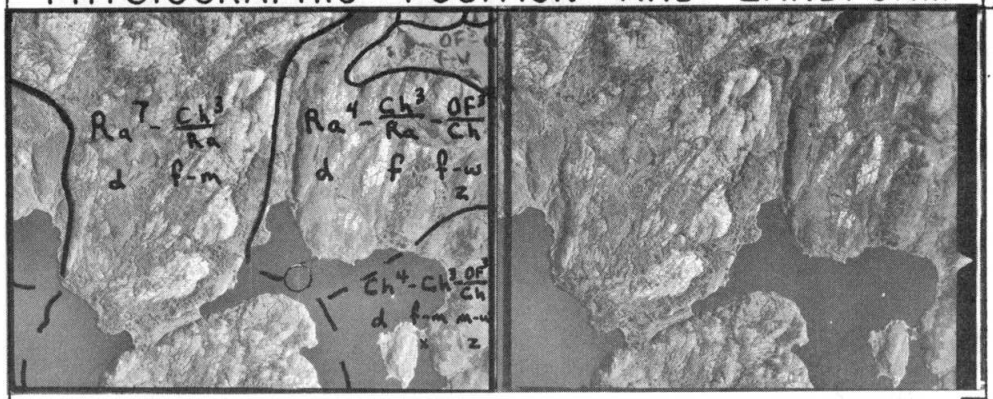
Collapse edge of clay palsa.
Collapse (sedge covered) in foreground.

SENSITIVITY

Highly sensitive to flooding, erosion and fire. As result of flooding, the permafrost will melt. This will result in extensive collapsing and slumping. It is expected that construction will have the same effect. New stable shorelines will take a long time to establish.

ECOSYSTEM	PRECAMBRIAN BEDROCK, DRY	MAPPING SYMBOL Ra d
ECOREGION 2b, 3	JACK PINE - LICHEN	

PHYSIOGRAPHIC POSITION AND LANDFORM



SOIL CHARACTERISTICS

The soil, if any, consists mainly of organic material in various stages of decomposition. Such soils are classified as Follisols if the L-H horizon exceeds 4 inches in thickness; if not, they are designated as bedrock.
Site NH 12 (profile #77) is representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL Ra d

FOREST COVER

The forest cover, if any, consists mainly of Jack pine with various proportions of Black spruce. The amount of Black spruce increases as the amount of unconsolidated materials increases. The trees are mostly in groups, rooting in accumulated organic matter or mineral materials (often of colluvial nature or in the form of weathered rock). Trees show little height growth and small diameters, although young trees look rather vigorous.

UNDERSTORY AND GROUNDCOVER

Jack pine and Black spruce regeneration can be found. Alnus crispa growth in wet depressions with organic accumulation. Lesser vegetation is scarce. Patches of mainly Pohlia nutans, Pleurozium schreberi and sometimes Sphagnum spp. occur. The bedrock is either void of vegetation, or covered with crustose lichen spp., or a thick carpet of Cladonia rangiferina and C. alpestris. The latter condition tends to result in accumulation of organic and weathered mineral material, which provides an initially favourable medium for the establishment of tree vegetation. Other species encountered are: Vaccinium myrtilloides, Potentialla tridentata and Rubus strigosus.

SENSITIVITY

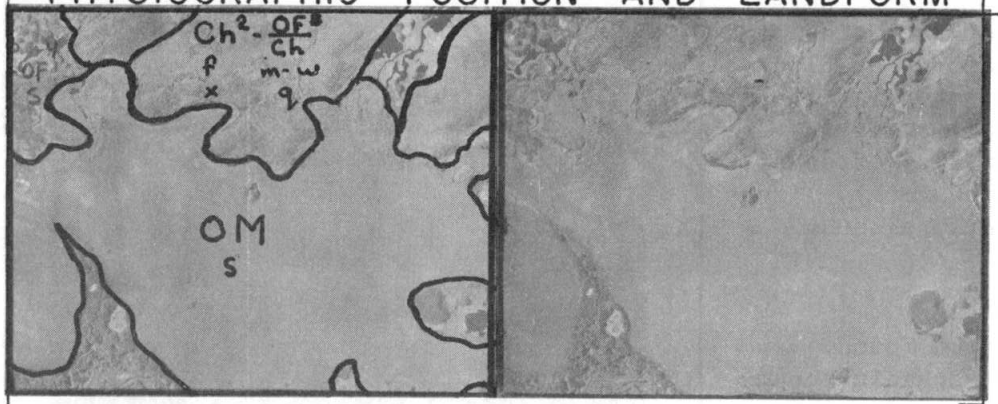
Not sensitive to flooding, construction or erosion. New shorelines will be established in short order; although trees may remain standing for some time, but probably not very long.

Bare bedrock with crustose lichen and some other vegetation.

Young Jack pine and Black spruce growing in slight depression in bedrock outcrop. Note abundance of lichen on the bedrock.

ECOSYSTEM	DEEP MESIC ORGANIC, SATURATED SEDGES WITH STUNTED TAMARACK	MAPPING SYMBOL OM s
ECOREGION 3, 2b		

PHYSIOGRAPHIC POSITION AND LANDFORM



PERMAFROST

Permafrost only in associated ecosystems (palsas and peat plateaux and along the edges.

SOIL CHARACTERISTICS

Typic Mesisols characterized by moderately well decomposed fen peat overlying moderately to strongly calcareous lacustrine clay. The thickness of the organic deposit varies from 5 to 15 feet. These soils are saturated throughout the year and are free from permafrost. Sites SI 15 and BT 29 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL OM s

FOREST COVER

No forest cover in this system. The only tree species to be found are Tamarack and a few Black spruce which are generally only a few feet tall and ± 1" in diameter.

UNDERSTORY AND GROUNDCOVER

Salix spp. and particularly Betula glandulosa can form an extensive coverage. Carex spp. form a very important part of the plant community and form a large part of the groundcover. Some Sphagnum spp. occur especially along the edges of the system. Other plant species likely to be found are: Kalmia polifolia, Vaccinium oxycoccos, Maianthemum canadense, Equisetum hyemale, Potentilla palustris, Menyanthes trifoliata, Chamaedaphne calyculata and Andromeda glaucophyla.

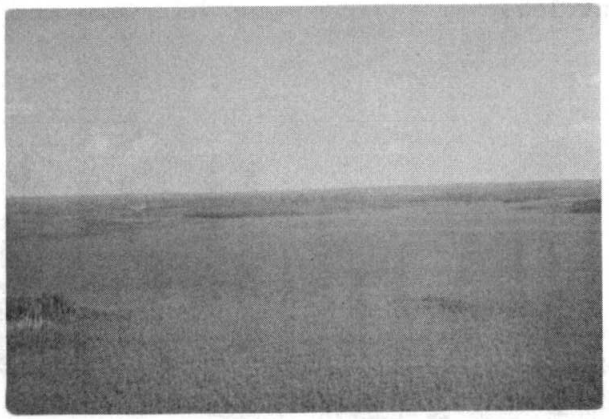
SUCCESSION

In the 2b zone this system may develop into a Sphagnum covered flat bog with an open Black spruce forest cover. Permafrost will likely develop. In the northern part of zone 3, this system may well stay the same for some time to come. In time, Sphagnum will become a more important component of the vegetation, but development of permafrost will take more time.

SENSITIVITY

No shoreline will develop in this system after flooding. Shorelines will be established in higher ground adjacent to these areas. Flooding may cause floating conditions, while subsequent wave action may erode the organic material.

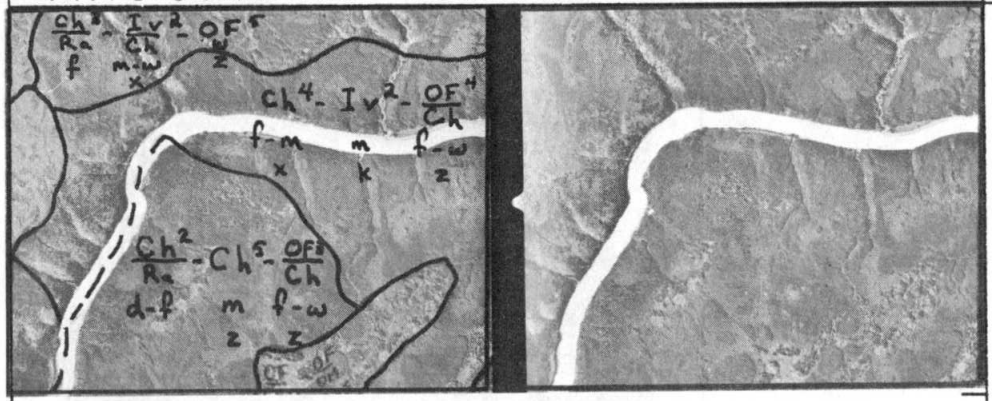
Extensive sedge vegetation, with some tamarack.



More advanced stage. More tree growth, generally drier. Note the heavier treed areas which contain permafrost.

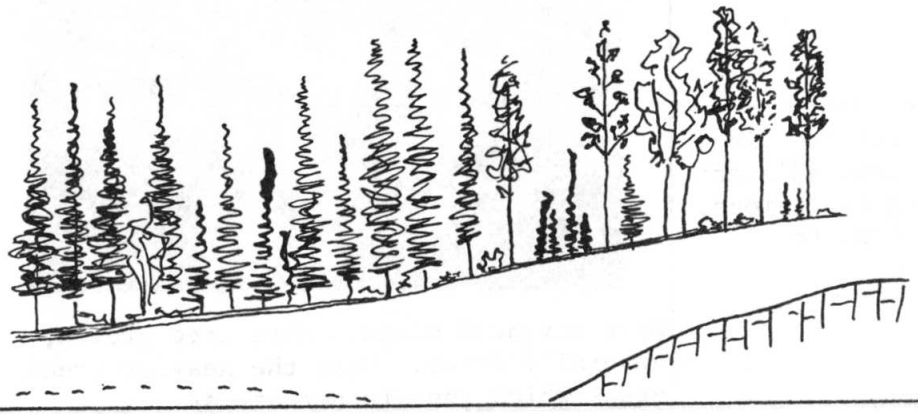
ECOSYSTEM	LACUSTRINE (/BEDROCK), FRESH AND MOIST, (PERMAFROST)	MAPPING SYMBOL $\frac{Iv,Ch,Ch}{f\text{-}m \quad Ra}$
ECOREGION 3	BLACK SPRUCE - FEATHERMOSS	

PHYSIOGRAPHIC POSITION AND LANDFORM



PERMAFROST

Permafrost is not very common in these landforms. When encountered it is found in the moist locations, where the L.F.H. layer is somewhat thicker than normal. In those cases permafrost can be found within 6 feet. On the upland sites pf. is either not present or below 6 feet. The content low.



SOIL CHARACTERISTICS

Orthic Brunisols and Orthic Gray Luvisols characterized by a relatively thin solum consisting of a thin L-H horizon underlain either by a brown Bm horizon or by a light gray platy Ae and a brown, subangular blocky Bt horizon. These soils have a medium to fine texture, having developed on stratified lacustrine silt and clay deposits. Sites T1, 5, 11, BT37, MM2 and 9 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL Iv,Ch,$\frac{Ch}{Ra}$ f-m

FOREST COVER

Black spruce occurs in most of these ecosystems. In many cases, however, this cover is replaced by Jack pine, White birch and/or Trembling aspen as a result of fire. Black spruce will often form part of the cover or will be present in the understory. Close to lakes and rivers White spruce may form mixed stands with Black spruce and/or Trembling aspen. Mature stands of Black spruce will be relatively dense. Average height of the stands is between 40 and 50 feet at 80-100 years of age. Diameters are between 5 and 8" and basal areas are around 100-110 square feet per acre.

UNDERSTORY AND GROUNDCOVER

Salix spp. and Alnus crispa shrubs occur throughout the stands and may reach heights greater than 10 feet. Black spruce layering in climax Black spruce stands or regenerating in stands of Jack pine can be found throughout, the latter situation occuring most frequent. Ledum groenlandicum, Vaccinium vitis-idaea, V. myrtilloides, V. oxycoccos, Cornus canadensis, Rosa acicularis, Equisetum sylvaticum,Achillea borealis, Epilobium angustifolium, Fragaria spp. can be found throughout, but the number vary from place to place. Mosses, like Pleurozium schreberi, Hylocomium splendens, Hypnum crista-castrensis and Pohlia nutans constitute the dominant groundcover.

Jack pine mixed with some Black spruce and Trembling aspen. Note good bS-regeneration.

Groundcover of feathermoss plus some lichen,strawberry and fireweed.Fresh to moist.

SENSITIVITY

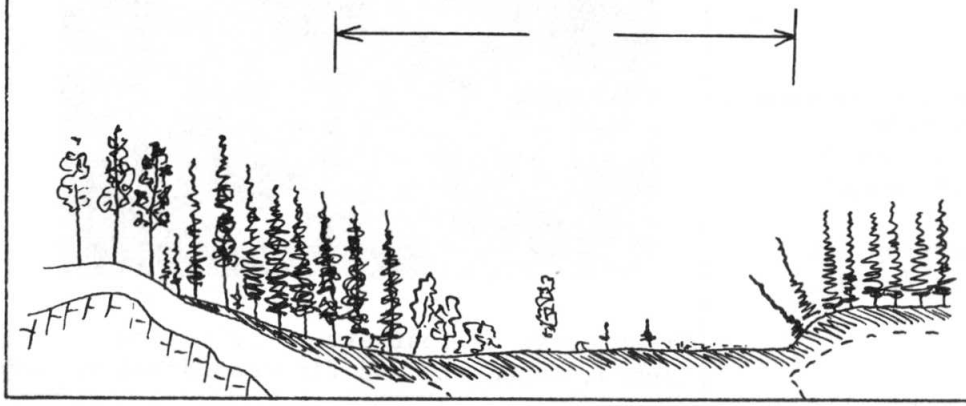
Sensitive to flooding, erosion and construction.
Silt laminae, when present, are apt to liquifaction.
Permafrost, if any, will melt out upon disturbance, resulting in collapsing.
New shorelines will take a long time to develop into stable ones. Vegetation may remain standing for a considerable period of time.

ECOSYSTEM	DEEP FIBRIC-OR FIBRIC OVER MESIC ORGANIC	MAPPING OF $\frac{OF}{OM}$
ECOREGION 3	SPHAGNUM-TAMARACK-BLACK SPRUCE	SYMBOL w-s

PHYSIOGRAPHIC POSITION AND LANDFORM

PERMAFROST

The permafrost peat landforms are really different ecosystems but are in mapping often included with this ecosystem. The permafrost is found in the raised peat-bodies (palsas and peat plateaus) and often along the edges of this ecosystem.



SOIL CHARACTERISTICS

Sphagno-Fibrisols and Mesisols characterized by thin to thick (16-52"), relatively undecomposed sphagnum peat underlain by either relatively undecomposed sphagnum peat or moderately well decomposed forest and/or fen peat. These soils are very poorly drained and are free of permafrost. Sites SI19b, 22 and MM8b are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL OF $\frac{OF}{OM}$ w-s

FOREST COVER

There is no continuous tree cover. Isolated or small group of trees may occur. Tree species are Tamarack and Black spruce with some White birch. The trees are usually stunted.

UNDERSTORY AND GROUNDCOVER

There can be an extensive cover of Betula glandulosa. Salix spp. tend to concentrate along the edges of the unit. Sphagnum spp. form an extensive, often hummocky cover. The tops of the hummocks are usually dry, but between the hummocks open water may occur. Other ground cover such as Pleurozium schreberi and Cladonia spp. may be found growing on the hummocks. Associated vegetation includes: Ledum groenlandicum, Chamaedaphne calyculata, Rubus chamaemorus, Carex spp., Equisetum hyemale, Potentilla palustris, Vaccinium oxycoccos, Menyanthes trifoliata.

SUCCESSION

This type of peatland is in a more advanced stage than the one described under OM. As a result of the sphagnum build up a raised bog will eventually develop, which will have a drier surface and a more continuous tree cover composed of Black spruce. Under suitable climatic conditions permafrost may form in the organic material, which will turn the landform into a palsa or peat plateau.

SENSITIVITY

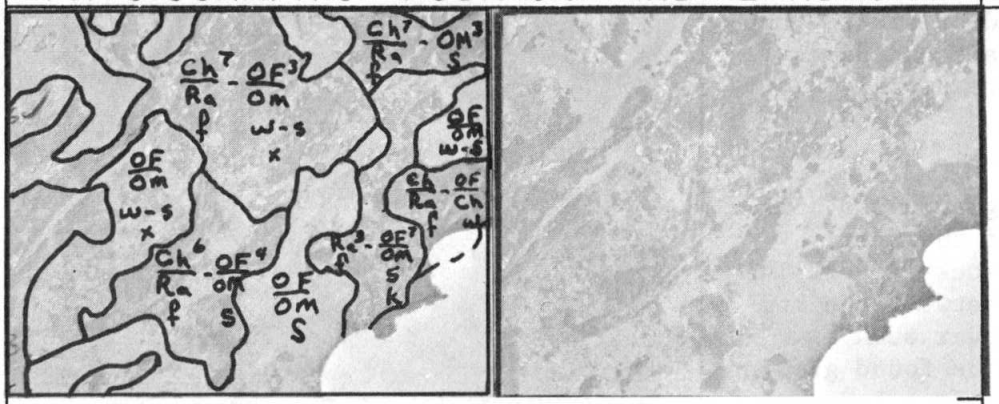
Highly sensitive to flooding and erosion and unsuitable for construction purposes. Flooding will likely cause flotation of the organic material. If but partially flooded, gradual erosion will take place resulting in new stable shorelines, which will take a long time to develop.

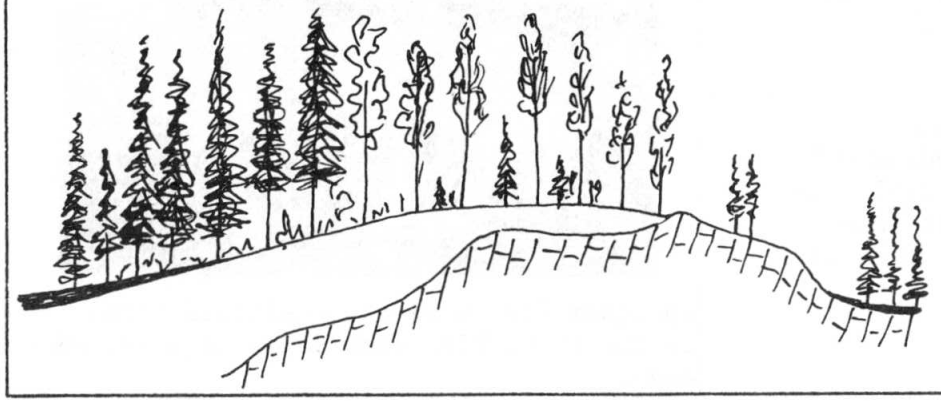
Along Rat River. Note the abundant Willow growing on slightly better drained sites.

Sphagnum fen. Note the collapsed palsa on the left. View from palsa with collapse edge.

ECOSYSTEM	LACUSTRINE OVER BEDROCK. DRY to MOIST	MAPPING SYMBOL $\frac{Ch}{Ra}$ d - m
ECOREGION 3	BLACK SPRUCE/JACKPINE-FEATHERMOSS-LICHEN	

PHYSIOGRAPHIC POSITION AND LANDFORM





SOIL CHARACTERISTICS

Orthic Gray Luvisol and Degraded Eutric Brunisol soils developed on stratified lacustrine silt and clay deposits and underlain by bedrock within 40 inches of the mineral surface. These soils are characterized by a thin L-H horizon underlain by a light gray Ae horizon and a brown Bm or Bt horizon. The upper part of the Luvisolic Bt horizon usually has a strong subangular blocky structure and the peds may have light gray exterior colours. Sites NH12a, 13 and 23 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL $\frac{Ch}{Ra}$ d - m

FOREST COVER

Climax forest is Black spruce. However, it is often mixed with Jack pine. Close to lakes, the associated species are Trembling aspen and White spruce. Stands rate from fair to good, depending on the thickness of the mineral soil and the drainage. Heights 40 to 60 feet at 100 years and diameters up to 12". Basal areas of 80-140 square feet per acre can be expected.

UNDERSTORY AND GROUNDCOVER

Alnus spp. is the most common shrub encountered on these sites. Rosa acicularis, Epilobium angustifolium, Cornus canadensis, Geocaulon lividum, Lonicera canadensis, Vaccinium myrtilloides, Petasites, palmatus, Linnaea borealis, Pyrola virens, Fragaria vesca, Ledum groenlandicum, Arctostaphylos uva-ursi, occur in small numbers (less than 5% cover). Pleurozium schreberi, Hylocomium splendens Cladonia rangiferina, C. alpestris dominate the ground cover; Peltigera aphthosa, Calamagrostis canadensis and Galium boreale occurring in minor amounts.

SUCCESSION

After fire, the drier sites normally have regeneration of Jack pine and more moist sites of Trembling aspen. Black spruce will establish itself rather quickly in the form of understory regeneration and will eventually take over. White birch also occurs in sub-seral stands. In areas where bedrock is close to the surface, Jack pine may form more than one generation, even when site remains undisturbed.

SENSITIVITY

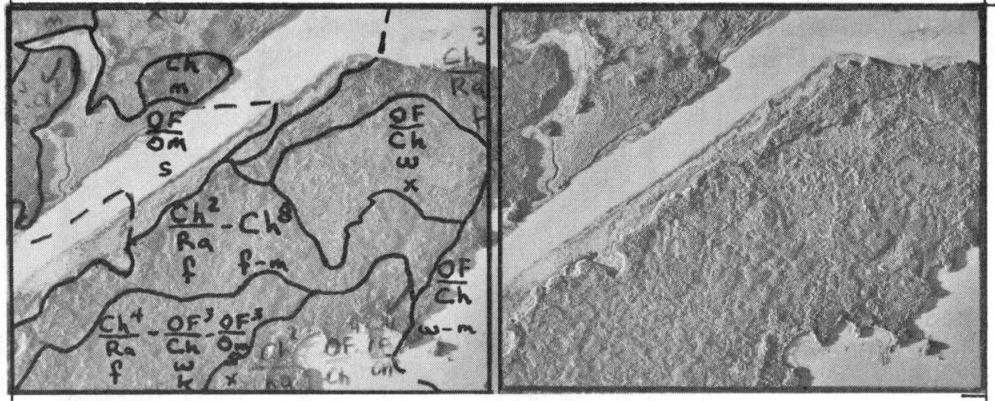
These ecosystems are moderately sensitive to construction, flooding or erosion. The new shoreline will be controlled by bedrock. Depending on the depth of the clay the time period required for the development of stable shoreline will vary.

Black spruce overmature. Bedrock close to the surface.

Stand of overstocked Black spruce on deeper clay over bedrock. Good height-growth.

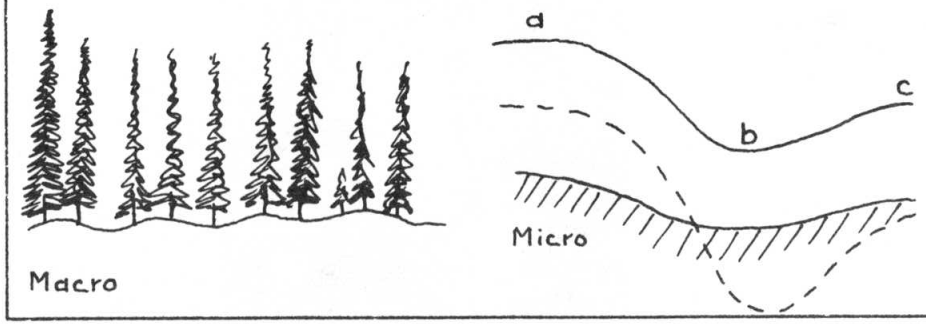
ECOSYSTEM	ORGANIC OVER CLAY, PERMAFROST	MAPPING SYMBOL $\frac{OF}{Ch}$ w - m
ECOREGION 3	BLACK SPRUCE-SPHAGNUM-FEATHERMOSS	

PHYSIOGRAPHIC POSITION AND LANDFORM

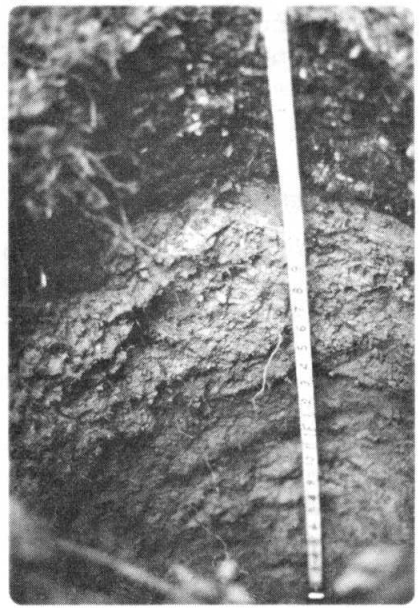


PERMAFROST

The depth of the active layer varies with the configuration of the micro relief. When there is a good insulative hummock of sphagnum peat(a) the permafrost will be found within 20". When the peat layer is more shallow(b) no pf. will be encountered within 40" from the surface. When the active layer is deeper, pf. found only in the mineral soil. The density has also a distinct effect.



SOIL CHARACTERISTICS



Gleysolic soils characterized by a thick organic horizon underlain either by relatively unaltered parent material or by a thin dark coloured Ah horizon, a light gray Ae horizon and a dull-coloured B horizon. The organic horizon usually consists mainly of sphagnum peat. These soils have a medium to fine texture, having developed on clayey lacustrine deposits. Permafrost may be encountered below a depth of 40 inches. Site BT38 is representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL $w\frac{Ch}{OF}m$

FOREST COVER

Picea mariana forms the tree cover on these landforms. The growth will vary widely as a result of drainage conditions, thickness of active layer and the depth of the mineral soil.

UNDERSTORY AND GROUNDCOVER

Often good regeneration of P. mariana. Tall shrubs are not common on this landform. Other vegetation includes: Ledum groenlandicum, Rubus chamaemorus, Vaccinium vitis-idaea, in various proportions. Sphagnum spp. (especially fuscum) and Pleurozium schreberi form the building material of the organic material. Cladonia rangiferina and alpestris occur on top of the organic hummocks.

SUCCESSION

The stable tree cover is P. mariana which will regenerate and form the tree cover for many rotations. These landforms may, however, become over mature, that is, the permafrost may melt out which causes collapsing and much wetter conditions and a new different ecosystem will be formed. This melting out of permafrost will occur quite likely after a disturbance such as a fire.

Oblique view of ecosystem Better tree growth than generally found.

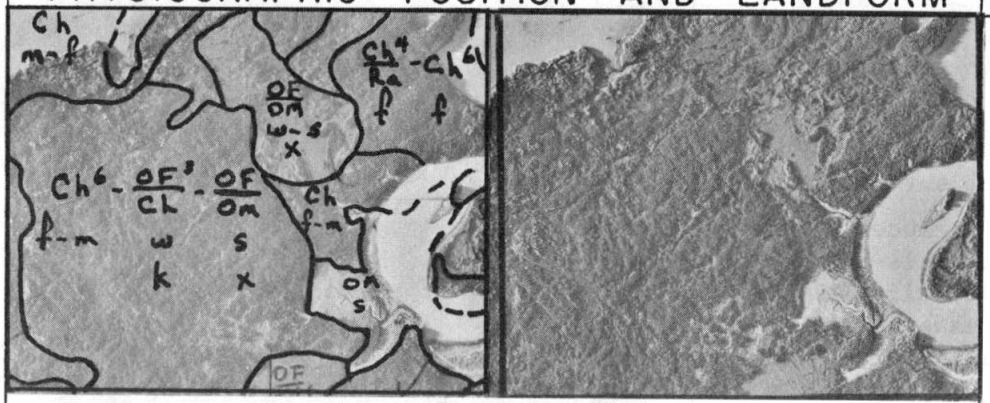
More common bS-stand in this ecosystem. Note: sphagnum hummocks.

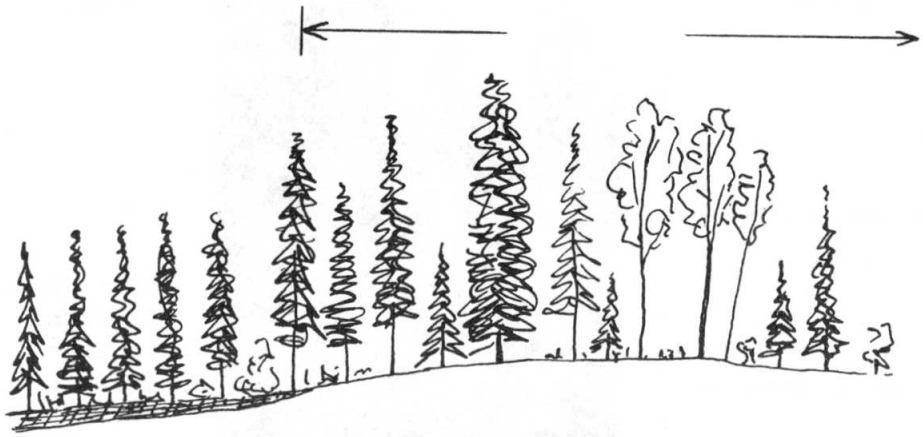
SENSITIVITY

These ecosystems are very sensitive to flooding and construction. The permafrost will melt and as a result collapsing will follow. The vegetation will remain in a standing position long after flooding and new stable shorelines will take a long time to develop

ECOSYSTEM	LACUSTRINE, MOIST AND FRESH	MAPPING SYMBOL Ch m - f
ECOREGION 3	BLACK SPRUCE-FEATHERMOSS	

PHYSIOGRAPHIC POSITION AND LANDFORM





SOIL CHARACTERISTICS

Orthic- and Solodic Gray Luvisols characterized by a thin L-H horizon underlain by a light gray Ae horizon and a brown Bt horizon. The Ae horizon of Orthic Gray Luvisols normally have a shot-like structure and their Bt horizon is subangular blocky. The Solodic Gray Luvisols are characterized by a platy structure in the Ae horizon and a columnar macro-structure in the upper Bt horizons. These soils usually have a heavy clay texture. Sites T12, BT2, MM8a, 10, NH1, 2, 4, and 6 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL Ch m-f

FOREST COVER

The climax forest cover is Black spruce. In many cases the stands are not pure and may contain Jack pine and White birch. On suitable sites (modified microclimate) the mixture may include White spruce and Trembling aspen. The Black spruce may be as high as 50-60 feet at 100 years of age, with diameters between 6 and 12", and basal areas between 100-150 square feet per acre. White spruce may be over 70 feet tall at 100+ years with diameters up to 20+ inches.

UNDERSTORY AND GROUNDCOVER

Salix spp. and White birch frequently occur as tall shrubs in the understory. Pleurozium schreberi, Hylocomium splendens and, to a lesser extent, Hypnum crista-castrensis may form an extensive groundcover. Often encountered with these mosses are patches of Cladonia spp. and some Peltigera aphthosa. Other vegetation consists of: Rosa acicularis, Epilobium angustifolium, Vaccinium myrtilloides, V. vitis-idaea, Fragaria vesca, Linnaea borealis, Cornus canadensis, Pyrola virens, Rubes pubescens, Viburnum edule.

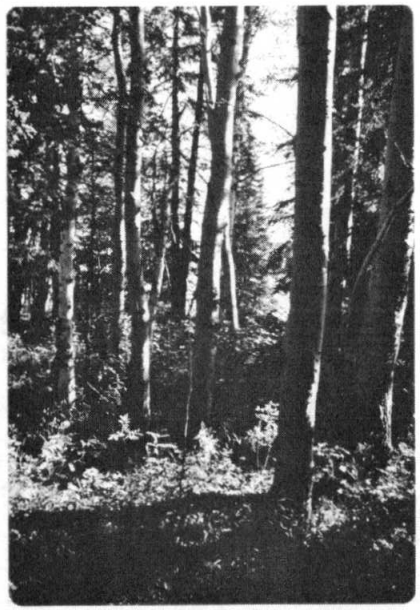
SUCCESSION

The stable and climax vegetation is Black spruce or a mixture of Black and White spruce. After disturbance by fire, a treecover of Jack pine, Trembling aspen and/or White birch may develop. Soon Black spruce regeneration will establish itself and will eventually take over.

SENSITIVITY

Fairly sensitive to flooding and erosion. Vegetation will likely remain standing for a long time and the establishment of a new stable shoreline will take a long period of time.

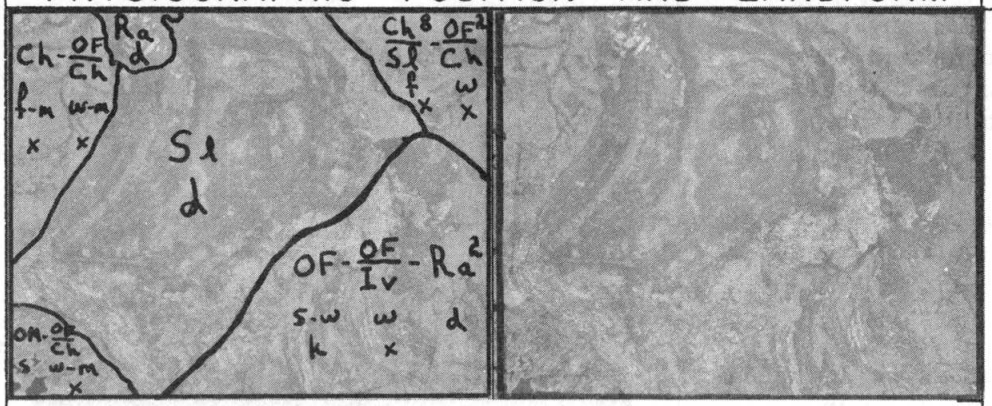
Mature Black Spruce on moist clay.

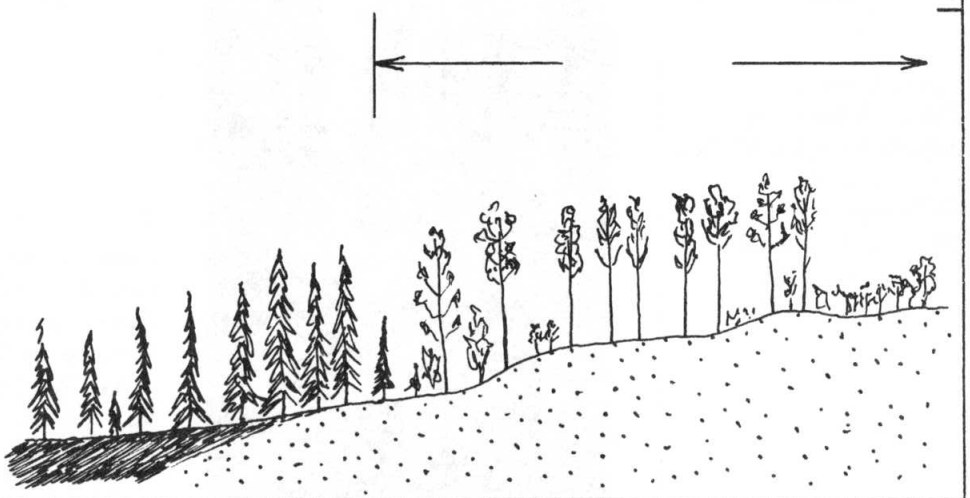


Very good Trembling aspen mixed with Black spruce and some White Spruce on fresh site.

ECOSYSTEM	GLACIO-FLUVIAL OUTWASH, DRY JACK PINE - LICHEN	MAPPING SYMBOL Gl d S1 d
ECOREGION 3		

PHYSIOGRAPHIC POSITION AND LANDFORM





SOIL CHARACTERISTICS

Degraded Dystric Brunisols characterized by a thin L-H horizon, underlain by a distinct, light gray, strongly acid Ae and a friable, brown to reddish brown Bm horizon.

These soils have a medium sandy texture, having developed on beach deposits and on lake modified, glacio-fluvial deposits derived from Precambrian rock. The parent material tends to be weakly calcareous at three feet depth.

Sites T4, MM8a, and SI 18 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL G1 d S1 d

FOREST COVER

Jack pine occurs frequently on these sites as a result of fire and of highly permeable soil materials. Black spruce may form part of the forest cover, as may White birch. Tree growth varies from poor to fairly good, depending on coarseness of the soil material and depth of the water table. Heights vary from 40-55 feet at 150-200 years with diameters between 10 and 12" and basal areas of 100 to 110 in better stands of Jack pine.

UNDERSTORY AND GROUNDCOVER

White birch and Alnus crispa may occur as shrubs in stands. Most of the ground is covered with litter. The moss layer is not extensive; some Pleurozium schreberi and Pohlia nutans will occur together with Cladonia rangiferina. The amount of mosses will increase with improvement in moisture conditions. Other plant species most likely to be found are: Epilobium angustifolium, Vaccinium myrtilloides, V. vitis-idaea, Arctostaphylos uva-ursi, Viburnum edule.

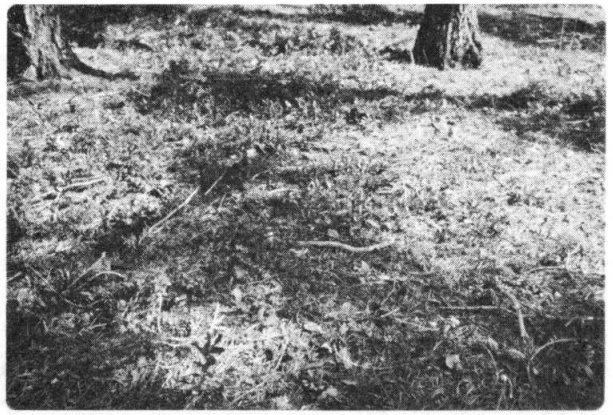
SUCCESSION

These areas are very prone to fire. As a result, tree cover is in most cases Jack pine. If no disturbance occurs, the stand may perpetuate itself into another Jack pine stand or may convert into a mixture of Jack pine and Black spruce. Invasion of Black spruce occurs especially in areas which border lower lying areas where Black spruce forms the forest cover.

SENSITIVITY

These landforms constitute good sources of sand and gravel for construction purposes.
These ecosystems are not too sensitive to flooding and erosion. Sandy beaches may form readily provided the original slope is not too steep.

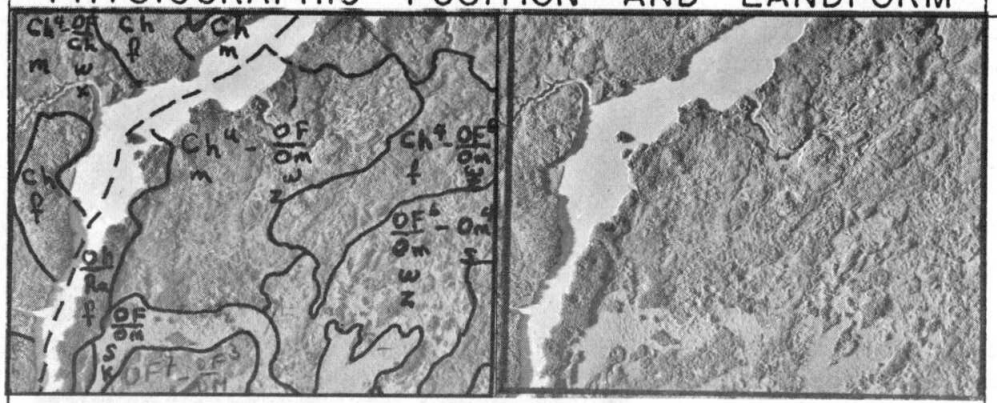
Open mature Jack pine stand. Note the dense jP regeneration in the background.



Groundcover: Forest litter, some mosses and Vaccinium spp.

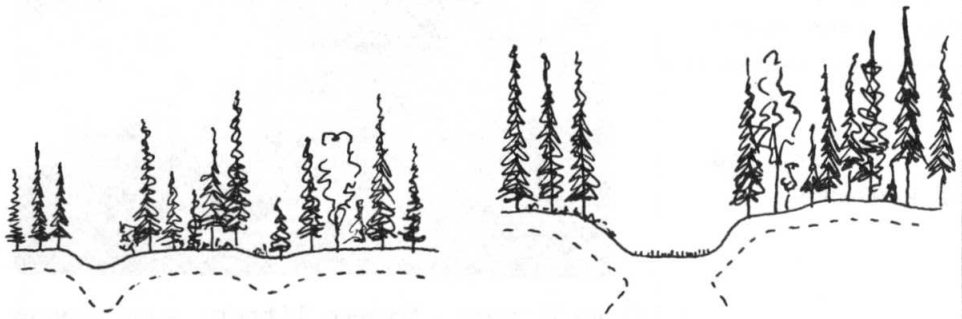
ECOSYSTEM	FIBRIC OVER MESIC ORGANIC, FIBRIC-AND MESIC ORGANIC,- PERMAFROST	MAPPING SYMBOL OF, OF, OM / OM w-s
ECOREGION 3, 4	BLACK SPRUCE - SPHAGNUM	

PHYSIOGRAPHIC POSITION AND LANDFORM



PERMAFROST

The upper limit of the permafrost is wavy. The depth of the active can vary considerably over short distances. The depth of the active layer usually within 15 to 32 inches. The permafrost is often not continuous in these systems, in many places the p.f. has melted causing collapses of various sizes.



SOIL CHARACTERISTICS

Cryic Humisols,-Mesisols, or-Fibrisols characterized by a level or domed macro-relief and the presence of permafrost usually at about 18 inches from the land surface. These organic soils are moderately well drained when domed owing to upheaval by permafrost, and are usually surrounded by a collapse scar. They consist of thick to very thick organic accumulations comprised by either sphagnic, forest, or fen peat or a combination of these materials. Sites Bt3, NH7a, 7b and 8 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL OF, OF, OM / OM w-s

FOREST COVER

The forest cover is mainly Black spruce, sometimes mixed White birch. Even Trembling aspen and White spruce are found on some of these sites. Growth will vary considerably as a result of drainage, type of peat and depth of active layer. In most cases growth is not too impressive. For Black spruce 25-50 feet in 100 years with diameters of 2.5-8 inches and basal areas of about 100 square feet per acre.

UNDERSTORY AND GROUNDCOVER

Salix spp. and White birch often occur in the understory. Ledum groenlandicum may form an extensive cover but constitutes often only a lesser part of the vegetation. Sphagnum spp. comprise up to 80+% of the moss layer, Pleurozium schreberi being an important associate. Other vegetation includes: Rubus chamaemorus, Chamaedaphne calyculta, Linnaea borealis, Hylocomium splendens, Dicramum fuscescens, Cladonia rangiferina and C. alpestris.

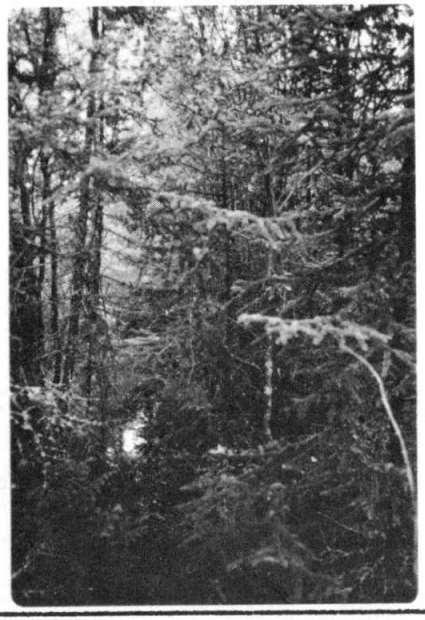
SUCCESSION

The stable vegetation is Black spruce with minor inclusions of White birch and sometimes White spruce and Trembling aspen. After fire the amount of White birch will likely increase, however Black spruce regeneration will be abundant. Melting of the permafrost because of disturbance will result in the development of a completely different ecosystem.

SENSITIVITY

These ecosystems are very sensitive to flooding and construction. Permafrost will melt, resulting in collapsing. Flooding will probably cause floating-bog conditions. It will take a long time before a new stable shoreline will be established.

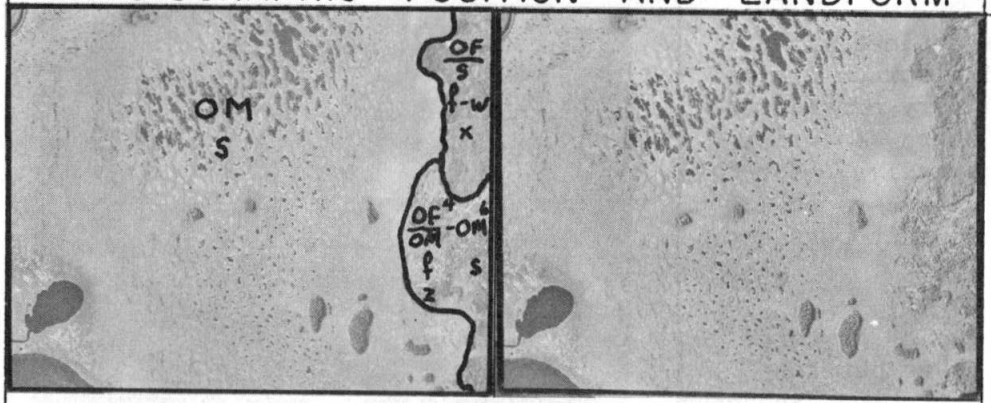
Good uneven-aged Black spruce on moist site.



Black spruce over feather-mosses. Permafrost in hummocks; in depressions open water.

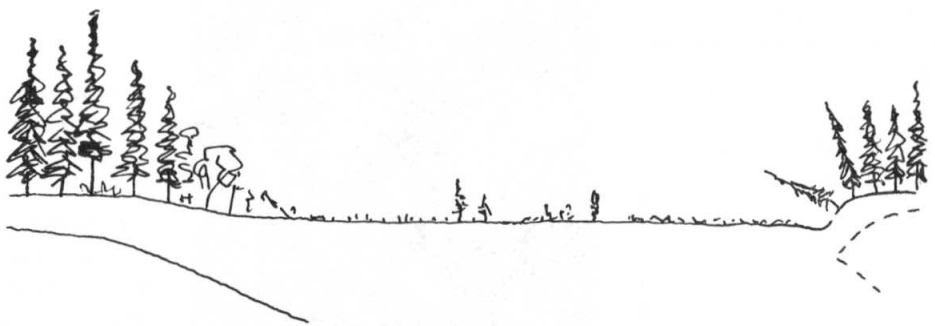
ECOSYSTEM	DEEP MESIC ORGANIC, SATURATED	MAPPING SYMBOL OM s
ECOREGION 3, 4	SEDGES WITH STUNTED TAMARACK	

PHYSIOGRAPHIC POSITION AND LANDFORM



PERMAFROST

No permafrost in these systems. However these systems are often associated with palsas and peat plateaus, which are higher than the surrounding area and contain permafrost.



SOIL CHARACTERISTICS

Typic- and Terric Mesisols characterized by thick to very thick, moderately decomposed fen peat overlying moderately to strongly calcareous lacustrine clay. This mesic peat is derived mainly from sedges and rushes. The ridges of patterned fens usually have a thin, discontinuous layer of undecomposed, sphagnum-derived peat overlying the fen peat. These soils are very poorly drained and free of permafrost. Sites SI21 and NH9 and 10 are representative of these conditions.

BIOTIC CHARACTERISTICS

MAPPING SYMBOL OM s

FOREST COVER

No tree cover.

UNDERSTORY AND GROUNDCOVER

Some stunted, very widely spaced Tamarack on horizontal fens. In the case of patterned fens, Tamarack confined to the ridges and associated with feathermosses and to some extent Sphagnum spp. Sometimes stunted Black spruce will occur. Most of the area (especially flarks in patterned fens) is very wet with a vegetation composed of: Carex spp. (large coverage), Equisetum hyemale, Drepanocladus spp., Vaccinium uligonosum, Menyanthes trifoliata, and Potentilla palustris. Betula glandulosa (and Salix spp.) can form an extensive coverage when the area is in a more advanced stage, that is, when the flarks and ridges are less distinct and the water is not at the surface.

SUCCESSION

Disturbances like fire are not likely to occur and if occurring only the surface will burn. The surface of this system will become drier with time, organic accumulation raising the system above the water table. Sphagnum spp. will become more abundant and this will accellerate the raising of the system. Black spruce will move in and eventually will form at first an open tree cover which may become denser with time. Permafrost may develop, but is not very likely to happen in this region.

SENSITIVITY

Flooding is likely to result in floating bog conditions with subsequent erosion of the organic material by wave action. The shorelines will develop in higher ground adjacent to these areas.

Sedge vegetation with some stunted tamarack. In background higher ground with bS.

Extensive cover of Betula glandulosa. Area generally drier than the one pictured above.

SOIL CHARACTERISTICS IN RELATION TO ENVIRONMENTAL DISTURBANCE

The morphological and analytical soil properties of importance to certain man-made disturbances of the environment are discussed in this section. For purposes of this discussion, pertinent analytical results are presented in Tables IX, X, and XI. Specific results of physical and chemical analyses are presented in Appendix II, together with their respective soil, vegetation, and site descriptions.

A. Susceptibility to Water Erosion

1. Runoff Erosion

Evaluations of the susceptibility of soil materials to erosion by running water are based on the results obtained for dispersion ratio analysis (Table IX). The dispersion ratio (D.R.) of a soil or material is entirely dependent on the soil characteristics. Hence, the effect of slope, vegetative cover, and rainfall intensity and duration must be considered in conjunction with the dispersion ratio values in order to evaluate the total impact of water erosion. In general, soil materials situated in areas with little or no slope and having dispersion ratio values of less than 15 per cent are relatively unaffected by runoff erosion.

The results show that the Ah and Ae horizons have a dispersion ratio percentage less than 12; with the exception of the result for Site S19. AB horizons have a value of less than 6 per cent; the 20 per cent dispersion ratio for Site BT 18a being questionable. BA horizons have dispersion ratios ranging between 7 and 19 per cent, while that of the

TABLE IX

CERTAIN PHYSICAL AND CHEMICAL PROPERTIES OF HORIZONS FROM SOME SOILS OF THE STUDY AREA

Site #	Horizon	Material	Si	C	Org.C	$CaCO_3$	D.R.	B.D. M.	B.D. DRY	$NaHCO_3$-soluble P
			%	%	%	%	%	g/cc	g/cc	ppm
NH1	L-H	Litter			52.5					21.4
NH2	L-H	Litter			44.3					21.6
NH4	L-H	Litter			47.7					62.0
NH5	F-H	Litter			32.6					83.0
NH6	L-H	Litter			43.3					71.0
NH12a	F-H	Litter			45.1					37.8
NH12c	L-F	Litter			52.4					36.6
NH14	L-H	Litter			43.2					33.6
NH17	F-H	Litter			53.2					42.2
NH19	L-H	Litter			53.4					24.0
NH23	F-H	Litter			56.7					28.8
T4b	Ahg	Glacio-fluvial	71	26	6.1	4.7	9.3	1.36	1.52	
BT7	Aheg	Lacustrine	40	54	14.4	-	6.2	0.81	1.01	
BT48	ACg	Lacustrine	42	51	2.1	-	3.0	1.56	1.70	
NH3	IIAC	Lacustrine			17.1					2.0
BT1	Aeh	Lacustrine	8	91	3.3	-	2.2	1.39	1.42	
BT15b	Aeh	Calc. Till	37	49	13.6	-	1.9	0.87	0.98	
T1	Ae	Lacustrine	44	52	1.8	-	2.1	1.08	1.21	
T9	Ae	Lacustrine	29	28	1.8	-	11.9	1.38	1.40	
T11	Ae	Alluvium	62	35	1.5	-	5.5	1.60	1.57	
T13	Ae	Lacustrine	14	86	0.3	-	5.6	1.61	1.54	
BT4	Ae	Glacio-fluvial	11	3	0.9	-	11.4	0.99	1.48	
BT5	Ae	Lacustrine	29	58	2.4	-	6.8	0.92	0.97	
SI1	Ae	Lacustrine	30	65	6.3	-	8.6	1.13	1.14	
SI8a	Ae	Lacustrine	26	72	2.5	-	2.9	0.85	0.95	
SI9	Ae	Lacustrine	20	79	2.7	-	31.7	0.90	0.97	

TABLE IX (continued)

Site #	Horizon	Material	Si	C	Org.C	$CaCO_3$	D.R.	B.D. M.	B.D. DRY	$NaHCO_3$-soluble P
			%	%	%	%	%	g/cc	g/cc	ppm
BT12	Ae	Lacustrine	41	55	5.5	-	4.6	1.13	1.21	
BT15a	Ae	Calc. Till	38	30	5.6	-	2.4	1.31	1.32	
SI10b	Ae	Lacustrine	33	46	1.5	-	3.4	1.42	1.44	
BT18a	Ae	Lacustrine	39	57	11.5	-	9.2	1.20	1.23	
SI12	Ae	Lacustrine	31	65	2.7	-	4.6	1.43	1.45	
SI20	Ae	Colluvium	8	6	4.6	-	-	1.54	1.60	
BT35	Ae	Lacustrine	64	33	1.9	-	6.2	1.31	1.35	
NH1	Ae	Lacustrine	21	74	5.2	-	1.8	0.87	0.98	54.2
NH4	Ae	Lacustrine	27	69	3.0	-	2.3	0.86	0.97	8.4
NH5	Ae	Lacustrine	31	47	7.1	-	3.6	0.82	0.97	119.0
NH6	Ae	Lacustrine	32	65	2.4	-	3.0	0.89	1.13	5.8
NH12a	Ae	Lacustrine	50	39	3.5	-	-	-	-	3.4
NH14	Ae	Lacustrine	24	73	2.9	-	-	-	-	1.2
NH17	Ae	Lacustrine	35	59	3.8	-	-	-	-	8.6
NH19	Ae	Lacustrine	59	15	2.4	-	-	-	-	1.0
NH23	Ae	Lacustrine	55	9	2.2	-	-	-	-	
T12	IIAe	Lacustrine	26	69	5.5	-	10.0	1.12	1.54	
T9	AB	Lacustrine	23	51	1.1	-	4.5	1.54	1.54	
T13	AB	Lacustrine	15	84	0.7	-	5.7	1.53	1.54	
SI8a	AB	Lacustrine	32	64	1.0	-	4.9	1.63	1.69	
BT15a	AB	Calc. Till	42	28	3.1	-	5.3	1.23	1.42	
BT18a	AB	Lacustrine	39	57	2.0	-	20.0	1.39	1.43	
BT18b	AB	Lacustrine	36	61	6.2	-	2.4	0.87	-	
NH2	AB	Lacustrine	14	84	1.5	-	1.9	1.64	1.71	0.4
NH4	AB	Lacustrine	11	88	1.5	-	3.6	1.40	1.47	2.2
NH5	AB	Lacustrine	28	68	4.1	-	2.4	0.90	0.97	48.8
NH6	AB	Lacustrine	14	85	1.3	-	1.0	1.50	1.65	4.0
NH17	AB	Lacustrine	25	72	1.5	-	-	-	-	3.0
NH19	AB	Lacustrine	53	26	2.0	-	-	-	-	0.0

TABLE IX (continued)

Site #	Horizon	Material	Si	C	Org.C	$CaCO_3$	D.R.	B.D. M.	B.D. DRY	$NaHCO_3$-soluble P
			%	%	%	%	%	g/cc	g/cc	ppm
BT1	BA	Lacustrine	6	93	1.1	-	7.0	1.47	1.53	
SI1	BA	Lacustrine	29	67	3.1	-	18.8	1.26	1.31	
BT15b	BA	Calc. Till	32	28	0.6	-	18.9	1.93	1.98	
BT7	BAg	Lacustrine	15	83	5.8	-	7.1	1.37	1.45	
BT8	BAg	Lacustrine	25	73	6.4	-	18.3	1.22	1.35	
T1	Btnj	Lacustrine	17	82	0.8	-	5.6	1.60	1.66	
BT2	Btnj	Lacustrine	9	91	0.9	-	4.8	1.48	1.60	
BT15a	Btnj	Calc. Till	37	31	1.2	-	26.3	1.78	1.89	
NH17	Btnj	Lacustrine	20	78	1.2	-	-	-	-	
T12	IIBtnj	Lacustrine	21	75	0.7	0.5	15.9	1.54	1.56	
T12	IIBt	Lacustrine	8	92	0.3	0.3	7.6	1.43	1.44	
T1	Bt	Lacustrine	7	71	0.8	-	2.5	1.65	1.65	
T9	Bt	Lacustrine	13	36	0.6	-	7.1	1.56	1.65	
T11	Bt	Alluvium	49	47	1.2	-	2.1	-	1.54	
BT2	Bt	Lacustrine	8	92	0.8	-	2.9	1.41	1.49	
SI1	Bt	Lacustrine	18	81	0.7	-	6.7	1.46	1.55	
SI9	Bt	Lacustrine	14	86	11.8	-	2.9	1.60	1.67	
BT12	Bt	Lacustrine	20	80	1.4	-	2.2	1.42	1.45	
SI10b	Bt	Lacustrine	14	84	1.6	-	4.1	1.51	1.57	
BT18a	Bt	Lacustrine	7	93	0.6	-	6.9	1.43	1.60	
BT18b	Bt	Lacustrine	7	92	0.8	-	4.3	1.37	1.64	
SI12	Bt	Lacustrine	38	53	0.8	-	4.4	1.42	1.51	
SI16	Bt	Lacustrine	14	85	2.5	-	53.8	1.51	1.65	
BT39b	Bt	Lacustrine	58	38	0.7	0.9	18.1	1.46	1.49	
NH2	Bt	Lacustrine	3	96	0.7	-	3.0	1.22	1.49	0.6
T4a	Bt1	Lacustrine	8	91	1.4	-	3.7	1.65	1.60	
BT15a	Bt1	Calc. Till	30	59	0.4	-	10.1	1.64	1.64	
BT15b	Bt1	Calc. Till	31	62	0.4	-	5.8	1.72	1.75	
NH4	Bt	Lacustrine	7	92	1.1	-	1.9	1.40	1.56	2.2
NH12	Bt	Lacustrine	29	69	0.9	-	-	-	-	1.0
NH17	Bt	Lacustrine	19	80	0.9	-	-	-	-	2.0
NH19	Bt	Lacustrine	50	32	1.2	1.1	-	-	-	0.2

TABLE IX (continued)

Site #	Horizon	Material	Si	C	Org.C	$CaCO_3$	D.R.	B.D. M.	B.D. DRY	$NaHCO_3$-soluble P
			%	%	%	%	%	g/cc	g/cc	ppm
T4a	Bt2	Lacustrine	7	92	0.8	-	3.3	1.44	1.47	
BT15a	Bt2	Calc. Till	19	33	0.3	-	22.1	1.65	1.65	
BT15b	Bt2	Calc. Till	59	34	0.3	-	17.2	1.61	1.66	
NH1	Bt2	Lacustrine	12	88	1.3	-	2.3	1.17	1.23	3.4
BT12	Bnt	Lacustrine	24	76	1.2	-	5.2	1.57	1.66	
SI12	Bnt	Lacustrine	13	86	1.0	-	4.4	1.52	1.56	
NH2	Bnt	Lacustrine	6	93	0.9	-	3.6	1.51	1.66	0.4
BT18a	Bnt1	Lacustrine	32	65	1.6	-	7.8	1.27	1.53	
BT18b	Bnt1	Lacustrine	33	63	2.0	-	15.2	1.17	1.20	
NH6	Bnt1	Lacustrine	11	88	0.9	-	2.8	1.55	1.73	1.6
BT18a	Bnt2	Lacustrine	17	82	1.0	-	4.1	1.51	1.67	
BT18b	Bnt2	Lacustrine	19	79	1.1	-	5.7	1.39	1.57	
NH6	Bnt2	Lacustrine	11	88	0.8	-	3.0	1.36	1.47	2.2
NH23	Bm	Lacustrine	51	4	0.6	-	-	-	-	0.4
NH14	Bm	Lacustrine	32	66	1.2	2.6	-	-	-	2.0
T12	Bm	Colluvium	22	74	15.1	-	2.9	0.56	0.93	
SI8a	Bm	Lacustrine	27	69	0.8	3.7	4.6	1.08	1.12	
BT39a	Bm	Lacustrine	57	39	1.4	-	7.3	1.51	1.58	
BT46b	Bm	Lacustrine	12	82	4.9	-	1.8	1.07	1.15	
BT4	Bm1	Glacio-fluvial	1	1	0.2	-	-	1.29	1.23	
BT35	Bm1	Lacustrine	59	39	1.3	-	4.5	1.26	1.30	
BT35	Bm2	Lacustrine	59	38	1.1	-	10.9	1.50	1.54	
T13	Bmg1	Lacustrine	26	73	0.3	1.3	10.3	1.40	1.49	
T13	Bmg2	Lacustrine	18	78	0.3	2.9	3.9	1.55	1.55	
BT1	Btg	Lacustrine	5	93	0.1	3.7	11.6	1.43	1.54	
BT5	Btg	Lacustrine	15	85	1.0	-	0.8	1.27	-	
NH5	Btg	Lacustrine	3	96	0.7	0.2	3.7	1.47	1.57	8.2
BT7	Btng	Lacustrine	19	79	1.0	-	10.0	1.59	1.73	
NH5	Btng		13	85	1.2	-	3.7	1.65	1.73	12.4
BT8	Btnjg	Lacustrine	24	75	2.1	-	9.4	1.62	1.76	

TABLE IX(continued)

Site #	Horizon	Material	Si	C	Org.C	$CaCO_3$	D.R.	B.D. M.	B.D. DRY	$NaHCO_3$-soluble P
			%	%	%	%	%	g/cc	g/cc	ppm
T1	BC	Lacustrine	40	59	0.4	17.4	15.5	1.45	1.49	
T4a	BC	Lacustrine	21	77	0.4	12.0	6.8	1.50	1.58	
T9	BC	Lacustrine	19	21	0.4	0.9	15.7	1.84	1.71	
T10	BC	Lacustrine	53	45	6.4	27.5	2.9	0.91	0.99	
SI9	BC	Lacustrine	49	44	11.5	5.0	3.9	1.44	1.46	
BT18a	BC	Lacustrine	22	76	0.6	-	12.0	1.36	1.40	
BT18b	BC	Lacustrine	15	84	0.7	0.4	7.3	1.32	1.51	
SI12	BC	Lacustrine	30	67	1.7	-	7.2	1.51	1.56	
SI16	BC	Lacustrine	47	52	0.7	11.1	2.6	1.10	1.28	
NH12a	BC	Lacustrine	56	41	1.4	26.2	-	-	-	0.4
NH14	BC	Lacustrine	40	59	1.1	18.4	-	-	-	1.6
NH23	BC	Lacustrine	58	6	0.4	13.5	-	-	-	0.6
BT39b	BCk	Lacustrine	71	26	0.5	29.3	34.8	1.52	1.56	
BT46a	BCk	Lacustrine	60	38	3.3	29.5	3.5	0.93	0.97	
NH6	BCk	Lacustrine	21	79	0.6	10.4	7.2	1.16	1.14	0.8
BT7	BCg	Lacustrine	17	81	0.6	-	3.6	1.61	2.06	
BT5	BCkg	Lacustrine	56	38	0.6	14.3	17.8	1.39	1.42	
BT18a	Ck	Lacustrine	29	60	-	13.5	21.6	1.54	1.63	
BT18b	Ck	Lacustrine	26	69	-	13.3	-	1.41	1.50	
BT46a	Ck	Lacustrine	-	-	-	-	-	1.59	1.60	
NH2	Ck	Lacustrine	8	92	-	36.0	7.8	1.50	1.56	1.4
NH4	Ck	Lacustrine	20	80	-	23.0	19.8	1.39	1.47	2.0
NH12	Ck	Lacustrine	62	24	-	34.9	-	-	-	0.8
NH23	C1	Lacustrine	66	6	-	25.4	-	-	-	0.2
NH19	IICk2	Calc. Till	29	7	-	25.0	-	-	-	0.4
NH23	C2	Lacustrine	55	3	-	0.5	-	-	-	1.2
NH23	C3	Lacustrine	33	0	-	0.6	-	-	-	0.0
T10	Ck1	Lacustrine	83	15	3.6	42.1	4.9	1.53	1.54	
T11	Ck1	Alluvium	64	34	-	33.2	9.6	1.65	1.68	
BT35	Ck1	Lacustrine	74	23	-	23.9	32.6	1.59	1.61	

TABLE IX (continued)

Site #	Horizon	Material	Si	C	Org.C	$CaCO_3$	D.R.	B.D. M.	B.D. DRY	$NaHCO_3$-soluble P
			%	%	%	%	%	g/cc	g/cc	ppm
BT39a	Ck1	Lacustrine	81	16	-	36.3	70.3	1.64	1.66	
BT39b	Ck1	Lacustrine	85	12	-	43.0	26.6	1.51	1.56	
BT46b	Ck1	Lacustrine	-	-	-	-	-	1.49	1.53	
NH6	Ck1	Lacustrine	18	77	-	15.2	10.8	1.45	1.54	0.6
NH14	Ck1	Lacustrine	52	45	-	30.2	-	-	-	1.2
NH17	Ck1	Lacustrine	46	52	-	19.7	-	-	-	0.6
NH19	Ck1	Lacustrine	62	16	-	39.2	-	-	-	0.4
T11	Ck2	Lacustrine	52	45	-	21.3	16.3	1.50	1.54	
BT2	Ck2	Lacustrine	35	60	-	18.4	26.1	1.49	1.55	
SI16	Ck2	Lacustrine	62	36	-	25.2	-	1.54	1.70	
BT38	Ck2	Lacustrine	25	72	-	23.9	15.7	1.53	1.58	
BT39a	Ck2	Lacustrine	62	34	-	25.4	18.3	1.49	1.53	
BT46b	Ck2	Lacustrine	68	29	-	39.3	62.6	1.43	1.52	
NH6	Ck2	Lacustrine	26	74	-	18.7	11.1	1.51	1.59	0.8
NH17	Ck2	Lacustrine	73	25	-	42.1	-	-	-	1.2
T1	Ckg	Lacustrine	13	73	-	21.4	12.7	1.63	1.66	
T4b	Ckg	Glacio-fluvial	65	31	-	24.1	6.7	1.68	1.72	
T4a	C	Lacustrine	63	27	-	24.5	29.9	1.60	1.67	
T9	IICca	Calc. Till	36	15	-	14.1	10.5	1.29	1.35	
T10	Ck10	Lacustrine	43	56	-	26.2	4.7	1.58	1.60	
T10	Ck11	Lacustrine	91	7	-	39.3	47.7	1.75	1.99	
T11	Ck3	Alluvium	58	41	-	29.0	15.7	1.38	1.74	
NH17	Ck3	Lacustrine	43	55	-	27.6	-	-	-	0.6
T11	Ck4	Alluvium	47	53	-	21.9	20.5	1.45	1.51	
NH17	Ck4	Lacustrine	60	35	-	38.5	-	-	-	0.2
T12	IICk	Lacustrine	13	86	-	6.1	11.4	1.54	1.55	
T9	IICk	Calc. Till	34	13	-	10.8	8.5	1.99	2.04	
BT45	Cg	Lacustrine	5	95	-	0.6	2.7	1.50	1.59	
NH5	Ckg1	Lacustrine	6	92	-	7.3	10.8	1.56	1.65	3.4
NH5	Ckg2	Lacustrine	9	88	-	10.8	7.3	1.08	1.12	3.6
NH12	Ck(a)	Lacustrine	51	9	-	25.5	-	-	-	0.2
NH12	Ck(b)	Lacustrine	65	26	-	36.8	-	-	-	0.8
NH14	IICk2(a)	Lacustrine	16	24	-	17.5	-	-	-	0.4
NH14	IICk2(b)	Lacustrine	38	18	-	30.9	-	-	-	0.2
NH17	Ck5	Lacustrine	62	21	-	31.3	-	-	-	0.2

Bt and Bnt horizons is generally less than 7 per cent. Of interest in the results for the latter horizons is the high percentage for Sites BT 15a and BT 15b which may well relate to the moderately to strongly calcareous till on which these soils have developed. The values obtained for Btnj horizons are like Bt horizons for some and similar to BA horizons for others. Bm and Bg horizons have dispersion ratio values of less than 10 per cent. Data for the C horizons show the greatest variability with values ranging up to 45 per cent, excluding the result for Site BT 39a.

These results indicate that materials affected by soil development are less susceptible to runoff erosion than relatively unaltered materials; i.e., C horizons. Thus, runoff erosion could be kept at a minimum if the mineral material would be left undisturbed. Retention of an organic (litter) cover on the mineral material would further reduce runoff erosion through protection of the mineral material from raindrop erosion and because of its relatively high water-holding capacity. Maintenance of an organic cover is deemed necessary on sloping areas, particularly on terrain having a hummocky micro-relief. Removal of the organic horizon from such terrain will likely result in rapid development of gullies owing to runoff waters concentrating and flowing in the micro-grooves.

2. Wave erosion

No specific analysis were conducted to measure the susceptibility of soil materials to wave erosion; although, soil dispersibility and structure figure extensively in its evaluation. The dispersion ratio results indicate that upper soil horizons will take a longer time to erode by wave

action than unaltered parent materials of similar textural composition. Bnt horizons would be least affected by wave erosion owing to their strong columnar structure. As shown in Photo 1, wave action dislodges peds of Bnt horizons from the soil matrix; however, these peds remain intact and sink rather than disperse. Similarly, in areas of hummocky micro-relief, the mound portion of soil hummocks are likely to become dislodged from the soil matrix and sink rather than disperse. This effect was observed at Site 18 and is shown on Photo 2. The Photo, taken within 24 hours after excavation, shows a dislodged soil mound which was shored-up to prevent it from slumping into the pit. The contact between the mound and the underlying unaltered material constitutes a slip-surface. In this example, the unaltered material is water-saturated owing to thawing out of the underlying

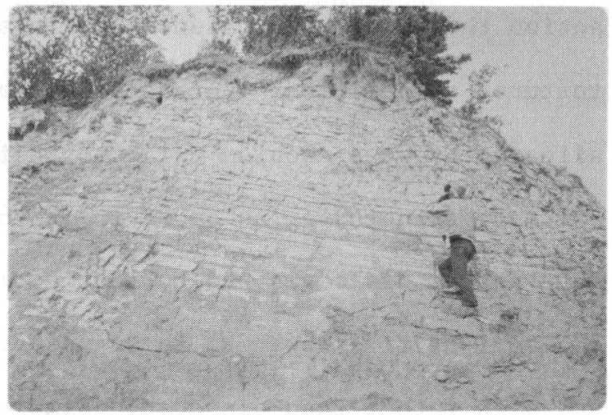
1. Dislodgement of peds from a Bnt horizon resulting from erosion by wave action.

2. Soil mound, shored-up to prevent it from slumping into excavation.

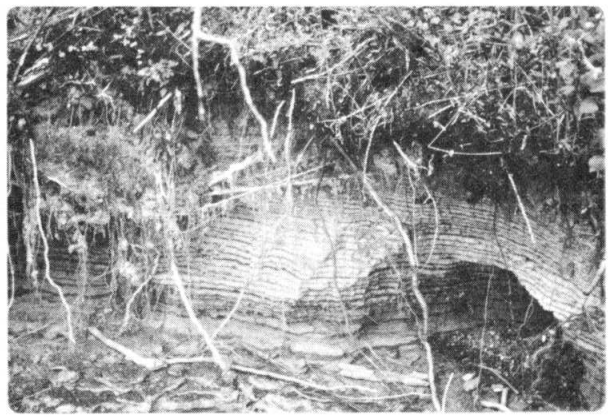
permafrost.

Wave action on unaltered lacustrine materials causes fall-type or flow-type deformation. Flow-type deformations occur in the form of slumping in clay-textured deposits and in the form of slides in dipping, stratified, lacustrine materials. In the latter case, sliding is the result either of saturated conditions of one or more of the strata (beds) or of their liquifaction due to man-made disturbances. Liquifaction of silt-textured material has been measured to occur at a field-moisture content of 18 per cent.

Wave action on flat, stratified lacustrine deposits causes bank-undercutting followed by soil fall. This produces cliff-like shorelines, as illustrated on Photos 3 and 4. Mature shorelines in areas of lacustrine deposits will likely be bedrock-controlled. Clay-textured



3. Embankment of stratified lacustrine deposits on island in Harding Lake.



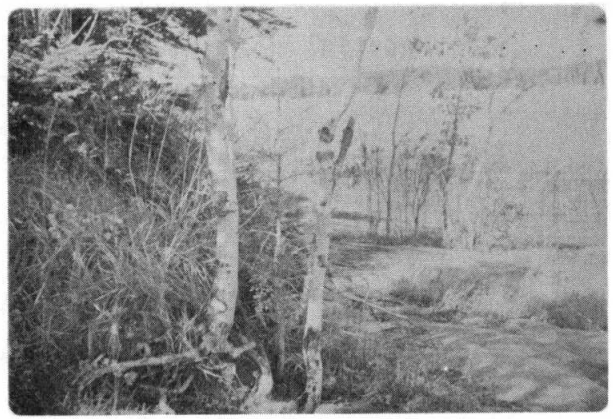
4. Recent shoreline development in stratified lacustrine deposits along Sipiwesk Lake.

materials on bedrock are expected to attain a characteristic shoreline slope of about 80 per cent (Photo 5).

B. Permeability

Permeability of a soil as it occurs in place is mainly dependent on its texture, structure, and consistence. The time allotted for this study did not permit permeability measurements of undisturbed soil nor of disturbed materials. Estimates of the undisturbed permeability of relatively unaltered materials are provided in Table X, as based on measurements from elsewhere in the Province. Field permeabilities of less than 2.0 inches per hour will be most frequently encountered in the study area, since lacustrine silt and clay materials predominate.

The permeability estimates listed in Table X will be influenced to a greater or lesser extent by the structure and consistence of the materials. Permeabilities of the unaltered lacustrine deposits will be affected by the thickness of the varves or laminae and their material composition. In this respect, the permeability estimates should be lower than indicated when dealing with stratified lacustrine



5. Exposed bedrock shore and clay--textured lacustrine deposits above the high-water mark.

TABLE X. ESTIMATED PERMEABILITIES OF RELATIVELY UNALTERED MATERIALS

Material	Textural Classification			Permeability (in./hr.)
	CSSC[1]	AASHO[2]	Unified[3]	
Lacustrine	C	A-7-6	CH-MH	0.05
	SiCL, SiC	A-6-7	CL	0.05 - 1.0
	CL	A-4 to A-6	ML-CL	0.6 - 1.0
	SiL	A-4 or A-5	ML or CL	0.6 - 2.0
	L	A-4	ML	0.6 - 2.0
	SL	A-3	ML	1.0 - 4.0
	VFSL	A-2-4	ML	1.0 - 4.0
	VFS	A-3	SW	6.0 - 10.0
	LVFS	A-2	SM	6.0 - 10.0
	FS	A-3	SW	6.0 - 10.0
	S and FGr	A-1	GW-GP	10.0+
Acid Till	SL	A-2 to A-3	ML-SM	2.0 - 6.0
Calc. Till	CL	A-4	ML	0.6 - 1.0
Glacio-Fluvial	S and FGr	A-1	GW-GP	10.0+

[1] The System of Soil Classification for Canada. 1970. Canada Department of Agriculture. Queen's Printer.

[2] Standard Specifications for Highway Materials and Methods of Sampling and Testing (The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, Designation: M145-149) Part 1, Ed. 8, American Association of State Highway Officials, 1961. Washington, D.C.

[3] The Unified Soil Classification System, Technical Memorandum No. 3-357, Vol. 1, Waterways Exp. Sta., U.S. Corps of Engineers, March, 1953.

deposits. The extent of such decreases in the estimated values is dependent on the textural variation between the laminae. Structural changes found in materials affected by soil formation are likely to increase the permeability of the materials; excepting platy structures.

The degree of expression of soil structure in various horizons is reflected, to some extent, by their bulk density measurements (Table IX). Generally speaking, the higher the bulk density value, the more pronounced the horizon structure. The results obtained show that the AB, BA, Bt and Bnt horizons have the highest bulk densities. Bulk density values for texturally-different laminae from stratified lacustrine deposits vary considerably; being unrelated to the pseudo-platy structure which such laminae have in common.

C. Plasticity

The tests for liquid limit and plastic limit measure the effect of water on the consistence of soil. The plastic limit signifies the change from the friable to the plastic consistence. At this point, orientation of particles and their subsequent sliding over each other take place since sufficient water has been added to provide a film around each particle. The liquid limit signifies that moisture content at which the water films become so thick that cohesion is decreased and the soil mass flows under an applied force. The plasticity index represents the amount of water that must be added to a soil system to produce the change from the point where the soil ceases to be friable to that where the soil begins to flow. Soils for which the liquid or plastic limit cannot be determined

TABLE XI. ENGINEERING TEST DATA FOR SOME SOILS OF THE STUDY AREA.

Site #	Horizon	Textural Class[1]	Plasticity			Shrinkage			
			Liquid Limit	Plastic Limit	Index	Satur. (%)	Limit %	Ratio %	Lineal (Dish) %
T3	Ahg	C	30.0	24.9	5.1	36.4	24.0	1.65	3.36
	Ckg1	SiL	21.8	18.2	3.6	28.7	18.0	1.89	3.86
	Ckg2	C	34.9	20.6	14.3	41.7	17.8	1.83	8.87
T4a	Ae	C	57.0	39.2	17.8	71.9	27.0	1.52	12.47
	Bt1	C	58.5	35.4	23.1	63.6	19.6	1.75	15.46
	Bt2	C	60.0	33.8	26.2	69.8	20.7	1.79	16.34
	BC	C	53.5	32.1	21.4	60.7	20.7	1.75	13.56
	C	SiL	39.6	23.4	16.2	47.1	20.0	1.77	10.36
T9	Ae	CL	26.3	17.6	8.7	42.3	16.5	1.80	5.52
	AB	C	37.7	20.8	16.9	39.5	14.9	1.84	8.70
	Bt	SC	31.8	19.6	12.2	33.0	14.6	1.88	7.43
	BC	SL-SCL	22.5	14.3	8.2	25.3	13.3	1.94	4.10
	Cca	L	22.5	16.2	6.3	27.5	15.9	1.84	4.11
	Ck	SL	18.5	13.1	5.4	23.8	14.8	1.92	3.37
T10	Bm	SiL-SiCL	59.3	39.3	20.0	76.5	36.5	1.22	8.11
	BC	SiC	48.8	31.9	16.9	57.2	23.5	1.53	9.44
	Ck1	SiL	25.0	18.7	6.3	35.6	21.8	1.67	3.86
NH6	Ae	C	51.7	30.0	21.7	54.5	23.4	1.50	8.39
	AB	C	50.5	29.9	20.6	63.7	19.7	1.71	14.49
	Bnt1	C	65.4	31.5	33.9	64.9	18.3	1.83	15.35
	Bnt2	C	65.3	32.4	32.9	70.5	18.2	1.81	17.11
	BCk	C	56.0	31.4	24.6	64.1	16.9	1.79	14.87
	Ck1	C	66.7	27.2	39.5	67.0	20.7	1.71	14.73
	Ck2	C	54.9	25.7	29.2	55.9	23.0	1.74	13.70

TABLE XI (continued)

Site #	Horizon	Textural Class[1]	Plasticity			Shrinkage			
			Liquid Limit	Plastic Limit	Index	Satur. (%)	Limit %	Ratio %	Lineal (Dish) %
NH12	Ae	SiCL	39.4	26.3	13.1	49.8	24.3	1.48	6.04
	Bt	C	62.2	29.3	32.9	60.6	14.9	1.96	16.95
	BC	SiC	40.4	22.0	18.4	47.4	20.2	1.76	9.16
	Ck(a)	SiL	15.7	13.0	2.7	24.8	15.9	1.92	1.92
	Ck(b)	SiL	31.7	18.3	13.4	39.2	19.1	1.77	5.30
NH14	Ae	C	68.9	33.3	35.6	67.1	19.6	1.72	16.31
	Bm	C	75.0	32.5	42.5	67.9	13.8	1.89	18.12
	BC	C	53.7	25.2	28.5	55.3	20.4	1.78	14.98
	Ck1	SiC	39.8	22.7	17.1	47.2	22.8	1.71	7.93
	IICk2(a)	LS	N.P.						
	IICk2(b)	L	28.0	17.3	10.7	39.4	25.3	1.62	4.11
NH17	Ae	C	54.9	31.5	23.4	57.4	25.7	1.52	10.41
	AB	C	54.3	27.8	26.5	48.3	17.7	1.79	11.08
	Btnj	C	64.0	27.0	37.0	59.4	16.7	1.89	15.79
	Bt	C	68.1	29.4	38.7	70.6	16.3	1.86	16.55
	Ck1	SiC	48.5	22.8	25.7	52.4	19.2	1.84	11.84
	Ck2	SiL	28.1	14.9	13.2	36.1	18.8	1.81	5.76
	Ck3	SiC	51.1	22.8	28.3	52.0	18.5	1.83	11.33
	Ck4	SiCL	28.8	18.6	10.2	34.3	18.1	1.84	5.56
	Ck5	SiL	25.1	15.4	9.7	28.0	17.1	1.94	4.07
NH19	Ae	SiL	32.0	21.4	10.6	39.3	31.3	1.41	2.17
	AB	SiL	40.0	21.0	19.0	45.1	21.1	1.68	8.47
	Bt	SiCL	50.2	21.9	28.3	46.7	15.9	1.85	11.08
	Ck1	SiL	31.1	19.5	11.6	38.2	24.0	1.66	4.55
	IICk2	SL	N.P.			18.1	21.7	2.06	1.92

TABLE XI (continued)

Site #	Horizon	Textural Class[1]	Plasticity			Shrinkage			
			Liquid Limit	Plastic Limit	Index	Satur. (%)	Limit %	Ratio %	Lineal (Dish) %
NH23	Ae	SiL	26.8	23.2	3.6	40.6	29.3	1.46	3.14
	Bm	SiL	N.P.			26.2	15.9	1.81	2.88
	BC	SiL	N.P.			26.1	17.4	1.87	1.69
	Ck1	SiL	N.P.			26.1	15.9	1.88	2.17
	C2(a)	SiL	N.P.			22.4	17.0	1.86	3.13

[1] The System of Soil Classification for Canada. 1970. Can. Dept. Agric., Queen's Printer.

or for which the plastic limit is equal to, or higher than, the liquid limit are termed non-plastic.

Results for soil plasticity are presented in Table XI. They show that plasticity increases with the content of smaller particles, being highest for materials classified as clay. Within this textural class, the plasticity index varies from 14.3 to 42.5. The results also show that materials affected by soil formation have a lower plasticity index than their respective, unaltered parent material or C horizon. A liquid limit of as low as 15.7 has been measured for the Ck(a) horizon (i.e. a component bed of the stratified lacustrine parent material) of Site NH 12. This and other results corroborate the field observation and measurement at Site SI 16 of liquefaction occurring at a moisture content of less than 20%.

D. Shrinkage

Shrinkage refers to measurement of volume changes with variations in moisture content. The shrinkage limit of a soil signifies that moisture content at which an equilibrium condition of volume change is reached and further reduction in moisture content will not cause a decrease in the volume of the soil mass. The shrinkage ratio of a soil is the ratio between the volume change and the corresponding change in moisture content. It equals the apparent specific gravity of the dried soil. The lineal shrinkage of a soil is the decrease in one dimension, expressed as a percentage of the original dimension of the soil mass,when the moisture content is reduced from a stipulated percentage to the shrinkage limit.

The results in Table XI show that soils classified as clay (C) generally have high shrink-swell potential. Non-plastic soils and those having a small amount of slightly plastic fines have low shrink-swell potential. The results also show that soil B horizons generally have a higher shrink-swell potential than their relatively unaltered C horizon of similar texture.

E. Eutrification Potential

Sodium bicarbonate has been employed to extract the portion of the soil phosphorus that could be correlated with the eutrification of alkaline water upon land flooding.

Results presented in Table IX show that such water may extract considerable quantities of phosphorus. Organic materials and mineral materials with a relatively high organic carbon content have the highest content of bicarbonate-soluble phosphorus. Such mineral materials are mostly from soils having imperfect or poor drainage. The bicarbonate-soluble phosphorus content of organic materials is expected to vary according to composition and degree of decomposition. In this respect, sphagnum peat will likely contain the least amount of bicarbonate-soluble P, followed by sedge peat while forest peat and forest litter should contain the highest amount.

In general, the bicarbonate extractable phosphorus decreases with increase in soil depth. Relatively unaltered soil materials contain the least amounts of extractable phosphorus. The amount extracted from such materials varies according to texture, coarse materials containing a lesser amount than fine-textured materials.

A P P E N D I X I

A. LAND DISTRICTS OF THE RAT-BURNTWOOD RIVERS AND SOUTHERN INDIAN LAKE PROJECT AREAS

MY Mystery Lake Land District

Characterized by deep lacustrine clay and silt, and glacio-fluvial sand and gravel. Thick to thin organic material overlies the mainly lacustrine mineral deposits in depressions and flat areas with impeded drainage. Some infrequent Precambrian gneissic and granitic bedrock outcrops occur.

The lacustrine clay and silt deposits have a gently undulating to gently rolling topography and are generally thick to very thick over bedrock. These deposits are laminated; the laminae usually being greater than one inch thick. The common soils encountered on these deposits are Gray Luvisols, which may or may not show evidence of cryoturbation, and Low Humic Eluviated Gleysols.

Black spruce will form the climax forest vegetation on most sites. Depending on moisture regime, the groundcover will vary from a thin organic layer of feathermosses, lichen, and forest litter to rather thick layers of organic material derived from feathermosses, sphagnum mosses and forest litter. The present forest vegetation may be completely different from that in the climax stage, owing to disturbances mainly caused by fire. On dry sites jack pine, white birch, and, to some extent, black spruce will form the intermediate forest cover. On more moist sites, trembling aspen will form a major component of the subseral forest cover. In areas with poor drainage, black spruce will form the fire regeneration as well as the climax forest. Along lakes and

streams the stable vegetation is often a mixture of black spruce, white spruce, trembling aspen and balsam poplar, the latter especially in areas which are flooded from time to time and are subject to some deposition of alluvial materials.

Permafrost is found in areas which have imperfect or poor drainage and an organic surface layer thick enough to create adequate insulation. The active layer varies in thickness from 18 to 30 inches; but may be locally thicker. Ice content of the permafrost is low.

The glacio-fluvial deposits are undulating to gently rolling in topography. These deposits are generally quite deep; the underlying bedrock having very limited influence on the topography. Degraded Dystric Brunisols are the common soils present with Orthic Regosols occurring in disturbed areas, such as blow-outs.

As a result of fires, jack pine and white birch often form the forest cover. Black spruce may constitute part of the stand mixture and forms the climax forest cover if no disturbances occur. The organic surface layer is generally thin and composed of feathermosses, lichen and forest litter. Because of their textures, these landforms are normally well drained and little or no permafrost is found. Some permafrost is found in those areas that have heavier organic mantles, in which case the permafrost occurs in the organic material.

The low relief organic deposits vary from thick to thin and are usually underlain by lacustrine materials. The moisture regime varies from saturated to rather dry as a result of peat buildup and permafrost. The wet to very wet areas are comprised of sedge peat, sphagnum peat, or mixtures

of both. Palsas and peat plateaux are organic landforms, that are raised compared to the surrounding area as a result of peat accumulation and permaforst. A relatively extensive forest cover is found on these landforms, whereas fen-type peat landforms generally lack tree vegetation. The stable forest cover on the palsas and peat plateaux is black spruce with a variable component of white birch. The active layer is about 18 inches thick and the surface is rather dry. The ice content in the frozen peat is high.

Very few lakes occur in this area. The ones that do occur are pitted lakes in the flacio-fluvial material, which are small, fairly deep, and have sandy shores. Some small to medium sized lakes occur in the remainder of the area. The shores of these lakes, as well as the rivers consist of clay and bedrock primarily.

PL Paint Lake Land District

Characterized by thick lacustrine clay and silt deposits and thick to thin organic accumulations that overlay lacustrine materials in depressions and flat areas with impeded drainage. Precambrian gneissic and granitic bedrock is infrequently exposed or close to the surface.

The lacustrine areas have a very gently undulating to gently rolling topography and are generally thick to very thick over Precambrian bedrock. These deposits have alternating clay and silt laminae which very in thickness from location to location, but also with depth. The common soils are: Gray Luvisols and Low Humic Eluviated Gleysols.

Permafrost is found in poorly and imperfectly drained areas when a thick organic layer is present. The active layer is about 1½ to 2 feet thick. The

permafrost extends into or occurs solely in the mineral soil; the latter situation occurring infrequently in better drained positions.

Black spruce forms the climax forest vegetation on most sites; i.e. moisture conditions ranging from fairly dry to wet. Along lakes and rivers the climax forest is a mixture of white spruce, black spruce, trembling aspen and balsam poplar. The present forest cover is often subseral in nature. On the well drained sites, jack pine and white birch with some black spruce will form the forest cover after fire, while trembling aspen will be subseral on moist sites. On sites with a thick organic overlay the fire regeneration is mainly black spruce.

Extensive areas consist of thick to thin organic accumulations which have low relief. The slight differences in elevation in these peatlands are a result of permafrost and peat accumulation. In the wet and very wet peat areas, which consist of sedge peat and/or sphagnum peat over sedge peat, tree growth is very stunted. Scattered tamarack and some black spruce are the tree species present. On the frozen elevated peat bodies (palsas and peat plateaus), the forest cover can be rather dense and consists mainly of black spruce with some white birch. The peat material consists of sphagnum and forest peat, often over sedge peat.

The large lakes in this district have irregular, mostly bedrock-controlled shorelines. These lakes are fairly deep and dotted with bedrock-controlled islands. The smaller lakes are shallow and have rather smooth,peaty and/or clayey shorelines.

HL Hunter Lake Land District

Characterized by thick lacustrine clay and silt deposits, and thick to thin peat overlying

lacustrine materials. Precambrian gneissic and granitic bedrock is infrequently exposed throughout the area.

The topography of the lacustrine areas ranges from very gently undulating to gently rolling. The deposits are varved and are generally thick to very thick over bedrock. The common soils are: Gray Luvisols, which usually show evidence of cryoturbation, and Low Humic Eluviated Gleysols.

Black spruce forms the climax forest on most sites. Density and height growth of black spruce as well as groundcover and organic accumulation will vary, depending primarily on moisture regime. The better drained sites have a shallow LFH layer mainly consisting of feathermosses, lichens and forest litter. With increase in moisture supply, the organic layer becomes thicker and eventually becomes a peaty overlay. The present forest cover of many sites differs from the climax one, owing to fire disturbance. On dry sites, jack pine and white birch are the dominant subseral tree vegetation while, on more moist sites, trembling aspen will form a major component of the stand. Wet sites with thick organic layers will have black spruce as forest cover, even after fire, with alder and willow forming an extensive shrub cover.

Suitable sites along lakes and streams have a mixed-forest comprised of black spruce, white spruce, trembling aspen, white birch, and balsam poplar.

Permafrost is found in soils with a thick organic layer. On sites with a very thick organic layer the permafrost occurs in the organic deposit. Their active layer is about 1½ to 2 feet thick and

extends into the mineral material. In soils with better drainage the permafrost is found between 2 and 4 feet depth, depending on the thickness of the LFH layer. Fairly dry sites usually lack permafrost.

Very extensive areas are covered by peat. These areas have a low relief with differences in elevation ranging between 2 and 10 feet. The topographic variations are caused by peat accumulation, permafrost, and occasionally by the topography of underlying mineral materials.

The wet to saturated areas consist of sedge peat which may overlay other kinds of peat at greater depths. These areas have little or no forest cover. When present, it consists of some stunted tamarack and/or black spruce. The raised peat landforms -- palsas and peat plateaux -- support a forest vegetation of black , spruce and, to some extent, white birch. The organic material is comprised of sphagnum and forest peat which may overlie sedge peat. The ice content of the frozen organic material is high.

PH Partridge Crop Hill Land District

Characterized by sandy end-morainic and glacio-fluvial deposits, lacustrine clay and silt deposits, and thin to thick organic accumulations. Precambrian gneissic and granitic bedrock occurs frequently at or close to the surface.

The morainic and glacio-fluvial areas are gently undulating to rolling. Parts of these areas are flat, lower slopes often being covered by organic accumulations. Silty materials occur along the edges of the sand deposits, and often have an organic overlay. In general, this silt overlies clay-textured lacustrine material. Most common soils are: Dystric

Brunisols on the sandy deposits and Rego Gleysols and Gray Luvisols on the lacustrine materials.

The present forest cover consists of jack pine and white birch. If left undisturbed,black spruce may form part of the forest cover. Lower slopes and flat areas with impeded drainage have a black spruce cover.

Permafrost does not occur in the better drained materials. Some permafrost may be found in moist areas with thick organic accumulations. The wet to very wet conditions that prevail in most of the District have inhibited the development of permafrost.

The lacustrine areas have a very gently undulating to slightly rolling topography. Some steeper relief is found in areas where bedrock affects the topography. The forest vegetation on these landforms is the same as in land districts PL and HL. Permafrost is somewhat less frequent than in the afore-mentioned land districts, even on sites with sufficient organic insulation. The organic peat lands have very low relief. Permafrost is found in palsas and peat plateaux (see PL and HL).

The water bodies in this district are generally small and shallow with regular peat shorelines.

AL Apeganau Lake Land District

Characterized by thick lacustrine clay and silt deposits and thin to thick organic deposits overlying lacustrine material. Precambrian, gneissic and granitic bedrock at or close to the surface occurs in isolated areas.

The lacustrine clay and silt deposits have a very gently undulating to very gently rolling top-

ography and are generally thick to very thick over bedrock. These deposits are laminated with the clay and silt laminae varying in thickness. Common soils encountered are: Gray Luvisols and Low Humic Eluviated Gleysols.

Black spruce generally forms the climax forest vegetation. Most sites are imperfectly drained and have rather thin organic layers overlaying the mineral materials.

Permafrost is found throughout but is not widespread. The active layer is about 2 feet thick.

Extensive thin to thick organic deposits occur which are usually underlain by lacustrine materials. These peatlands have a very low relief. Black spruce cover is found on the raised peat bodies which contain permafrost. The wet peatlands -- collapse scars and fens -- are almost void of tree vegetation, except for scattered, stunted tamarack and black spruce. The ice-content of the permafrost is high.

The bedrock-controlled areas are undulating to rolling and contain frequent bedrock outcrops. The unconsolidated mineral overlay varies from thin to thick as does the organic overlay in depressions. Black spruce forms the climax forest cover but, as a result of fires, the present cover consists often of jack pine, white birch or trembling aspen with black spruce in mixtures or as understory.

Permafrost is found on the lower slopes where a peaty layer has developed. Some permafrost occurs at depth in mineral soils with thin LFH. Ice contents vary from high to low. Two lakes of moderately large size occur in this district. Shorelines are irregular to regular. Shore materials

consist of exposed bedrock, clay and organic materials.

LL Leftrook Lake Land District

Characterized by thick to thin lacustrine clay and silt deposits, some glacio-fluvial sand deposits, extensive thin to thick peat accumulations overlying lacustrine materials, and areas with Precambrian gneissic and granitic bedrock outcrops.

The lacustrine areas have a gently undulating to gently rolling topography and are generally thick over bedrock. These deposits have clay and silt laminae of varying thickness. Common soils are: Gray Luvisols and Low Humic Eluviated Gleysols on the lacustrine materials and Dystric Brunisols on the glacio-fluvial deposits.

Black spruce forms the climax forest vegetation on most sites. As a result of fire, jack pine, white birch and, on moist sites, trembling aspen constitute the forest cover, often in mixture with black spruce or with black spruce in the understory. The organic layer varies in thickness from rather thin on the well drained sites to thick or even peaty on the moist and very moist locations.

Permafrost occurs locally in the mineral soils but is more frequently found in the organic accumulations.

Extensive areas are covered by thin to thick, low relief organic deposits. Palsas and peat plateaux normally have a black spruce cover with some white birch as secondcomponent. The active layer is about 1½ feet thick and ice content of the permafrost is high. The flat, very wet peatlands

do not contain permafrost and have mainly a sedge or sedge/sphagnum vegetation with scattered, stunted tamarack and black spruce.

Bedrock-controlled areas have an undulating to rolling topography. Surface materials consist of exposed bedrock and thin to thick lacustrine and/or organic deposits overlaying the bedrock.

Black spruce forms the climax forest cover. As a result of fires, it is often replaced by or mixed with jack pine and to some extent white birch on the drier sites.

The lakes are relatively small, deep and have irregular shorelines which are mainly bedrock controlled.

WW Wuskwatim Lake Land District

Characterized by thick lacustrine clay and silt, thin to thick organic accumulations overlying lacustrine materials, thin lacustrine and organic deposits underlain by Precambrian bedrock, and exposed bedrock.

The lacustrine areas have a very gently undulating to gently rolling topography, slightly influenced by the configuration of the underlying bedrock. These deposits have silt and clay laminae of varying thickness. Common soils encountered on these deposits: Gray Luvisols and Low Humic Eluviated Gleysols.

Black spruce forms the climax forest vegetation on most sites. Depending on moisture regime, the thickness of the organic layer will vary from a thin LFH layer composed of feather mosses and forest litter to peaty overlays composed of dead and living sphagnum and feathermosses as well as forest litter.

The present vegetation is often in an intermediate, subseral stage. In these stands black spruce often constitutes an important component of the species composition, depending partly on the time lapse since disturbance. Jack pine and white birch generally predominate in subseral forests on dry sites while trembling aspen is dominant on moist locations. Sites with a peaty overlay generally have a black spruce vegetation with alder and willow forming an extensive shrub cover.

Along lakes and rivers white spruce will form part of the species composition as will balsam poplar. Permafrost is not widespread in this area and is confined to those soils which have a peaty overlay.

The low relief organic deposits are thick to thin and are underlain by lacustrine materials.

The very wet organic areas have fen-type vegetation and have little or no tree growth. Stunted tamarack is evenly distributed or, in the case of patterned fens, occurs on the ridges. Some stunted black spruce may be present, particularly along the borders of these units.

The raised peat landforms are the result of peat accumulation, permafrost, and sometimes underlying materials. They support a black spruce forest cover of varying density and height growth. White birch often occurs in association with the black spruce. The active layer is normally 1½ to 2 feet thick and the ice content of the permafrost is high.

Areas consisting of a thin overlay over bedrock or exposed bedrock show slight elevation differences over short distances but, generally speaking, have a weakly broken topography. In depressions

organic material has accumulated which may overlay bare bedrock or thin lacustrine deposits. Permafrost is of local extent in these areas.

The main water body of this District is Wuskwatim Lake which has irregular to regular shoreline. Bedrock comprises the dominant shore material with clay and organic materials being of lesser importance.

NH Nelson House Land District

Characterized by Precambrian gneissic and granitic bedrock which is either exposed or covered with a thin overlay of lacustrine and/or organic materials. Thin to thick lacustrine deposits occur in the valleys and on the slopes of the bedrock-controlled terrain. Thin to thick organic deposits have developed in areas with impeded drainage.

The bedrock outcrops have gentle to steep slopes but are rounded or flat at the top. Shallow lacustrine and/or organic deposits overlie the bedrock in depressions and on the gentle slopes. The present vegetation on gently sloping sites is mainly subseral and dominated by jack pine, but black spruce will likely form the climax. White birch is also often found in these areas. On slopes with somewhat thicker mineral deposits trembling aspen can form the intermediate forest cover but will be replaced by black spruce in advanced stages of forest development. Black spruce forms the forest vegetation on organic deposits. Very little permafrost is encountered in the bedrock-controlled areas; when present, it occurs in the organic deposits.

The lacustrine deposits have a gently undulating to rolling topography. In the latter case the relief is bedrock-controlled. Black spruce forms

the climax vegetation on most sites, but as result of fire, is often replaced by jack pine, white birch or trembling aspen, depending on moisture regime. Permafrost is more frequently found in these areas, especially in locations where a peaty overlay has developed.

The organic deposits have low relief and overlay lacustrine materials. A forest cover of black spruce occurs on the raised peat landforms (palsas and peat plateaux). The ice content of the permafrost is high. Collapse scars and fens generally lack tree vegetation,although scattered stunted tamarack and black spruce do occur, in particular, on ridges.

A number of large, deep lakes occur in the district. The shore material of these lakes consists mainly of exposed bedrock.

NL Notigi Lake Land District

Characterized by Precambrian gneissic and granitic bedrock, which is exposed or very close to the surface in most of the area, and lacustrine and peat deposits in valleys and depressions.

The bedrock areas have rather steep slopes with rounded or flat crests. The topography ranges from gently to strongly rolling. Exposed bedrock is usually void of vegetation. Black spruce and jack pine can be found in shallow depressions where unconsolidated materials have accumulated. On the slopes a thick layer of mainly lacustrine materials overlay the bedrock and more and better tree cover is found.

The lacustrine areas have a gently undulating to gently rolling topography which is slightly to moderately controlled by bedrock except in the val-

leys and plains between the bedrock outcrops. These materials are often overlain by an organic deposit. Black spruce is the most common tree species but trembling aspen, balsam poplar and white spruce are found on suitable sites; the latter two especially in the vicinity of lakes and rivers. Permafrost is found in these mineral soils when drainage and thickness of the organic layer are favorable.

Peat deposits of varying thickness frequently overlay the lacustrine materials. Permafrost is found in the raised peat landforms and has a high ice content.

Small and moderately large lakes are scattered throughout the district. Shore materials consist of bedrock and clay.

RL Rat Lake Land District

Characterized by Precambrian gneissic and granitic bedrock, which is close to or at the surface in the major part of the area, and lacustrine clay and silt deposits and peat deposits overlying lacustrine materials.

The bedrock areas are undulating to moderately rolling; bedrock being frequently exposed. In depressions and on lower slopes the bedrock is covered by thin to thick lacustrine materials which, in turn, are overlain by organic deposits in depressions. The dry sites generally have a subseral jack pine cover with black spruce, jack pine, white birch and trembling aspen. In poorly to very poorly drained locations the tree cover is stunted black spruce mixed with often tall willow and alder.

Permafrost occurs on the slopes and in depressions, mainly under or in thick organic layers and has a medium to high ice content.

The lacustrine areas have a topography rang-

ing from gently undulating to gently rolling, depending on the degree of control by the underlying bedrock. The forest cover is mainly black spruce, which may be replaced (as the result of fire) by jack pine and white birch on the drier sites and by trembling aspen on fresh to moist locations. Permafrost is found throughout but occurs mainly on sites with a thick LFH or peaty layer. Ice content is moderate to high.

The organic areas have a low relief. The very wet peat areas have a sedge vegetation. A forest cover of black spruce, mixed with white birch is found on the raised peat landforms. The ice content of the permafrost in peat palsas and peat plateaux is high.

Many lakes occur in this district which vary in size from small to moderately large,are deep, and contain many rocky islands. Shore materials are mainly bedrock, clay or organic in nature.

IL Issett Lake Land District

Characterized by extensive, thick organic deposits, thick lacustrine clay and silt deposits, and infrequent Precambrian gneissic and granitic bedrock outcrops.

The extensive peat areas have a low relief. The peat is generally thicker than 9 feet, saturated, and without permafrost, particularly along the Rat River. Palsas and Peat plateaux are quite common in this District and are often associated with variations in relief of the underlying materials. These landforms can support fairly good black spruce forests which may be mixed with white birch and, to some extent, trembling aspen.

The lacustrine areas generally have a gently

undulating topography. Black spruce and, to a lesser extent, white spruce and trembling aspen form the forest vegetation. Permafrost is common in the mineral soil and raised clay landforms with slumping edges are frequently encountered.

The ice content of the permafrost varies from moderate in the mineral materials to high in the peat deposits.

The shore materials of the water bodies consist of exposed bedrock, and clay and organic materials. The Rat River proper mainly has organic shore materials.

SB South Bay Land District

Characterized by extensive Precambrian gneissic and granitic bedrock areas which are overlain by lacustrine and organic deposits, but frequently show exposed bedrock. The remainder consists of thin to thick lacustrine clay and silt deposits, often overlain by thin to thick peat,and infrequent glacio-fluvial deposits consisting of sand and gravel.

The strongly bedrock-controlled areas have a topography varying from undulating to rolling. Most of the area has a climax black spruce forest vegetation but a subseral cover of jack pine mixed with white birch occurs in part of the area. Trembling aspen occurs on favourable sites, reaching its northern limit in this district. Permafrost is found in the thin to thick mineral and organic deposits which may overlay the bedrock.

The lacustrine clay and silt areas have a gently undulating to gently rolling topography. The configuration of the bedrock is often reflected in the topography even when the deposits are relativ-

ely thick. Black spruce forms the climax forest cover but subseral jack pine and white birch often occur on the better drained sites. White spruce occurs mixed with black spruce on favourable sites along the shorelines of lakes.

Permafrost is widespread on moist to fresh sites and even occurs on some of the drier sites. Ice content is moderate.

Common soils are: Cryic Gray Luvisols and Cryic Low Humic Eluviated Gleysols.

The organic areas have a low relief and frequently contain permafrost landforms (palsas and peat plateaux). Black spruce mixed with white birch forms the dominant forest cover. Fens and collapse scars occur frequently. They have sedge or sphagnum vegetation with few, if any, trees.

The present vegetation on the glacio-fluvial sand and gravel deposits consists mainly of jack pine but is often mixed with black spruce or has black spruce in the understory.

Common soils are: Degraded Dystric Brunisols with minor amounts of Orthic Regosols.

Permafrost is found in more moist locations where organic material has accumulated.

Lakes vary in size from small to very large (Southern Indian Lake) and are generally deep. The shorelines are irregular and have mainly exposed bedrock and sandy shores.

LP Long Point Land District

Characterized by extensive lacustrine clay and silt deposits over Precambrian gneissic and granitic bedrock, and thick to thin organic deposits over lacustrine materials.

The topography of the lacustrine plains varies from gently undulating to gently rolling,

reflecting the configuration of the underlying bedrock which is frequently exposed throughout the area.

Common soils are: Cryic Gray Luvisols and Cryic Low Humic Eluviated Gleysols.

The climax forest cover is composed of black spruce which, as a result of fire, may be replaced on drier sites by jack pine and white birch.

Permafrost is widespread throughout the district occurring in dry or moist locations and having a moderate ice content. The glacio-fluvial deposits present in this district often have an intermediate vegetation of jack pine and white birch in mixture with black spruce.

Organic deposits occur in the depressional areas and comprise mixtures of palsas, peat plateaux, collapse scars, and small fens. Permafrost with high ice content is of widespread occurrence.

The lakes range in size from small to very large (Southern Indian Lake) with irregular, bedrock-controlled shorelines. Sandy beaches occur throughout the area.

KH Kame Hills Land District

Characterized by glacio-fluvial deposits, end-morainic and ground-morainic deposits, lacustrine clay and silt deposits, and thick to thin peat accumulations overlying these materials. Precambrian bedrock is infrequently exposed throughout the area.

The topography of the lacustrine terrain is gently undulating to gently rolling, often reflecting the configuration of the underlying bedrock.

Common soils are: Cryic Low Humic Eluviated Gleysols and Cryic Gray Luvisols.

Black spruce forms the climax vegetation on all sites but may be replaced temporarily by jack pine and white birch after disturbance due to fire. Permafrost is encountered throughout this District. The active layer is generally between 1 to 1½ feet thick and the ice content is generally high.

The glacio-fluvial deposits are sandy to gravelly in texture. They often support a subseral jack pine and white birch forest cover although black spruce is frequently found in mixture or as understory. The topography is sometimes rough but mostly rolling. The end- and ground-morainic deposits vary from clay to sandy till and have a forest cover ranging from black spruce to jack pine, depending on drainage and fire history. Permafrost is found frequently in these areas but the ice content varies with the permeability of the material.

Organic deposits overlay the mineral materials in depressions or in areas with imperfect drainage. They consist mainly of palsas and peat plateaux; although, collapse scars are frequent. Ice content of the permafrost is high. Forest cover on the permafrost peat landforms consists of open to fairly closed black spruce with some white birch.

Lakes vary from small to large with irregular to regular shorelines developed in bedrock, clay, organic and sand materials. Sandy beaches occur extensively in this District. The lakes are deep to shallow.

B. LANDSCAPE UNITS OF THE OUTLET LAKES PROJECT AREA

Landscape Unit 01 (385 sq. mi.)

Very weakly broken area of peat plains underlain by lacustrine clay and thick clay till. Natural drainage of water on the land surface is in a northeasterly direction, excepting areas immediately adjacent to water bodies where it drains to the south.

Land systems comprising the land portion of this landscape unit are: SBx; Fk; FSk; Sk; SF; BxF; FBx; S; BkF; BkS; FS; BxS; F; Bz; 41: BkS-41.

Water occupies 44 per cent of the area, all of which constitutes a part of Lake Winnipeg. The shorelines along this portion of Lake Winnipeg are regular, with an abrupt, steep embankment of over 30 feet in elevation. Shore materials consist of clay till overlain by organic material, either of which may or may not contain permafrost. These materials are subjected to active wave erosion as evidenced from slumping features on the embankment.

Landscape Unit 02 (425 sq. mi.)

Very weakly broken area of peat plains, lacustrine clay and modified glacio-fluvial deposits, underlain by lacustrine clay and deep clay till. Natural drainage of land-surface waters is in a northeasterly direction.

Land systems composing the land portion of this landscape unit area are: BxF-(49); 49-T; BxS; S; BxS-41; BxF; FS; SF; F; BkF; SBx; 41-F; BkS; BkS-1; BkS-4; SBx-4; Sk.

Lakes or portions thereof occupy 30 per cent of the area. Lakes of various size classes occupy the following proportion of the landscape unit:

Large lakes:	15%
Moderately large lakes:	13%
Relatively small lakes:	2%

The moderately large and large lakes con-

stitute but portions of large- to very large-size lakes (Playgreen Lake, Kiskittogisu and Kiskitto Lake). All lakes are moderately deep and have regular shorelines. The shore material is mainly peat, but clay and sandy shores do occur locally.

Landscape Unit 03 (55 sq. mi.)

Very weakly broken area of peat plains and beach deposits underlain by lacustrine clay and thick clay till. The moisture regime of the beach deposits is moist to fresh, except in the most southern portion of the landscape unit where it is wet. Surface waters drain mainly in a southwesterly direction.

Land systems composing the land portion of the landscape unit are: FSk; T; SBx; F; SBz.

The portion of this landscape unit area that is situated within the boundaries of the Outlet Lakes study area does not contain any lakes.

Landscape Unit 04 (73 sq. mi.)

Very weakly to weakly broken area of peat and lacustrine plains. The moisture regime of the lacustrine deposits is fresh when the deposits occur adjacent to stream channels and lakes, but tends to be moist to wet when the deposit is located within the peat plains. Major streams flow in a northeasterly direction; minor streams and other surface waters drain either in an easterly or westerly direction.

Land systems composing the land portion of the landscape unit are: TkS; 89-T; BkS; 49-T; 80-T; 79-T; BxF; BkT-49.

Lakes cover 5 per cent of the landscape unit area situated within the boundaries of the Outlet

Lakes study area. These lakes are relatively small in size within the unit area, and constitute a portion of a moderately large lake (Hill Lake).

The lakes are moderately deep and have somewhat irregular shorelines. The shore material consists mainly of lacustrine silt and clay.

Landscape Unit 05 (66 sq. mi.)

Very weakly broken area of peat plains interspersed with bedrock-controlled outcrops. These outcrops consist of exposed bedrock, laminated lacustrine deposits and lacustrine clay materials. The peat plains are underlain chiefly by lacustrine clay. Minor streams and other surface waters drain in an easterly direction.

The land portion of this landscape unit area comprises the following land systems: Fk-39; 39; BkS.

Water bodies occupy 54 per cent of the area. The greater part of these water bodies constitute a portion of a large-size lake (Kiskitto Lake). The various size classes of the water bodies occupy the following proportion of the landscape unit.

Moderately large lake: 53%

Small lake: 1%

The moderately large water bodies are moderately deep to deep and have somewhat irregular shorelines; whereas the small lakes are shallow with regular shorelines. The shore material is mainly organic, with minor inclusions of exposed bedrock and laminated lacustrine deposits overlying bedrock. The small lakes are without open outlets.

Landscape Unit 06 (80 sq. mi.)

Weakly broken area of peat plains, and sand-

textured water-modified, glacio-fluvial deposits, interspersed with bedrock-controlled outcrops. The peat plains and glacio-fluvial deposits are underlain primarily by lacustrine clay. Peat plains adjacent to the glacio-fluvial deposits tend to be underlain by a thin mantle of sand over lacustrine clay. Natural drainage is mainly in a westerly direction.

Land systems composing the land portion of this landscape unit are: BxF-39; BxF; S; 41; 39; BkF; BkT-49; 49-S; BxF-(29).

Water bodies cover 35 per cent of the area. They constitute portions of large-size lakes (Kiskitto Lake, Kiskittogisu Lake, and Playgreen Lake), and contain infrequent rock outcrops. The various size classes of the water bodies occupy the following proportion of the landscape unit:

Moderately large lake: 31%

Relatively small lake: 3%

Small lake: 1%

The water bodies are moderately deep to deep and have somewhat irregular shorelines. Organic material with minor inclusions of exposed bedrock and sand comprise the shoreline material.

Landscape Unit 07 (100 sq. mi.)

Very weakly to weakly broken area of peat plains, underlain by lacustrine deposits, and interspersed with bedrock-controlled outcrops and sand-textured, water-modified, glacio-fluvial deposits. The bedrock-controlled outcrops are composed of exposed bedrock, laminated lacustrine deposits and lacustrine clay. The laminated lacustrine deposits consist chiefly of silt- and sand-size materials, and include beach deposits. Natural drainage of the land is mainly in a southwesterly direction.

Land systems composing the land portion of this landscape unit are: SF-(49); F-(29); BkF; 41; F.

Water bodies cover 20 per cent of the area. The greater part of these water bodies constitute a portion of a large-size lake (Playgreen Lake), and contain infrequent rock outcrops. The various size classes of the water bodies occupy the following proportion of the landscape unit:

Moderately large lake: 17%

Relatively small lake: 3%

The moderately large lakes are moderately deep to deep and have somewhat irregular shorelines. Shore materials consist dominantly of organic material with minor inclusions of sand, clay, and exposed bedrock. The relatively small- and small lakes are shallow to moderately deep and have regular to somewhat irregular shorelines. The shore material is mainly organic; rock outcrops being of minor importance.

Landscape Unit 08 (85 sq. mi.)

Very weakly broken area of dominantly fibric peat plains and rock outcrops. The peat plains are underlain by lacustrine clay, which also covers the sides of the rock outcrops. Drainage is in a southerly direction.

The land portion of this landscape unit area comprises the following land systems: TS-39; FS-19.

Water bodies occupy 70 per cent of the area and belong to the moderately large size class. These water bodies constitute a portion of a large-size lake (Playgreen Lake).

The water bodies are deep and have irregular shorelines. Shore materials are mainly exposed

bedrock and organic material.

Landscape Unit 09 (135 sq. mi.)

Weakly broken area of sand-textured, water-modified, glacio-fluvial material and peat plains with infrequent bedrock-controlled outcrops. The peat- and glacio-fluvial deposits are underlain mainly by lacustrine clay or, less frequently, bedrock. The peat plains immediately adjacent to the glacio-fluvial deposits tend to have a thin mantle of sand on top of the lacustrine clay. Drainage of surface waters is mainly in a southeasterly direction, a minor portion of the area draining towards the southwest.

Land systems composing the land portion of this landscape unit are: BkS; SBx, 41; FSk; SkF; SF; BkT; BxS; BxS-(29); FSk-19; BkS-50.

Water bodies cover 11 per cent of the area. The various size classes of the water bodies occupy the following proportion of the landscape unit:

Relatively small lake: 7%

Small lake: 4%

The water bodies are moderately deep and have somewhat irregular shorelines. Shore materials are mainly sand and peat, with minor inclusions of exposed bedrock.

Landscape Unit 10 (50 sq. mi.)

Very weakly broken area of peat plains and sand-textured, water-modified, glacio-fluvial deposits, infrequently interspersed with bedrock-controlled outcrops. The peat plains and glacio-fluvial deposits are underlain by lacustrine clay and, less frequently, bedrock outcrops. The land portion drains in a southwesterly direction.

Land systems composing the land portion of this landscape unit are: TS-29; 43; F-10; ST-39; Sk-(10).

Water bodies cover 18 per cent of the area, all of which constitute a portion of a large-size lake (Playgreen Lake).

The water bodies are deep and have irregular shorelines. Shore materials are mainly exposed bedrock and organic material, with minor inclusions of sand and clay.

Landscape Unit 11 (130 sq. mi.)

Very weakly broken area of peat plains with isolated rock outcrops. The peat plains are underlain mainly by lacustrine clay; clay till and bedrock occurring less frequently. Drainage of the land portion is mainly in a southerly direction.

The land portion of this landscape unit area comprises the following land systems: SBk-49; BkS; F-(10); Bz; BxS-(4); SF-(10).

Water bodies occupy 23 per cent of the area and are moderately large in size. These water bodies constitute a portion of a very large-size lake (Lake Winnipeg).

The water bodies are moderately deep to deep and have somewhat irregular shorelines. Shore materials include sand, organic matter, and exposed bedrock.

Landscape Unit 12 (60 sq. mi.)

Very weakly broken area of peat plains with exposed and submerged beach ridges underlain by lacustrine clay and clay till. Natural drainage of the land portion is in a south to southwesterly direction.

The land portion of this landscape unit area comprises the following land systems: BkS; Bz.

Water bodies occupy 60 per cent of the area

and are of moderately large size. These water bodies constitute a portion of a very large-size lake (Lake Winnipeg).

The water bodies are moderately deep to deep and have somewhat irregular shorelines. The shore material consists dominantly of sand with minor inclusions of exposed bedrock. An abrupt steep embankment of clay till overlain by organic material may be present in areas where the shore material is bedrock overlain by clay till.

Landscape Unit 13 (80 sq. mi.)

Very weakly broken area of peat plains and bedrock-controlled outcrops. The peat plains are mainly underlain by lacustrine clay. This material also coats the sides of the bedrock-controlled outcrops. A major stream -- the Gunisao River -- flows in a northwesterly direction; other surface water drainage being approximately perpendicular to this direction.

Land systems composing the land portion of the landscape unit are: FS-19; SF-(10); 19-S; FS-10; ST-20; S-10.

Lakes cover 15 per cent of the landscape unit area situated within the boundaries of the Outlet Lakes study area. Lakes of relatively small size occupy 15% of this portion of the landscape unit.

The lakes have regular to somewhat irregular shorelines and are shallow to moderately deep. Organic matter is the main shore material, exposed bedrock being of infrequent occurrence. The lakes are without open outlets, draining through bogs.

Landscape Unit 14 (90 sq. mi.)

Weakly to moderately broken area of peat plains, glacio-fluvial materials, and bedrock-controlled outcrops. The coarse-textured, water-modified, glacio-fluvial material is underlain chiefly by bedrock. The bedrock-controlled outcrops are composed mainly of exposed bedrock, having deposits of lacustrine clay on their lower sides. The peat plains are mainly underlain by lacustrine clay, which tends to be covered with a thin mantle of sand immediately adjacent to the ice-contact deposits. Natural land drainage is mainly in a westerly direction, whereas the major stream of the landscape unit area flows towards the north-west.

Land systems composing the land portion of this landscape unit are: 41; SF-(10); Sk-59; 59-S; TS-79; FS-24; 29-TS; TS-29.

Lakes cover 12 per cent of the area. Lakes of various size classes occupy the following proportion of the landscape unit:

Relatively small lakes: 10%

Small lakes: 2%

The lakes have regular to somewhat irregular shorelines and are shallow. Shore material is mainly organic matter with infrequent exposed bedrock. The lakes are without open outlets, draining through bogs.

Landscape Unit 15 (235 sq. mi.)

Moderately broken area of bedrock-controlled outcrops and peat plains. The bedrock-controlled outcrops consist of exposed bedrock and lacustrine clay overlying bedrock. Lacustrine clay generally underlies the peat plains. Natural drainage of the land portion of this landscape unit is in a

southwesterly direction.

Land systems composing the land portion of this landscape unit are: TS-79; F-(19); 79-S; SF-19; TS-29; 79-TS; 59-SF; 69-S; FS-69; FS-19; FS-(10); 59-S.

Water bodies cover 27 per cent of the area. Lakes of various size classes occupy the following proportion of the landscape unit:

Moderately large lake: 21% (Little Playgreen Lake)

Relatively small lake: 4%

Small lake: 2%

The moderately large lakes have irregular shorelines and are moderately deep. The shore material is mainly bedrock, exposed approximately 4 feet above the average lake level. Above this, the bedrock is overlain by lacustrine clay. The relatively small and small lakes have somewhat irregular shorelines and are shallow to moderately deep. Shore materials consist mainly of organic matter with minor inclusions of exposed bedrock. These lakes are without open outlets, draining through bogs.

Landscape Unit 16 (90 sq. mi.)

Weakly broken area of bedrock-controlled outcrops, modified glacio-fluvial deposits and peat plains. The bedrock controlled outcrops consist mainly of exposed bedrock, with lacustrine clay covering their lower sides. The sand-textured, water-modified, glacio-fluvial deposits are chiefly underlain by bedrock, whereas the peat plains are underlain mainly by lacustrine clay. Natural drainage of the land portion is in a southwesterly direction.

Land systems composing the land portion of this landscape unit are: 69-S; TS-69; 41; 29-FT; FS-69; FS-70; 69-TS.

Lakes cover 8 per cent of the landscape unit area situated within the boundaries of the Outlet Lakes Area. The various size classes of these lakes occupy the following proportion of the landscape unit:

Relatively small lakes: 7%

Small lakes: 1%

The lakes have somewhat irregular shorelines and are shallow to moderately deep. Shore materials consist mainly of organic matter and, less frequently, exposed bedrock. All lakes are without open outlets, draining through bogs.

Landscape Unit 17 (85 sq. mi.)

Weakly broken area of peat plains, and bedrock-controlled outcrops with infrequent glacio-fluvial deposits. Lacustrine clay mainly underlays the peat plains and also covers the sides of the bedrock-controlled outcrops. These outcrops contain a large proportion of exposed bedrock. Natural drainage of the land portion is mainly in a southerly direction.

Land systems composing the land portion of this landscape unit are: BkS; 79-S; TS-(49); SkF-29; BkS-(39); TS-29; 69-TS; SF-29; FS-30; BxS-29.

Lakes cover 6 per cent of the area. Lakes of various size classes occupy the following proportion of the landscape unit:

Relatively small lakes: 4%

Small lakes: 2%

The lakes have regular to somewhat irregular shorelines and are shallow. Organic matter is the principal shore material. The lakes are without open outlets, draining through bogs.

Landscape Unit 18 (2 sq. mi.)

Moderately broken area of bedrock-controlled outcrops and bouldery till. Peat deposits under-

lain by lacustrine clay occur in depressions. The bedrock-controlled outcrops consist mainly of exposed bedrock, lacustrine clay covering their lower sides. Natural land drainage is in a southwesterly direction.

Land systems composing the land portion of this landscape unit and situated within the boundaries of the Outlet Lakes study area are: SBx; TS-79; 41.

Lakes are absent within the confines of the Outlet Lakes study area.

Landscape Unit 19 (85 sq. mi.)

Weakly broken area of peat plains and coarse-textured, water-modified, glacio-fluvial deposits, containing infrequent bedrock-controlled outcrops. The peat plains and glacio-fluvial deposits are underlain chiefly by lacustrine clay and clay till. Natural drainage of the land portion is multi-directional, the major streams flowing in a north to northeasterly direction.

Land systems composing the land portion of this landscape unit are: 41; BkS-29; BkS-39; 79-ST; FBx; 80-S; 44; FS; TBk-49; F-(19); BkF; SBx.

Water covers 10 per cent of the landscape unit area situated within the boundaries of the Outlet Lakes study area. The various size classes of these lakes occupy the following proportion of the landscape unit:

Relatively small lakes: 9% (East Nelson River channel)

Small lakes: 1%

The lakes have somewhat irregular shorelines and are shallow to moderately deep. Organic matter and exposed bedrock are the principal shore materials. Some lakes are without open

outlets, draining through bogs.

Landscape Unit 20 (17 sq. mi.)

Weakly broken area of modified glacio-fluvial deposits, peat plains, and bedrock-controlled outcrops. The glacio-fluvial deposits have a coarse texture and are underlain by lacustrine clay and bedrock. Lacustrine clay underlays the greater part of the peat plains. The bedrock-controlled outcrops consist of exposed bedrock at their apex, with lacustrine clay covering the remainder. Natural drainage of the land portion is in a southwesterly direction.

Within the boundaries of the study area, land systems composing the land portion of this landscape unit are: 41; BkS-69; FS-69.

Water covers 17 per cent of the area, 16 per cent of which constitutes a portion of the East Nelson River channel.

All lakes have regular to somewhat irregular shorelines and are shallow. The shore material is mainly organic matter. All lakes are without open outlets, draining through bogs.

Landscape Unit 21 (110 sq. mi.)

Weakly to moderately broken area of bedrock-controlled outcrops with peat plains in the depressions. The bedrock-controlled outcrops consist mainly of exposed bedrock; lacustrine clay being of minor significance. The peat plains are mainly underlain by lacustrine clay.

Land systems composing the land portion of this landscape unit are: 79-T; 69-TS; BkF-29; 39-BkF; TkF-49.

Water covers 50 per cent of the area, nearly all of which constitutes a portion of a large-size lake (Playgreen Lake). The size classes

of the water bodies that occur in this landscape unit are 49 per cent moderately large and 1 per cent small.

The water body has an irregular shoreline and is moderately deep. Organic matter and exposed bedrock are the principal shore materials. The bedrock shore material is usually exposed approximately four feet above the average lake level, above which it is covered with lacustrine clay.

Landscape Unit 22 (115 sq. mi.)

Weakly broken area of bedrock-controlled outcrops and peat plains. The bedrock-controlled outcrops are comprised of exposed bedrock and laminated medium to coarse textured lacustrine deposits at the higher elevations, while lacustrine clay occurs at the lower elevations. The peat plains are mainly underlain by lacustrine clay.

Land systems composing the land portion of this landscape unit are: 49-FkT; Fk-49; F-49; 79-F; BkF-39; BkF-79; BkF-49; SkT-39; 79-Fk; 39.

Water covers 38 per cent of the area, the greater part of which constitutes a portion of large size lakes (Playgreen Lake, Kiskittogisu Lake). The various size classes of the water bodies occupy the following proportion of the landscape unit:

Moderately large lakes: 33%

Relatively small lakes: 4%

Small lakes: 1%

The water bodies have irregular to somewhat irregular shorelines and are mostly moderately deep. Exposed bedrock and organic matter are the principal shore materials. The bedrock shore material is exposed up to about four feet above

the average lake level, above which it is covered by unconsolidated geological deposits. The moderately large water bodies have an open outlet, while the relatively small ones drain through bogs.

Landscape Unit 23 (45 sq. mi.)

Weakly broken area of bedrock-controlled outcrops and peat plains. The bedrock-controlled outcrops consist chiefly of lacustrine clay with some exposed bedrock. The peat plains are mainly underlain by lacustrine clay. Natural drainage of the land portion is in a southwesterly direction.

Land systems composing the land portion of this landscape unit are: 79-FK; F-39; 49-FkT; Fk-49; 79-F.

Water covers 14 per cent of the area, some of which constitutes a portion of a large size lake (Kiskitto Lake). The various size classes of the water bodies occupy the following proportion of the landscape unit:

Moderately large lakes: 11 %

Relatively small lakes: 2%

Small lakes: 1%

The lakes have somewhat irregular shorelines and are moderately deep. Organic matter and exposed bedrock are the principal shore materials. Excepting Kiskitto Lake, all lakes lack an open outlet, but drain through bogs.

Landscape Unit 24 (135 sq. mi.)

Weakly broken area of peat plains, underlain by lacustrine clay, and bedrock-controlled outcrops. The bedrock-controlled outcrops are composed of exposed bedrock, laminated lacustrine deposits and lacustrine clay. Drainage of the land is partly in a northwesterly

and partly in a southeasterly direction.

Land systems composing the land portion of this landscape unit are: BxS; FkS; BkS-39; ST-49; SBx-49; F-39; 39-BkS; BkF-49; 79-BkF; 79; 79-T.

Water covers 8 per cent of the area, a portion of which belongs to a moderately large size lake (Hill Lake). Lakes of various size classes occupy the following proportion of the landscape unit:

Relatively small lakes: 7 %

Small lakes: 1 %

The lakes have somewhat irregular shorelines and are shallow to moderately deep. Laminated lacustrine and lacustrine clay deposits are the principal shoreline materials of Hill Lake. The shore material of the other lakes consists mainly of organic matter and exposed bedrock. The latter lakes are without open outlets, draining through bogs.

Landscape Unit 25 (205 sq. mi.)

Weakly broken area of peat plains, underlain by lacustrine clay, and bedrock-controlled outcrops. These outcrops consist chiefly of lacustrine clay with some exposed bedrock. Natural drainage of the land portion is mainly in a northeasterly direction.

Land systems composing the land portion of this landscape unit are: BkS-(39); 80-BkF.

Lakes cover 9 per cent of the landscape unit area. The various lake-size classes occupy the following proportion of the landscape unit:

Relatively small lakes: 6 %

Small lakes: 3 %

The lakes have regular to somewhat irregular shorelines and are shallow. Organic matter and exposed bedrock are the principal shore materials. Some lakes have an open outlet, but most lakes drain through bogs.

Landscape Unit 26 (120 sq. mi.)

Very weakly to weakly broken area of peat plains, underlain by lacustrine clay, and bedrock-controlled outcrops. These outcrops are composed of exposed bedrock and laminated lacustrine deposits at the higher elevations, while lacustrine clay covers the lower flanks. Natural drainage of the land portion is primarily in a southwesterly direction.

Land systems composing the land portion of this landscape unit are: BkS-(39); 29-FS; BxS-79; SF-(40); 40-FS; 39-ST.

Water covers 20 per cent of the landscape unit area. Lakes of various size classes occupy the following proportion of the lanscape unit:

Relatively small lakes: 14 %

Small lakes: 2%

The lakes have irregular shorelines and are shallow to moderately deep. Exposed bedrock and organic matter are the principal shore materials. Some lakes have open outlets but most small lakes drain through bogs.

Landscape Unit 27 (105 sq. mi.)

Moderately broken area of bedrock-controlled lacustrine clay deposits with peat plains in the depressions. Drainage of the land portion is in an easterly or westerly direction, whereas the surface waters (Black Duck Creek) drain towards the north.

Land systems composing the land portion of this landscape unit are: 79-FkS; 39; SFk; S-79; 79-BkF; 79-ST; 89-FkT; FkT-89.

Water covers 13 per cent of the area.

Lakes of various size classes occupy the following proportion of the landscape unit:

Relatively small lakes: 11 %

Small lakes: 2 %

The lakes have somewhat irregular shorelines and are shallow. Organic matter and exposed bedrock are the principal shore materials. All lakes, except the relatively small Drunken Lake, lack an open outlet, draining through bogs.

Landscape Unit 28 (100 sq. mi.)

Weakly to moderately broken area of bedrock-controlled lacustrine clay and peat plains underlain by lacustrine clay. Drainage of the land portion is in a northeasterly direction.

Land systems composing the land portion of this landscape unit are: 79-Tk; FS-49; SkT-39; BxF; BkF; SBx-39; BxF-79; BxF-39.

Lakes cover 15 per cent of the area. Lakes of various size classes occupy the following proportion of the landscape unit:

Relatively small lakes: 10 %

Small lakes: 5 %

The lakes have regular to somewhat irregular shorelines and are shallow to moderately deep. Organic matter is the main shore material. All lakes are without open outlets, draining through bogs.

Landscape Unit 29 (125 sq. mi.)

Weakly to moderately broken area of bedrock-controlled lacustrine clay and peat plains underlain by lacustrine clay. Natural drainage of the land portion is in a northeasterly direction, which is similar to the drainage direction of the surface waters (West Nelson River).

Land systems composing the land portion of this landscape unit are: 79-FT; 79-F, SkT-89; 79-SkT; BxF-89; TkF-40; 79-T.

Water covers 39 per cent of the area, part of which belong to large size lakes (Kiskittogisu Lake, Playgreen Lake). Lakes of various size classes occupy the following proportion of the landscape unit:

Moderately large lakes: 25 %

Relatively small lakes: 13 %

Small Lakes: 1 %

The lakes have irregular to somewhat irregular shorelines and are shallow to moderately deep. Organic matter and exposed bedrock are the principal shore materials. All lakes, except the small ones, have open outlets.

Landscape Unit 30 (80 sq. mi.)

Weakly broken area of clay till and peat plains underlain by lacustrine clay. Sandy beach overlays of varying thickness are associated with the clay till material. Natural drainage of the land portion is in a north-easterly direction; the clay till moraine acting as a drainage barrier.

Land systems composing the land portion of this landscape unit are: BxF-40; 90; 39-Fk; BxF-39; BkS-40; 49-Sk; BkF-39; 40-T; 79-Sk; 80-BkF; 79-BkF.

Lakes occupy 9 per cent of the landscape unit area. Seven per cent of these lakes are relatively small; the remaining two per cent being small in size.

The lakes have somewhat irregular shore-lines and are shallow to moderately deep. Organic matter is the main shore material, exposed bedrock being of lesser significance. All lakes are without open outlets, draining through bogs.

Landscape Unit 31 (70 sq. mi.)

Weakly to moderately broken area of clay till and bedrock-controlled outcrops of lacustrine clay. Peat plains occur in the depressions and are most prominent immediately adjacent to the till moraine. The clay till moraine is overlain in places by coarse-textured beach deposits of varying thickness. Natural drainage of the land portion is in south-westerly and northeasterly directions from the morainal high.

Land systems composing the land portion of this landscape unit are: 79-T; BxS-49; SkT-39; BkS; 90; 41; TBx-89; 90-T; SBk.

Water bodies occupy 19 per cent of the landscape unit area. All lakes are small in size, although a portion of these water bodies constitute a part of a large size lake (Playgreen Lake).

The lakes have regular to somewhat irregular shorelines and are shallow to moderately deep. Organic matter is the main shore material. Most lakes are without open outlets, draining through bogs.

Landscape Unit 32 (70 sq.mi.)

Very weakly broken area of clay till and peat plains underlain by lacustrine clay. The clay till moraine is overlain by coarse-textured beach deposits of varying thickness. Natural drainage of the land portion is in south-westerly and northeasterly directions from the morainal high. The peat plains are most prominent immediately adjacent to the till moraine.

Land systems composing the land portion of this landscape unit are: BkF-19; BkT-89;

BkF; F-(19); 50; SBx; SF; BkF-29.

Lakes occupy 6 per cent of the landscape unit area and are all small in size.

The lakes have regular shorelines and are shallow to moderately deep. Organic matter is the main shore material. All lakes are without open outlets, draining through bogs.

Landscape Unit 33 (45 sq. mi.)

Weakly broken area of bedrock-controlled lacustrine clay outcrops with peat plains in the depressions. The peat plains are primarily underlain by lacustrine clay. Land-drainage is multi-directional while surface waters (East Nelson River) drain in a northerly direction.

Land systems composing the land portion of this landscape unit are: 59-SF; 41; FS-(19); 69-S; 79-TS; 79-S; FS-69.

Water covers 23 per cent of this landscape unit area, the lesser portion of which constituting lakes. These lakes are all small in size and occupy 3 per cent of this landscape unit.

The lakes have somewhat irregular shorelines and are shallow to moderately deep. Organic matter is the main shore material, exposed bedrock being of lesser importance. All lakes are without open outlets, draining through bogs.

Landscape Unit 34 (230 sq. mi.)

Moderately broken area of bedrock-controlled, lacustrine clay outcrops with peat plains in the depressions. The peat plains are mainly underlain by lacustrine

clay. Land as well as surface water drainage is in a northeasterly direction.

Land systems composing the land portion of this landscape unit are: SkT-39; 79-T; 79-FBk; BkT-89; 89-SkT; SBk; 79-Bk$; 79-ST; SFk-89.

Water covers 30 per cent of this landscape unit area; the lesser portion constituting surface water drainage (East Nelson River channels). Lakes of various size classes occupy the following proportion of this landscape unit:

Moderately large lakes: 22 % (Pipestone Lake, Cross Lake, in part)
Relatively small lakes: 6 %
Small lakes: 2 %

The lakes have irregular shorelines and the large ones are moderately deep; the small lakes being shallow to moderately deep. The shore materials of the large size lakes consist primarily of exposed bedrock with some clay and organic matter. The small lakes have dominantly organic shore material. The large-size lakes have open outlets whereas the small ones drain through bogs.

Landscape Unit 35 (100 sq. mi.)

Weakly broken area of bedrock-controlled, lacustrine clay outcrops, and peat plains underlain by lacustrine clay. Natural drainage of the land surface is in a north-easterly direction.

Land systems composing the land portion of this landscape unit are: 79-TF; BkF-29; F-29; 29-FS; 80-TF; TF-79.

Lakes cover 20 per cent of the landscape unit area situated within the boundaries of

the Outlet Lakes study area. The various size classes of these lakes occupy the following proportion of the landscape unit:

Relatively small lakes: 10 %

Small lakes: 10 %

The lakes have somewhat irregular shorelines and are shallow to moderately deep. Organic matter and exposed bedrock are the principal shore materials. All lakes within the boundaries of the Outlet Lakes study area are without open outlets, draining through bogs.

Landscape Unit 36 (245 sq. mi.)

Weakly to moderately broken area of lacustrine clay plains with occasional occurrences of exposed bedrock. Peat plains occur in the depressions and also overlay large areas of the lacustrine plains. Natural drainage of the land portion is multi-directional, whereas surface water drainage (Nelson River) is in northeasterly and westerly directions.

Land systems composing the land portion of this landscape unit are: 79-Sk; 79; BkF-79; BkS-79; TSk-49; BkF-39; 79-T; 79-BkF; BkF-49; 49-T; 90; 79-TF.

Water covers 39 per cent of the landscape unit area situated within the boundaries of the Outlet Lakes study area. The various size classes of the lakes occupy the following proportion of the landscape unit:

Large lakes: 36 % (Cross Lake, in part)

Small Lakes: 3 %

The large lakes have irregular shorelines and are deep; whereas the small ones have regular shorelines and are shallow. Exposed

bedrock is the principal shore material of the large lakes; however, lacustrine clay is normally found within about four feet above the average lake level. The small lakes normally have organic matter as shore material. The large lakes have open outlets while the small ones drain through bogs.

APPENDIX II

SITE, VEGETATION, AND SOIL CONDITIONS

LIST OF ABBREVIATIONS

1. Descriptive Data

Colour: Munsell Soil Colour Charts (1954)[1] were used as a guide in describing the colours of the soils.

Horizon Boundary

Distinctness: d-diffuse, g-gradual, c-clear, a-abrupt

Form: s-smooth, w-wavy, i-irregular, b-broken

Texture: S-sand, Sl-silt, C-clay, L-loam, Gr-gravel, P-peaty, C-coarse, M-medium, F-fine, VF-very fine

Soil Structure

Grade:	structureless	0
	weak	1
	moderate	2
	strong	3
Class:	very fine	VF
	fine	F
	fine to medium	FM
	medium	M
	medium to coarse	MC
	coarse	C
	very coarse	VC
Kind:	platy	PL
	prismatic	PR
	columnar	COL
	angular blocky	ABK
	blocky	BK
	subangular blocky	SBK
	massive	MA
	single grain	SGR

[1] Munsell Colour Company Inc., Baltimore, USA.

Vegetation

Code	Common Name	Scientific Name
jP	jack pine	Pinus banksiana
wB	white birch	Betula papyrifera
wS	white spruce	Picea glauca
bS	black spruce	Picea mariana
tL	tamarack	Larix laricina
bF	balsam fir	Abies balsamefera
tA	trembling aspen	Populus tremuloides
bPo	balsam poplar	Populus balsamea

Understory

Scientific Name	Common Name
Alnus crispa	Green alder
Salix spp.	Willow
Betula papyrifera	White birch
Betula borealis	Northern birch
Betula glandulosa	Dwarf birch

2. Analytical Soil Data

pH - Hydrogen iron concentration

Conduct. - Conductivity

$CaCO_3$ Equiv. - $CaCO_3$ equivalent

Org. C - Organic carbon

N - Total Nitrogen

C.E.C. - Cation exchange capacity

Ca - Calcium

Mg - Magnesium

K - Potassium

Na - Sodium

Exch. Acid. - Exchange acidity (H+Al)

$NaHCO_3$ solu. P - Sodium-bicarbonate soluable phosphorus

G - Gravel; material >2 mm diameter; per cent of total sample

S - Sand; size range: <2 mm - 0.05 mm diameter; per cent of comminutable sample

Si	- Silt; size range: 50 μ - 2 μ diameter; per cent of comminutable sample
C	- Clay; size range: <2 μ diameter; per cent of comminutable sample
S.P.	- Suspension percentage
D.R.	- Dispersion ratio
Fiber, unrub.	- Fiber, unrubbed
Pyrophos. %A	- Sodium pyrophosphate solubility, per cent absorbance
Liquid Lim	- Liquid limit
Plastic Lim	- Plastic Limit
Shrinkage, sat.	- Saturation percentage

Site Number: T1

Date: 12th August '72

N.T.S. Map Sheet: Sipiwesk

Location: (32-78-3 W.)

Landform: Lacustrine Plain

Aspect:

Slope: 4%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series: Pipun

Soil Profile: # 1

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	1-0	as			10YR2/2	litter
Ae	0-4	gs	sic	10YR6/2	10YR5/3	PL
Btnj	4-10	di	c	10YR6/3	10YR4/3	3COL
Bt	10-19	db	c	10YR4/3	10YR3/4	clay coating
BC	10-23	db	c	10YR5/3	10YR4/3	
Ckg	23+		SIL	10YR5/3	10YR4/3	

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP,tA,bS	4/70 1/5 1/5
Ground	Ledum groen.	1/
	Vaccinium v.i.	5/
	Linnaea bor.	2/
	Equisetum syl.	2/
	Cladonia rang.	3/
	Pleurozium schr.	4/
	Fragaria vesca	1/

Tree Cover : jP, tA, bS
Species comp.(%): 85 5-10 5-10
Crown closure(%): 80 (+ open spots)
Cutting class : 2-3
Age Distribution: even
History, etc. : fire, climax will be bS
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jP	38	43	4.3	dom.
jP	41	45	5.0	
tA	37	-	4.1	
bS	26	57	4.5	av/dom

SITE NUMBER: T1 SUBGROUP: Orthic Gray Luvisol

PROFILE NUMBER: 1 SERIES: Pipun

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	1-0															
Ae	0-4	4.9	0.2				1.8	0.1	20.3	19.9	45.2	15.6	0.7	0.3	24.4	
Btnj	4-10	5.1	0.1				0.8	0.1	11.3	28.5	69.9	18.6	0.5	0.5	13.4	
Bt	10-19	6.0	0.1				0.8	0.1	10.9	32.0	78.3	16.1	0.5	0.5	8.8	
BC	19-23	7.5	0.4	17.4	17		0.4	0.0	9.8	22.3						
Ckg	23+	7.6	0.2	21.4	21					18.1						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	1-0																				
Ae	0-4			5	44	52	1.08	1.21	2.0	2.1											
Btnj	4-10			1	17	82	1.60	1.66	5.5	5.6											
Bt	10-19			2	7	91	1.65	1.65	2.5	2.5											
BC	19-23			1	40	59	1.45	1.49	15.4	15.5											
Ckg	23+			13	73	13	1.63	1.66	11.0	12.7											

Site Number: T 2

Date: 12th August '72

N.T.S. Map Sheet: Nelson House

Location:

Landform: Drumlinized Terrain

Aspect: NNW

Slope: 3%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	4-0					Moss
Ahe	0-2					
Ae	2-6					Shotty
Btnj	6-12					C1COL
Bt	12-21					
BCk	21-23					
Ckz	23+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, wB	4/5 1/
Understory	Alnus spp.	3/
	Cornus can.	3/
	Fragaria vir.	2/
	Rosa acic.	2/
	Linnaea bor.	3/
	Vaccinium v.i.	4/
	Vaccinium ang.	2/
	Hypnum c.c.	1/
	Pleurozium sch.	1/
	Dicranum spp.	2/
	Pohlia spp.	2/

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 60-80
Cutting class : 3-4
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	50	80	6.0	
bS	54	85	7.8	

Site Number: T3

Date: 13th August '72

N.T.S. Map Sheet: Nelson House

Location: 29-79-5 W

Landform: Lacustrine Plain

Aspect:

Slope: Nil

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Rego Gleysol

Soil Series: Button

Soil Profile: # 2

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
OF	9-0	as				litter
Ah	0-2	cw	C	10YR5/4	5Y2.5/1	
Ckg1	2-18	cw	SIL	10YR6/4	10YR4/4	
Ckg2	18+		C	10YR5/3	10YR5/4	

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	3/40
Understory	Betula gland.	2/
	Salix spp.	2/
Ground	Ledum groen.	2/
	Vaccinium ang.	
	Vaccinium oxy.	2/
	Equisetum syl.	2/
	Fragaria vesca	) 2/
	Fragaria virg.	)
	Cladonia rang.	2/
	Dicranum fus.	2/
	Epilobium ang.	
	Achillea spp.	2/

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 10-40
Cutting class : 2
Age Distribution: uneven
History, etc. : climax after fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	15	40	2.5	
bS	35	46	3.5	dom.

SITE NUMBER: T3 SUBGROUP: Rego Gleysol, Peaty Phase

PROFILE NUMBER: 2 SERIES: Button

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
O-F	9-0	6.7	.3				45.1	1.4	32.7	172.6	84.1	19.5	0.1	1.4	3.7	
Ahg	0-2	7.2	.2	14.3	5	8.8	3.0	.1	29.6	19.1						
Ckg1	2-18	7.7	.2	25.1	6	17.2				6.4						
Ckg2	18+	7.6	.2	16.5	4	11.9				13.0						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
O-F	9-0																				
Ahg	0-2			2	35	63									30	25	5	36	24	1.7	3.36
Ckg1	2-18			10	72	18									22	18	4	29	18	1.9	3.86
Ckg2	18+			5	8	87									35	21	14	42	18	1.8	8.87

Site Number: T4

Date: 13th August '72

N.T.S. Map Sheet: Nelson House

Location: 6-80-7 W

Landform: Lacustrine Plain

Aspect:

Slope:

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series: Pipun

Soil Profile: # 3

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-F	1-0	a				litter
Ae	0-4	cs	C	10YR8/2	10YR3/3	Shotty
Bt1	4-9	gw	C	10YR6/3	10YR4/3	M BKY
Bt2	9-14	as	C	10YR6/3	10YR4/3	F SBK
BC	14-22	gw	C	10YR7/3	10YR5/3	F SBK
C	22+		SIL	10YR8/3	10YR5/4	

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP, bS	4/ 6/8 3/48 3/32
Understory	Alnus crispa	4/
Ground	Ledum groen.	1/
	Cornus can.	2/
	Fragaria vesca	) 4/
	Fragaria virg.	)
	Linnea bor.	2/

Tree Cover : jP bS
Species comp.(%): 40 60
Crown closure(%): 50-80 (open spots)
Cutting class : 2-3
Age Distribution: uneven
History, etc. : intermediate after fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jp	35	36	4.5	av.

SITE NUMBER: T4 SUBGROUP: Orthic Gray Luvisol

PROFILE NUMBER: 3 SERIES: Pipun

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P.
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	1-0															
Ae	0-4	5.6	.2				3.9	0.2	21.4	31.4	73.6	16.9	0.4	0.3	20.2	
Bt1	4-9	6.3	.2				1.4	0.1	13.8	44.9	61.4	17.7	0.4	0.3	8.2	
Bt2	9-14	6.8	.5				0.8	0.1	10.7	33.0	88.2	23.1	0.5	0.5	5.4	
BC	14-22	7.6	.2	12.0	12		0.4	0.1	7.6	25.3						
C	22+	7.7	.3	24.5	25					15.6						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	1-0																				
Ae	0-4			7	19	75									57	39	18	72	27	1.5	12.47
Bt1	4-9			2	8	91	1.65	1.60	3.7	3.7					59	35	23	64	20	1.8	15.46
Bt2	9-14			1	7	92	1.44	1.47	3.3	3.3					60	34	26	70	21	1.8	16.34
BC	14-22			2	21	77	1.50	1.58	6.7	6.8					54	32	21	61	21	1.8	13.56
C	22+			10	63	27	1.60	1.67	26.9	29.9					40	23	16	47	20	1.8	10.36

Site Number: T4b

Date: 13th August '72

N.T.S. Map Sheet: Nelson House

Location: 24-79-5 W

Landform: Lacustrine Plain

Aspect:

Slope: Nil

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Peaty Rego Gleysol

Soil Series: Button

Soil Profile: # 5

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
Of	12-0	as				Sphag
Ah	0-3	as	SIL	10YR65/3	10YR3/2	M3GR
Ckg	3+		SICL	10YR45/2	10YR5/4	

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	4/
Understory	Salix spp.	2/
	Alnus spp.	2/
Ground	Sphagnum spp.	2/

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: T4b
PROFILE NUMBER: 5

SUBGROUP: Rego Gleysol, Peaty Phase
SERIES: Button

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
Of	12-0	6.4					53.7	1.2	46.7	116.8	70.5	16.0	2.7	.2	9.7	
Ahg	0-3	7.0	.4	4.8	2	3.0	6.1	.3	22.4	42.9						
Ckg	3+	7.6	.3	24.1	11	11.7				12.6						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES			PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
Of	12-0										98	48	.04	8							
Ahg	0-3			3	71	26	1.36	1.52	9.0	9.3											
Ckg	3+			4	65	31	1.68	1.72	6.5	6.7											

Site Number: T5

Date: 14th August '72

N.T.S. Map Sheet: Nelson House

Location: 11-80-6 W

Landform: Esker-Kame Complex

Aspect:

Slope: Nil

Parent Material: Glacio-fluvial

Climatic Zone: 3

Soil Subgroup: Degraded Dystric Brunisol

Soil Series: Clarke

Soil Profile: # 4

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	1-0					litter
Ae	0-3	cw	GrS	7.5YR7/2	7.5YR6/2	
Bm1	3-11	gs	GrS	10YR6/4	7.5YR5/6	
Bm2	11-26	gs	GrS	10YR6/4	10YR6/6	
BC	26-36	gs	GrS		10YR6/2	
C1	36-48	gs	GrS		10YR5/3	
C2	48+	as	SGr.		10YR5/3	

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP	3/40
Understory	Betula papinefora	3/
	Alnus crispa	3/
Ground	Epilobium ang.	2/
	Pleuronium schr.	2/
	Vaccinium myr.	3/
	Vaccinium v.i.	4/
	Arctostaphylos spp.	2/
	Cladonia rang.	1/

Tree Cover : jp
Species comp.(%): 100
Crown closure(%): 40-30
Cutting class : 4
Age Distribution: even
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jP	49	200	7	av.

SITE NUMBER: T5 SUBGROUP: Degraded Dystric Brunisol

PROFILE NUMBER: 4 SERIES: Clarke

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	1-0															
Ae	0-3	4.6	.2				.4	.0	38.0	2.5	9.8	10.6	.4	14.6	28.7	
Bm1	3-11	5.1	.1				.1	.0	10.0	1.6		15.6	.6	.6	99.9	
Bm2	11-26	6.1	.1				.1	.0	15.0	1.2		27.1	.8	.8	15.6	
BC	26-36	5.8	.1				.0	.0	6.7	1.2		33.6	.8	.8	13.9	
C1	36-48	7.0	.2	.2						.6						
C2	48+	7.7	.2	5.3	5.0					.8						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES			PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%		
L-H	1-0																			
Ae	0-3	9	1/8	96	4	0														
Bm1	3-11	5	1/8	99	1	0														
Bm2	11-26	4	1/8	100	0	0														
BC	26-36	11	3/16	100	0	0														
C1	36-48	1	1/8	100	0	0														
C2	48+	61	1/2	99	1	0														

Site Number: T 6

Date: 14th August '72

N.T.S. Map Sheet: Nelson House

Location:

Landform: Lacustrine Plain

Aspect:

Slope: Nil

Parent Material: Organic/Lacustrine

Climatic Zone: 3

Soil Subgroup: Gleysol, Peaty Phase

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/75
Understory	Salix spp.	3/
	Betula gland.	2/
Ground	Ledum groen.	2/
	Sphagnum spp.	3/
	Vaccinium oxy.	2/
	Cornus can.	2/
	Fragaria spp.	2/

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 50-80
Cutting class : 2
Age Distribution: even
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	13.5	70	5	

Site Number: T7a

Date: 15th August '72

N.T.S. Map Sheet: Nelson House

Location:

Landform: Drumlinoidal terrain

Aspect:

Slope:

Parent Material: Bedrock outcrop

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	
Understory	Pinus banksiana	
Ground	Peltigera aph.	2/
	Cladonia rang.	3/
	Pohlia nut.	3/
	Rubus spp.	1/
	Vaccinium myt.	1/
	Potentilla tri.	1/

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: T 7b

Date: 15th August '72

N.T.S. Map Sheet: Nelson House

Location:

Landform: Drumlinoidal terrain

Aspect:

Slope:

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	

Vegetation:

Stratification		Species	Dom/Cover
Tree		jP, tA, wB	
Understory		Alnus crispa	
Ground	A.	Pohlia nut.	4/
		Cladonia rang.	2/
		Epilobium ang.	2/
		Fragaria spp.	2/
		Rubus spp.	2/
	B.	Epilobium ang.	3/
		Pohlia nut.	2/
		Cladonia rang.	2/
		Linnaea bor.	2/
		Rosa spp.	2/
		Ledum groen.	1/

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: T7c

Date: 15th August '72

N.T.S. Map Sheet: Nelson House

Location:

Landform: Lacustrine Plain

Aspect:

Slope:

Parent Material: Organic/Lacustrine

Climatic Zone: 3

Soil Subgroup: Gleysol, Peaty phase

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
Of	12-0					
IIC	0-6+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, tA	
Ground	Sphagnum spp.	3/
	Pleurozium sch.	3/
	Cladonia rang.	2/
	Vaccinium oxy.	2/
	Fragaria spp.	2/
	Cornus can.	1/
	Equisetum syl.	1/
	Ledum groen.	3/

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: T8

Date: 15th August '72

N.T.S. Map Sheet: Sipiwesk

Location: Burntwood River

Landform:

Aspect: SE

Slope: 30-40 %

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series: Sipiwesk

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	

Vegetation:

Stratification	Species	Dom/Cover
Tree	wS, wB, tA	
Understory	Alnus crispa	
	Salix spp.	
Ground	Cornus stol.	
	Juniperus com.	
	Mentha arv.	
	Vaccinium spp.	4/
	Fragaria spp.	

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: T9

Date: 16th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 18-79-2W

Landform: Drumlinized Terrain

Aspect: N

Slope: 60%

Parent Material: Lacustrine/Till/Rock

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series: Apussigamasi

Soil Profile: # 6

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-F	8-4	cs				litter
F	4-0	as				litter
Ae	0-3	as	GrCL	10YR7/3	10YR4/3	C2PL
AB	3-8	cs	GrC	10YR7/3	10YR4/4	M3SBK
Bt	8-13	cs	Sc	7.5YR5/4	7.5YR4/4	M3SBK
BC	13-16	as	GrSCL	10YR6/3	10YR4.5/5	M1SBK
IICca	16-19	cs	GrL	10YR7/2	10YR6/3	M2GR
IICk	10-24+		GrSL	10YR7/2	2.5Y6/2	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS,jP,wB	4/64 2/8 2/8
Understory	Alnus crispa	3/
Ground A	Cornus can.	
	Pleurozium schr.	4/
	Vaccinium v.i.	2/
	Dicranum spp.	3/
	Lycopodium luc.	
	Lycopodium ann.	
Ground B	Cladonia alp.	4/
	Linnea bor.	4/
	Viburnum edule	2/
	Ledum groen.	1/
	Fragaria ves.	1/

Tree Cover : bS, jP, wB
Species comp.(%): 80 10 10
Crown closure(%): 80-40
Cutting class : 3-4
Age Distribution: uneven aged
History, etc. : Climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	45	65	6.1	dom.
bS		53	4.6	cod.

SITE NUMBER: T9 SUBGROUP: Orthic Gray Luvisol

PROFILE NUMBER: 6 SERIES: Apussigamasi

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	8-4	2.7					57.7	1.5	37.4	94.3	8.0	8.0	3.7	.1	80.0	
F	4-0	2.7					52.5	1.2	44.1	117.9	1.1	14.8	2.1	.1	78.6	
Ae	0-3	5.2	.3				1.8	.1	25.0	16.5	31.2	49.2	0.1	.1	25.7	
AB	3-8	6.0	.2				1.1	.1	16.3	21.2	48.6	55.1	1.6	.2	10.6	
Bt	8-13	6.9	.2				.6	.0	15.0	21.3	52.7	53.9	1.3	.3	4.6	
BC	13-16	7.3	.4	.9			.4	.0	13.0	12.0						
IICca	16-19	7.7	.3	14.4	13	1.4				6.4						
IICk	19-24	7.8	.3	10.8	9	1.7				5.2						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES			PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
L-F	8-4										72	6	.02	5							
F	4-0										84	10	.14	7							
Ae	0-3	7	1/8	43	29	28	1.38	1.40	6.8	11.9					26	18	9	42	17	1.8	5.52
AB	3-8	8	1/4	25	23	51	1.54	1.54	3.4	4.5					38	21	17	40	15	1.8	8.70
Bt	8-13	2	1/4	51	13	36	1.56	1.65	3.5	7.1					32	20	12	33	15	1.9	7.43
BC	13-16	21	1/4	61	19	21	1.84	1.71	6.2	15.7					23	14	8	25	13	1.9	4.10
IICca	16-19	40	1/4	49	36	15	1.29	1.35	5.4	10.5					23	16	6	28	16	1.8	4.11
IICk	19-24	23	1/4	53	34	13	1.99	2.04	4.0	8.5					19	13	5	24	15	1.9	3.37

Site Number: T10

Date: 16th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 6-79-2 W

Landform: Drumlinized Terrain

Aspect:

Slope: 70%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Orthic Eutric Brunisol

Soil Series: Mystery

Soil Profile: # 7

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
F-H	1-0	as				litter
Bm	0-1	as	SIL	10YR6/3	10YR4/3	M2PL
BC	1-3	as	SIC	10YR7/3	10YR5/3	M2GR
Ck1	3-5	aw	SIL	10YR8/3	10YR6/3	A
Ck2	5-5½	as	C			A
Ck3	5½	as	SI			A
Ck10	12-12½		SIC	10YR7/2	10YR3/3	A
Ck11	12½-15½		SI	10YR8/3	10YR6/3	A
Ck12	15½-16		SIC	10YR7/2	10YR3/3	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	wS,bS,wB	2/8 2/24 2/8
Understory	Alnus spp.	
Ground	Cladonia spp.	3/
	Pleurozium spp.	3/
	Linnaea bor.	3/
	Rosa spp.	2/
	Cornus can.	2/
	Shepherdia can.	2/
	Viburnum spp.	1/
	Juniperus spp.	1/

Tree Cover : wS, bS, wB
Species comp.(%): 20 60 20
Crown closure(%): open
Cutting class :
Age Distribution: uneven
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: T10 SUBGROUP: Orthic Eutric Brunisol

PROFILE NUMBER: 7 SERIES: Mystery

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	1-0	5.7	.5				46.9	1.3	37.2	107.5	78.0	11.0	1.1	0.1	17.9	
Bm	0-1	7.3	.5	20.2	11	8.5	6.4	.3	25.5	36.7						
BC	1-3	7.4	.4	27.5	28		3.6	.2	23.9	29.0						
Ck1	3-5	7.7	.3	42.1	27	13.5				6.7						
Ck10	12-12½	7.8		26.2	16	9.6				20.1						
Ck11	12½-15½	7.8	.3	39.3	11	25.8				3.1						
Ck12	15½-16	N/S														

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	1-0																				
Bm	0-1			5	67	27									59	39	20	77	37	1.2	8.11
BC	1-3			2	53	45	.91	.99	2.8	2.9					49	32	17	57	24	1.5	9.44
Ck1	3-5			2	83	15	1.53	1.54	4.8	4.9					25	19	6	36	22	1.7	3.86
Ck10	12-12½			2	43	55	1.58	1.60	4.6	4.7					50	30	21	53	19	1.8	11.48
Ck11	12½-15½			2	91	6	1.75	1.99	46.7	47.6					20	18	2	29	19	1.8	1.92
Ck12	15½-16			3	41	56															

Site Number: T11

Date: 16th August '72

N.T.S. Map Sheet:

Location: 36-78-3 W

Landform: Alluvial Terrace

Aspect:

Slope: Nil

Parent Material: Alluvium

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series: Pipun

Soil Profile: # 8

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
F-H						litter
Ae	0-3	aw	SICL	10YR7/3	10YR3/2	C1PL
Bt	3-10	as	SIC	10YR6/3	10YR3/3	C1SBK
Ck1	10-15	as	SICL	10YR8/3	10YR5/4	A
Ck2	15-17	as	SIC	10YR7/4	10YR4/4	A
Ck3	17-21	as	SIC	10YR7/4	10YR5/3	A
Ck4	21+		SIC	10YR7/4	10YR4/4	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	tA, bPo	4/60 3/40
Understory	Salix spp..	1/
Ground	Alnus spp.	2/
	Ledum groen.	2/
	Rosa spp.	2/
	Mosses	1/

Tree Cover : tA, bPo
Species comp.(%): 60-40
Crown closure(%): 100-70
Cutting class : 1-4
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
tA	45	45	6.1	cod.
tA	47	50	6.1	dom.

SITE NUMBER: T11 SUBGROUP: Orthic Gray Luvisol

PROFILE NUMBER: 8 SERIES: Pipun

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
F-H		5.3					42.0	1.6	26.1	105.7	56.8	18.2	3.0	0.1	22.2	
Ae	0-3	5.8	.2				1.5	.9	1.8	21.4	48.1	41.3	.8	0.2	13.6	
Bt	3-10	6.6	.3				1.2	.1	23.0	22.2	73.2	34.6	1.4	1.0	6.2	
Ck1	10-15	7.7	.3	33.2	20	11.9				13.2						
Ck2	15-17	7.7	.3	21.3	12	8.4				16.2						
Ck3	17-21	7.8	.3	29.0	15	13.0				13.3						
Ck4	21+	7.8	.3	21.9	22					16.4						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
F-H											70	10	.67	31							
Ae	0-3			3	62	35	1.60	1.57	5.4	5.5											
Bt	3-10			4	49	47		1.54	2.0	2.1											
Ck1	10-15			2	64	34	1.65	1.68	9.6	9.8											
Ck2	15-17			3	52	45	1.50	1.54	15.8	16.3											
Ck3	17-21			1	58	41	1.38	1.74	15.5	15.7											
Ck4	21+			0	47	53	1.45	1.51	20.5	20.5											

Site Number: T12

Date: 17th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 15-78-3W

Landform: Lacustrine Terrain

Aspect:

Slope: Nil

Parent Material: Collovium/Lacustrine

Climatic Zone: 3

Soil Subgroup: Gleyed Solodic Gray Luvisol

Soil Series: Mulchay

Soil Profile: # 9

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H1	5-3	as				litter
L-H2	3-0	as				litter
Bm	0-5	as	C	10YR3/3	7.5YR3/2	M2GR
IIAe	5-12	gd	C	10YR5/1	10YR3/2	C3COL
IIBA	12-17	as	C	10YR5/2	7.5YR3/2	VCCOL
IIBtnj	17-20	aw	C	10YR6/3	10YR4/3	CBK
IIBt	20-24	cs	C	10YR5/3	7.5YR4/4	M2GR
IICk	24+		C	10YR6/4	10YR4/4	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, bPo, tA	4/81 1/4 1/4
Understory	Salix spp.	2/
Ground	Ledum groen.	2/
	Vaccinium v.i.	
	Linnaea bor.	1/
	Orchis rot.	1/
	Hylocomium spp.	4/
	Dicranum spp.	4/
	Petasites pal.	4/
	Mitella nuda	3/
	Rosa spp.	2/

Tree Cover : bS, bPo, tA
Species comp.(%): 90 5 5
Crown closure(%): 80-90
Cutting class : 3-4
Age Distribution: uneven
History, etc. : climax after fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	40	70	4.5	dom.
bS	41	85	4.5	dom.
tA	41	60	5.9	dom.

SITE NUMBER: T12 SUBGROUP: Gleyed Cryic Solodic Gray Luvisol

PROFILE NUMBER: 9 SERIES: Mulchay

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H1	5-3	6.5					53.7	1.2	45.5	112.0	62.5	13.3	3.2	0.3	17.5	
L-H2	3-0	6.2					33.4	0.7	45.1	70.3	79.9	11.1	5.0	0.2	3.5	
Bm	0-5	5.7	0.5				15.3	0.9	17.6	66.1	48.1	31.3	1.1	1.3	20.0	
IIAe	5-12	6.1	0.3				5.5	0.4	14.4	42.9	15.4	69.5	1.2	1.0	16.8	
IIBA	12-17	6.1	0.4				3.1	0.2	14.5	35.7	47.9	45.9	1.5	1.5	9.8	
IIBtnj	17-20	7.1	0.3	0.5			0.7	0.1	9.3	29.2						
IIBt	20-24	7.4	0.3	0.3			0.3	0.1	5.6	30.5						
IICk	24+	7.8	0.3	6.1	6					28.1						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H1	5-3										90	12	0.14	10							
L-H2	3-0										88	26	0.10	40							
Bm	0-5			4	22	74	0.56	0.93	2.8	2.9								133	39	1.1	16.91
IIAe	5-12			5	26	69	1.12	1.54	9.5	10.0					52	38	13	57	22	1.5	9.35
IIBA	12-17			4	21	74									49	31	18	51	22	1.7	9.64
IIBtnj	17-20			4	21	75	1.54	1.56	15.3	15.9					48	27	21	17	19	1.8	10.87
IIBt	20-24			0	8	92	1.43	1.44	7.6	7.6					60	31	29	62	21	1.8	14.42
IICk	24+			1	13	86	1.54	1.55	11.4	11.4					53	32	21	64	18	1.8	14.56

Site Number: T13

Date: 16th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 29-78-3 W

Landform: Lacustrine Plain

Aspect:

Slope: Nil

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Gleyed Cryic Degr. Eutric Brunisol

Soil Series: Barrington

Soil Profile: # 10

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
F1	14-13					litter
F2	13-8					litter
H	8-0					litter
Ae	0-2	cs	C	3Y5/1	10YR2.5/1	M3SBK
AB	2-4	cs	C	10YR5/4	10YR4/4	F3SBK
Bm1g	4-8	cw	C	10YR6/2	7.5YR5/6	F1SBK
Bm2g	8-16	as	C	10YR6/3	10YR4/3	F1SBK
BCgz	16-20		C	10YR7/3	10YR5/4	
Ckgz	20-80+		C	10YR7/1	5GY5/1	

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/100
Understory	Salix spp.	
Ground	Ledum groen.	5/
	Pleurozium sch.	4/
	Cladonia rang.	4/
	Hypnum c.c.	2/
	Pohlia nutans	1/
	Vaccinium v.i.	2/
	Equisetum syl.	2/
	Linnaea bor.	1/

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 100-open spots
Cutting class : 4
Age Distribution: even
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	35	60	4.4	dom.
bS	30	65	4.5	cod

SITE NUMBER: T13 SUBGROUP: Gleyed Cryic Degraded Eutric Brunisol

PROFILE NUMBER: 10 SERIES: Barrington

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
F1	14-13	3.0					54.8	1.8	31.2	93.5	19.5	4.1	2.0	0.3	82.6	
F2	13-8	4.0					55.3	2.6	21.0	127.7	61.2	1.3	0.3	0.4	36.2	
H	8-0	5.0					50.5	1.5	34.8	220.5	59.2	7.2	0.1	0.1	29.7	
Ae	0-2	5.7	0.2				0.3	0.1	5.6	32.8	67.3	35.2	1.5	0.4	14.2	
AB	2-4	5.7	0.1				0.7	0.1	13.8	29.0	24.9	75.8	1.8	0.6	11.9	
Bmg1	4-8	7.4	0.3	1.3	1		0.3	0.0	8.0	24.9						
Bmg2	8-16	7.5	0.2	2.9	3		0.3	0.0	9.7	26.1						
BCgz	16-20	7.6	0.3	4.5	5		0.3	0.1	6.0	27.9						
Ckgz	20-80+	7.7	0.3	15.5	11	4.0				23.8						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
F1	14-14										98	24	.11	4							
F2	13-8										66	12	.51	7							
H	8-0										46	4	.60	14							
Ae	0-2			1	14	86	1.61	1.54	5.6	5.6					57	29	28	55	15	1.8	14.04
AB	2-4			1	15	84	1.53	1.54	5.7	5.7					57	29	28	65	16	1.9	17.11
Bmg1	4-8			1	26	73	1.40	1.46	10.1	10.3					54	25	29	58	17	1.9	15.07
Bmg2	8-16			4	18	78	1.55	1.55	3.8	3.9					56	31	25	63	20	1.7	12.71
BCgz	16-20			5	15	81									61	31	30	74	20	1.7	15.94
Ckgz	20-80+			1	14	85									60	29	31	78	18	1.8	17.51

Site Number: BT1

Date: 18th August '72

N.T.S. Map Sheet: Nelson House

Location: 31-78-7 W

Landform: Woody Mineral Palsa

Aspect: S

Slope: 6%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Gleyed Cryic Degraded Eutric Brunisol

Soil Series: Barrington

Soil Profile: # 11

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
F1	10-9	as			10YR3/2	litter
F2	9-6	as			10YR3/3	litter
H1	6-1	as			10YR4/4	litter
H2	1-0	as			10YR3/2.5	litter
Aeh	0-1½	aw	C	10YR5/1	10YR4/1	MC1SBK
AB	1½-3½	cw	C	10YR6/1	10YR2.5/1	F3SBK
Btg	3½-6	cs	C	10YR5/2	10YR4/1	F1SBK
BCkg	6-14	as	C	5Y6/1	10YR3.5/2.5	F2SBK
Ckgz	14-20+		C	5Y5.5/1.5	10YR4/2	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	4/70
Understory	Salix spp.	
Ground	Pleurozium schr.	4/
	Hynum c.c.	1/
	Linnaea bor.	2/
	Dicranum spp.	1/
	Vaccinium v.i.	1/
	Peltigera aph.	
	Cladonia rang.	2/20
	Mitella nuda	
	Shepherdia can.	
	Pleurozium spp.	5/80
	Hylocomium spp.	
	Hypnum spp.	

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 70-65
Cutting class : undermature
Age Distribution: even aged
History, etc. : close to climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	44	75	5.3	cod.
bS	44	(80)	4.2	av.
bS			6.8	dom.

SITE NUMBER: BT1 SUBGROUP: Gleyed Cryic Degraded Eutric Brunisol

PROFILE NUMBER: 11 SERIES: Barrington

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
F1	10-9	4.0					51.7	1.4	36.2	104.9	47.7	1.0	3.4	0.3	47.7	
F2	9-6	5.0					51.1	1.9	26.9	195.5	78.4	6.3	1.0	0.2	17.6	
H1	6-1	6.4					57.2	2.7	21.3	15.8	58.9	11.7	1.1	0.1	25.3	
H2	1-0	5.2					57.6	2.6	22.0	151.3	62.3	8.3	1.2	0.0	29.8	
Aeh	0-1.5	5.9	0.2				3.3	0.2	19.6	38.8	53.1	39.8	1.4	0.3	13.3	
BA	1.5-3.5	6.4					1.1	0.1	13.1	32.6	2.5	94.9	2.0	0.3	7.3	
Btg	3.5-6	7.7	0.2	3.7	4		0.7	0.1	12.0	30.2						
BCkg	6-14	7.8	0.2	8.8	9		0.6	0.1	11.8	25.9						
Ckgz	14-20+	7.7	0.3	10.8	11					25.9						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
F1	10-9										84	6	.20	9							
F2	9-6										100	20	.45	12							
H1	6-1										76	6	.59	9							
H2	1-0										86	12	.68	9							
Aeh	0-1.5			1	8	91	1.39	1.42	2.2	2.2											
BA	1.5-3.5			1	6	93	1.47	1.53	7.0	7.0											
Btg	3.5-6			2	5	93	1.43	1.54	11.5	11.7											
BCkg	6-14			4	9	86															
Ckgz	14-20+			10	7	84															

Site Number: BT2

Date: 18th August ' 72

N.T.S. Map Sheet: Uhlman Lake

Location: 26-83-12W

Landform: Bedrock Plain

Aspect: W

Slope: 7%

Parent Material: Lacustrine/Rock

Climatic Zone: 3

Soil Subgroup: Orthic Gray Luvisol

Soil Series: Sipiwesk

Soil Profile: #12

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-H	1-0	as			p10YR1/1	litter
Ae	0-3	as	C	10YR7/2	10YR4/3	M3GR
Btnj	3-9	cw	C	10YR6/3	10YR4/4	C3ABK
Bt	9-14	as	C	10YR5/3	10YR4/4	M23SBK
BCk	14-18	as	C	10YR6/2.5	10YR5/3	M1SBK
Ck1	18-26	cs	C	10YR6/3	10YR5/4	A
Ck2	26-36	aw	C	10Yr7/1	10YR5/2	A
R	36+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP,bs, wb	3/32 3/32 2/6
Understory	Alnus crispa	3/35
Ground	Cornus canadensa	1/
	Linnaea borealis	1/
	Rosa spp.	1/
	Ledum groen.	1/
	Lycopodium spp.	1/
	Viburnum spp.	1/
	Vaccinium v.i.	1/
	Pleurozium spp.	4/
	Hylocomium spp.	1/
	Dicranum spp.	1/
	Hypnum c.c.	1/
	Cladonia spp.	2/

Tree Cover : jP, bS, wB
Species comp.(%): 45 45 10
Crown closure(%): 70
Cutting class : young
Age Distribution: even
History, etc. : fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jP	27	43	3.3	dom.
jP	27	45	2.7	av.

SITE NUMBER: BT2 SUBGROUP: Orthic Gray Luvisol

PROFILE NUMBER: 12 SERIES: Sipiwesk

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	1-0	3.9	.4				41.9	1.0	41.5	74.5	0.0	38.0	2.9	.2	54.4	
Ae	0-3	5.8	.2				2.9	0.1	20.3	30.8	1.3	70.6	2.5	.2	17.9	
Btnj	3-9	5.6	.1				0.9	0.1	11.4	31.8	2.0	90.1	2.3	.5	14.9	
Bt	9-14	6.7	.4				0.8	0.1	11.1	29.8	0.7	99.9	2.5	.6	6.8	
BCk	14-18	7.8	.3	10.6	11		0.6	0.1	9.7	25.7						
Ck1	18-26	7.8	.3	14.7	15					23.8						
Ck2	26-36	7.8	.2	18.4	18					20.5						
R	36+		.3													

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	I d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	1-0																				
Ae	0-3			6	23	71															
Btnj	3-9			0	9	91	1.48	1.60	4.7	4.8											
Bt	9-14			1	8	92	1.41	1.49	3.0	3.0											
BCk	14-18			5	20	75															
Ck1	18-26			3	26	71															
Ck2	26-36			6	35	60	1.49	1.55	24.7	26.1											
R	36+																				

Site Number: BT4

Date: 19th August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 1-92-9 W

Landform: Esker-Kame Complex

Aspect:

Slope: Nil

Parent Material: Glacio-fluvial

Climatic Zone: 2

Soil Subgroup: Degraded Dystric Brunisol

Soil Series: Clarke

Soil Profile: # 13

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	2-0	aw			10YR3/2	Litter
Bm	0-2	aw	LS	10YR7/3	10YR6/3	C1GR
Ae	2-4	as	S	10YR7/2	10YR7/3	C1PL
Bm1	4-10	cs	S	10YR6.5/6	10YR5/8	M1GR
Bm2	10-19	cs	S	10YR7/4	10YR6/8	F1GR
BC	19-24	aw	GrS	10YR7/3.5	10YR6/6	SGR
Ck1	24-26	aw	GrS	10YR7/2.5	10YR6/6	SGR
Ck2	26-36		GrS	10YR7.5/3	10YR6/4	SGR

Vegetation:

Stratification	Species	Dom/Cover

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT4 SUBGROUP: Degraded Dystric Brunisol

PROFILE NUMBER: 13 SERIES: Clarke

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	2-0	3.3	.4				36.1	.5	80.3	53.3	5.6	6.5	3.5	4.5	78.4	
Bm	0-2	3.7	.2				1.2	.0	39.3	8.4		4.6	1.2	6.3	58.9	
Ae	2-4	4.2	.2				1.0	.0	32.0	4.1		11.5	1.0	8.1	70.0	
Bm1	4-10	4.6	.1				0.2	.0	22.0	2.0		17.8	1.5	14.2	65.5	
Bm2	10-19	6.6	.1				0.1	.0	13.0	1.3		52.4	1.6	0.8	41.3	
BC	19-24	6.5	.1				0.1	.0	20.0	0.9		99.9	2.2	1.1	22.8	
Ck1	24-26	7.7	.1	6.6	5	1.4				0.9						
Ck2	26-36	7.9	.2	8.0	8					0.5						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	2-0																				
Bm	0-2			81	13	6															
Ae	2-4			86	11	3	.99	1.48	1.6	11.4											
Bm1	4-10	2	1/8	97	1	1	1.19	1.23	2.8												
Bm2	10-19	3	1/8	99	1	0															
BC	19-24	12	1/16	100	0																
Ck1	24-26	17	1/8	98	2	1															
Ck2	26-36	9	1/8	99	0	0															

Site Number: BT5

Date: 19th August '72

N.T.S. Map Sheet: Ulman Lake

Location: 6-92-18 W

Landform: Esker-Kame Complex

Aspect: W

Slope: 5%

Parent Material: Lacustrine/Glacio-fluvial

Climatic Zone: 2

Soil Subgroup: Gleyed Cryic Orthic Gray Luvisol

Soil Series: Mynarski

Soil Profile: # 14

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L	7-6	as			10YR4/3	
F	6-1½	as			10YR4/2	
H	1½-0	as			10YR4/3	
Ae	0-3	cw	C	10YR6/3	10YR5/3	CF3GR
AB	3-5	aw	C	10YR7/1	10YR4/3	M2ABK
Btg	5-11	as	C	10YR6/1.5	10YR4/3	M3SBK
BCkg	11-16	aw	SICL	10YR5/2	10YR4/4	A
Ckg	16-20	as	SIC	10YR6.5/2	10YR5/4	A
Ckgz	20-25		SIC	10YR8/3	10YR6/3	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/100
Understory	Alnus crispa	3/
Ground	Pleurozium sch.	3/
	Hylocomium spl.	3/
	Hypnum spp.	1/
	Cladonia alp.	1/1
	Cladonia rang.	1/1
	Ledum groen.	2/5
	Vaccinium v.i.	2/8
	Peltigera aph.	1/1
	Rosa spp.	1/1

Tree Cover : bS
Species comp.(%): 100
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. : climax-fire damage in surrounding area
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	35	120	4.4	

SITE NUMBER: BT5 SUBGROUP: Gleyed Cryic Orthic Gray Luvisol

PROFILE NUMBER: 14 SERIES: Mynarski

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L	7-6	3.2					57.8	.9	65.6	73.8	26.7	7.5	8.5	.1	67.8	
F	6-1½	2.5					56.8	.7	86.0	74.7	8.8	2.7	6.7	.1	81.4	
H	1½-0	2.8					51.9	1.0	54.1	114.5	10.6	1.3	3.0	.1	83.1	
Ae	0-3	3.7	.2				2.4	.1	20.3	25.2	11.3	7.9	1.3	.2	71.3	
AB	3-5	4.7	.2				1.4	.1	17.9	26.6	62.3	13.9	1.6	.4	23.5	
Btg	5-11	6.6	.3				1.0	.1	12.9	29.9	90.1	15.3	1.8	.4	7.2	
BCgk	11-16	7.7	.4	14.4	14		0.6	.1	12.8	21.9						
Cgk	16-20	7.7	.3	22.0	22					17.6						
Ckz	20-25	7.8	.3	25.7	13	12.1				14.0						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L	7-6										92	38	.09	4							
F	6-1½										88	22	.12	2							
H	1½-0										80	18	.25	5							
Ae	0-3			13	29	58	0.92	0.97	5.9	6.8											
AB	3-5			7	24	70															
Btg	5-11			0	15	85	1.27		0.8	0.8											
BCgk	11-16			7	56	38	1.39	1.42	16.6	17.8											
Cgk	16-20			3	48	49															
Ckz	20-25			3	56	41															

Site Number: BT6

Date: 19th August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 6-92-8 W

Landform: Beach

Aspect: N

Slope: 7%

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: Orthic Regosol

Soil Series: Kame Hills

Soil Profile: # 15

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
C1	0-5	as	S	10YR7.5/2	10YR7/3	C1SBK
C2	5-9	as	S	10YR7/3	10YR6/3	SGR
C3	9-16	as	S	10YR7/2	10YR6.5/2	C1SBK
C4	16-26+		GrS	10YR7/3	10YR6.5/3	SGR

Vegetation:

Stratification	Species	Dom/Cover
Tree	bPo, jP	
Shrub	Salix spp.	
	Alnus crispa	
Ground	Juniperus com.	
	Cladonia spp.	
	Arctostaph. u-u.	

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT6 SUBGROUP: Orthic Regosol

PROFILE NUMBER: 15 SERIES: Kame Hills

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
C1	0-5	6.6	0.3							4.2	92.3	17.5	3.3	0.2	3.5	
C2	5-9															
C3	9-16	7.3	0.2	0.9						4.0						
C4	16-26	7.6	0.1	2.0						1.2						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES			PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
C1	0-5			100	0	0															
C2	5-9																				
C3	9-16	2.0	1/8	100	0	0															
C4	16-26	10	1/8	100	0	0															

Site Number: BT7

Date: 20th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 505000 E 6327000 N

Landform: Lacustrine Plain

Aspect:

Slope: Nil

Parent Material: Organic/Lacustrine

Climatic Zone: 2

Soil Subgroup: Cryic Humic Eluviated Gleysol, Peaty phase

Soil Series: Odei

Soil Profile: # 21

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
Of	11-3	aw				
Om	3-0	aw				
Aheg	0-4	aw	C	10YR4/1	10YR3/1	F2GR
BAg	4-5	cw	C	10YR6/1	10YR4/1	M2ABK
Btng	5-9	ai	C	10YR7/2	10YR5/2.5	C3ABK
BCg	9-17	as	C	10YR7/3	10YR4/2	F2GR
BCgz	17-21	as	C	10YR7/25	10YR5/3	A
Cgz	21-23+		C	10YR7/2	10YR6/3	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, tL	3/25 1/5
Understory	Alnus crispa	2/8
	Ledum groen.	4/
	Salix spp.	2/8
	Betula pap..	1/
Ground	Cladonia spp.	3/
	Vaccinium v.i.	2/
	Sphagnum fusc.	3/
	Pleuronium spp.	2/
	Polytrichem spp.	2/
	Dicranum rug.	2/
	Sphagnum rub.	)
	Sphagnum fus.	) 2/17
	Sphagnum cap.	)
	Peltigere aph.	1/

Tree Cover : bS +L
Species comp.(%): 100 20
Crown closure(%): 20-30
Cutting class : mature
Age Distribution: uneven age
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	27	130	4.6	av.

SITE NUMBER: BT7 SUBGROUP: Cryic Humic Eluviated Gleysol, Peaty Phase

PROFILE NUMBER: 21 SERIES: Odei

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
Of	11-3	2.8					54.6	0.4	143.7	116.3	47.2	14.4	0.7	0.3	34.7	
Om	3-0	4.7					39.2	1.2	32.4	114.5	63.6	10.4	0.5	0.2	30.2	
Aheg	0-4	5.4	.2				14.4	0.5	30.0	67.8	62.1	21.9	1.1	0.8	23.7	
BAg	4-5	5.9	.2				5.8	0.2	30.6	51.0	62.2	22.0	1.3	1.2	14.9	
Btng	5-9	5.8	.1				1.0	0.1	14.4	26.0	79.3	31.4	2.8	1.6	12.3	
BCg	9-17	6.5	.1				0.6	0.0	13.8	26.4	75.7	26.4	3.1	1.8	7.3	
BCgz	17-21	7.0	.2	0.6	1		0.3	0.0	7.3	25.2						
Cgz	21-23	7.5	.4	1.3	1					24.7						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	- d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
Of	11-3										94	70	.07	6							
Om	3-0										68	14	.51	27							
Aheg	0-4			7	40	54	0.81	1.01	10.3	6.2								113	21	1.3	18.40
BAg	4-5			2	15	83	1.37	1.45	7.0	7.1											
Btng	5-9	6	1/2	2	19	79	1.59	1.73	9.9	10.0								54	16	1.8	13.25
BCg	9-17			1	17	81	1.61	2.06	3.5	3.6								56	17	1.8	13.88
BCgz	17-21			1	18	81												58	18	1.8	12.47
Cgz	21-23			1	23	76															

Site Number: BT8

Date: 20th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 513000 E 6349000 N

Landform: Wooded Mineral Palsa

Aspect:

Slope:

Parent Material: Organic/Lacustrine

Climatic Zone: 2

Soil Subgroup: Cryic Humic Eluviated Gleysol, Peaty Phase

Soil Series: Odei

Soil Profile: # 22

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
Om	7-6	aw				
Of	6-2	aw				
Oh	2-0	aw				
Ahg	0-2	aw	CL	10YR4/1	10YR3/1.5	F1GR
BAg	2-2½	cw	C	10YR6/1	10YR4/1	F3SBK
Btnjg	2½-5	as	C	10YR7/2.5	10YR5.5/3	M1ABK
BCg	5-8	cs	C	10YR7/2	10YR5/3	M1GR
Ckg	8-20	as	SIC	10YR6.5/2	10YR5/3	A
Ckgz	20-26+		SIC			A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	2/20
Understory	Salix spp.	2/
	Betula gland.	1/1
Ground	Ledum groen.	4/
	Chamaedaphne spp.	3/
	Vaccinium v.i.	3/
	Vaccinium oxy.	2/
	Kalmia pol.	1/2
	Cornus can.	2/5
	Peltigere aph.	1/2
	Pleurozium schr.	2/5
	Sphagnum spp.	3/25
	Cladonia spp.	3/25
	Salix spp.	1/2

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 20
Cutting class : mature
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT8 SUBGROUP: Cryic Humic Eluviated Gleysol, Peaty Phase

PROFILE NUMBER: 22 SERIES: Odei

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
Om	7-6	4.2					49.3	1.0	48.8	78.1	35.2	6.7	2.8	0.4	53.4	
Of	6-2	3.8					55.8	0.5	109.4	128.0	43.9	15.6	0.4	0.3	38.2	
Oh	2-0	5.2					47.3	1.4	33.6	139.1	64.0	6.7	0.5	0.3	27.1	
Ahg	0-2	5.7	.2				16.1	0.6	27.4	75.6	71.6	13.4	0.7	0.6	19.4	
BAg	2-2½	5.9	.2				6.4	0.2	26.5	52.5	74.0	15.0	1.0	1.0	13.9	
Btnjg	2½-5	6.1	.2				2.1	0.1	19.2	30.2	72.7	23.5	2.0	2.2	12.2	
Btg	5-8	6.6	.5				1.1	0.1	13.5	30.0	82.7	20.3	2.2	0.4	6.5	
Ckg	8-20	7.6	.3	9.4	6	2.9				23.7						
Ckgz	20-26+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
Om	7-6										88	12	.12	6							
Of	6-2										90	64	.06	4							
Oh	2-0										52	10	.51	14							
Ahg	0-2			3	24	73															
BAg	2-2½			2	25	73	1.22	1.35	18.0	18.3											
Btnjg	2½-5			2	24	75	1.62	1.76	9.2	9.4											
Btg	5-8			1	19	79															
Ckg	8-20			1	33	65															
Ckgz	20-26+																				

Site Number: BT9

Date: 20th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 5/2000 E 6368000 N

Landform: Esker-Kame Complex

Aspect:

Slope:

Parent Material: Glacio-fluvial

Climatic Zone: 2

Soil Subgroup: Degraded Dystric Brunisol

Soil Series: Clarke

Soil Profile: # 23

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-H	¼-0	as				litter
Ae	0-3	as	GrS	10YR8/1	10YR7/2	SGR
Bm1	3-11	cs	GrS	10YR7/6	5YR5/8	SGR
Bm2	11-20	as	GrS	10YR7/4	10YR65/8	SGR
BC	20-29	as	MS	10YR7/3	10YR65/4	SGR
C	29-38+		MS	10YR8/3	10YR7/4	SGR

Vegetation:

Stratification		Species	Dom/Cover
Tree		jP,wB, bS	
Understory	B	Alnus spp.	1/
Ground	A	~~Arctostaphylos~~ u.u.	2/10
		Vaccinium v.i.	1/1
		Cladonia spp.	2/5
	B	Geocaulon liv.	2/7
		Polytridium com.	2/10
		~~Vaccinium v.i.~~	3/25
		Ledum groen.	2/5
		Sphagnum spp.	2/10
	C	Chamaedaphne spp.	
		Kalmia pol.	
		Rubus cham.	
	D	Dicranum spp.	
		Hylocomium spp.	
		Andromeda glav.	

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species		Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
A	jP	6			
	wB	1			
B	wB	5			

SITE NUMBER: BT9 SUBGROUP: Degraded Eutric Brunisol

PROFILE NUMBER: 23 SERIES: Clarke

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	¼-0															
Ae	0-3	4.3	.1				.3	0.0	34.0	1.8		35.2	2.3	2.8	86.9	
Bm1	3-11	5.9	.1				.2	0.0	18.0	2.3		10.1	0.9	2.2	47.6	
Bm2	11-20	6.5	.1				.1	0.0	7.1	0.8		31.3	2.5	5.0	17.5	
BC	20-29	6.0	.0				.1	0.0	12.5	0.5		42.0	2.0	4.0	6.0	
C	29-38	6.9	.1							0.6		74.5	1.8	1.8		

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	¼-0																				
Ae	0-3	16	3/4	96	3	1															
Bm1	3-11	92	2/3	98	1	0															
Bm2	11-20	25	1/2	100	0	0															
BC	20-29			100	0	0															
C	29-38			99	0	1															

Site Number: BT10

Date: 21st August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 11-90-8 W

Landform: Esker-Kame Complex

Aspect: E

Slope: 10%

Parent Material: Glacio-Fluvial

Climatic Zone: 2

Soil Subgroup: Degraded Dystric Brunisol

Soil Series: Clarke

Soil Profile: # 26

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	½-0	as				Litter
Ae	0-3	aw	GrS	10YR75/1	10YR65/1	C1PL
Bm1	3-9	cw	GrS	10YR6/6	7.5YR55/8	C2GR
Bm2	9-14	as	GrS	10YR75/4	10YR55/6	M1GR
BC	14-24	as	GrS	10YR6/3	10YR6/4	SGR
C	24-32+		GrS	10YR7/3	10YR7/4	SGR

Vegetation:

Stratification		Species	Dom/Cover
Tree		jP bS	5/20 2/5
Understory		Alnus crispa	4/70
Ground	A	Vaccinium myr.	2/20
		Ledum groen.	2/5
		Cladonium spp.	5/80
	B	Vaccinium v.i.	2/5
		Ledum groen.	2/13
		Pleurozium schr.	1/1
		Arctostaphylos u.u.	1/
		Limmaea bor.	1/
		Peltigera aph,	1/
		Cornus can.	1/
		Pohlia nutans	1/
		Dicranum fusc.	1/

Tree Cover : jP bS
Species comp.(%): 80 20
Crown closure(%): 20-25
Cutting class : young
Age Distribution: uneven, bS somewhat young
History, etc. : fire regeneration
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jp	23	60	3.0	
jp	16		1,9	
jp	20		2.5	

SITE NUMBER: BT10 SUBGROUP: Degraded Dystric Brunisol

PROFILE NUMBER: 26 SERIES: Clarke

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	¼-0	3.6					47.4	1.1	43.5	63.8	14.9	6.0	1.4	0.5	75.0	
Ae	0-3	4.7	.1				0.4	0.0	19.0	2.7	7.3	11.7	3.7	2.6	73.9	
Bm1	3-9	4.7	.0				0.2	0.0	23.0	2.6		8.4	3.8	2.7	45.6	
Bm2	9-14	6.8	.1				0.1	0.0	8.3	1.0	104.1	33.0	10.3	7.2		
BC	14-24	6.4	.0				0.1	0.0	15.0	0.9		20.0	11.1	7.8	41.1	
C	24-32+	6.1	.0							1.2		11.7	8.3	5.8	54.1	

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
L-H	¼-0																				
Ae	0-3	16	1/2	92	6	2															
Bm1	3-9	32	1/8	96	2	2															
Bm2	9-14	47	1/2	98	2	1															
BC	14-24	33	1/4	97	2	1															
C	24-32+	38	1/8	98	1	1															

Site Number: BT11

Date: 21 August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 11-90-8 W

Landform: Bedrock Plain

Aspect: E

Slope: 25%

Parent Material: Colluvium/Rock

Climatic Zone: 2

Soil Subgroup: Cryic Sphagno-Fibrisol

Soil Series: Wapism

Soil Profile: # 27

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
Of1	21-5	as				
Of2	5-1	as				
Oh	1-0	as				
ACg	0-2	as	SCL	10YR2/2	10YR2/1	M2GR
Cgz	2-5	aw	L	10YR2/2	10YR2/1	A
R	5+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/20
Ground	Ledum groen.	4/70
	Vaccinium v.i.	2/5
	Rubus chamae.	2/10
	Pleurozium schr.	2/8
	Polytrichum can.	1/1
	Vaccinium oxy.	1/1
	Lycopodium spp.	
	Sphagnum fus.)	3/55
	Sphagnum rub.)	
	Cladonia rang.)	2/20
	Cladonia fal.)	

Tree Cover : bS
Species comp.(%): 1
Crown closure(%): 15-20%
Cutting class :
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT11 SUBGROUP: Cryic Sphagno-Fibrisol

PROFILE NUMBER: 27 SERIES: Wapisu

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
Of1	21-5	2.5					53.8	0.3	168.0	120.8	4.7	1.5	0.9	.2	98.5	
Of2	5-1	3.2					54.7	1.2	47.2	114.5	6.4	1.9	1.3	.2	88.0	
Oh	1-0	3.2					54.1	1.8	30.2	103.0	3.9		0.3	.1	94.7	
ACg	0-2	3.5	.2				14.6	0.5	29.3	34.4	6.3	3.6	0.3	.3	80.0	
Cgz	2-5	3.9	.2				24.5	0.4	61.2	39.3	8.2	1.8	0.3	.2	89.5	
R	5+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
Of1	21-5										92	66	.03	2							
Of2	5-1										78	42	.24	4							
Oh	1-0										74	4	.67	23							
ACg	0-2			79		21															
Cgz	2-5			48	32	20															
R	5+																				

Site Number: BT12

Date: 21August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 16-89-7 W

Landform: Lacustrine Terrain

Aspect: E

Slope: 7%

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: Cryic Solodic Gray Luvisol

Soil Series: Torrance

Soil Profile: # 28

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	3-0	as				Litter
Ae	0-1	as	SIC	10YR7/1.5	10YR6/3	C3PL
Bnt	1-6	as	C	10YR7/2	10YR5/3	C3COL
Bt	6-9	as	C	10YR45/3	10YR36/4	M1SBK
BCk	9-12	aw	SIC	10YR5/25	10YR4/25	A
Ck1	12-22	as	SIC	10YR6/2	10YR6/3	A
Ck2a	22-32	ad	SICL	10YR8/2	10YR7/3	A
Ck2b	22-32	ad	SICL	10YR7/2	10YR6/3	A
Ck3	32-37		SICL			A
Ckz	37+		SIL			A

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP, bS	3/35 2/15
Understory	Alnus crispa	3/
Ground	Conus canadensis	1/1
	Vaccinium v.i.	1/1
	Vaccinium myr.	1/3
	Rosa spp.	1/3
	Pleurozium schr.	3/25
	Ledum groen.	2/10
	Cladonia rang.	2/10
	Hylocomium spl.	1/1
	Dicranum fusc.	1/1
	Peltigère aph.	1/1
	Linnaea bor.	1/1

Tree Cover : jP bS
Species comp.(%): 60 40
Crown closure(%): 40-50%
Cutting class : undermature
Age Distribution: even age
History, etc. : fire regeneration
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT12 SUBGROUP: Cryic Solodic Gray Luvisol

PROFILE NUMBER: 28 SERIES: Torrance

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	3-0	4.5					46.8	1.2	40.7	97.8	42.0	8.4	0.3	.1	44.2	
Ae	0-1	5.1	.2				5.5	0.2	24.8	28.5	59.5	17.0	2.1	.4	24.6	
Bnt	1-6	5.3	.1				1.2	0.1	14.9	25.6	69.2	19.7	2.5	.5	16.9	
Bt	6-9	6.8	.2				1.4	0.1	14.0	29.7	83.0	24.8	2.5	.4	3.6	
BCk	9-12	7.4	.3	10.0	10		0.8	0.1	14.0	26.4						
Ck1	12-22	7.6	.2	28.4	28					13.6						
Ck2a	22-32	7.6	.2	29.6	30					12.1						
Ck2b	22-32	7.5	.2	23.5	23					23.8						
Ck3	32-37															

Ckz HORIZON	37+ DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrub.	Rubbed	(%) A	%				%			
L-H	3-0																				
Ae	0-1			4	41	55	1.13	1.21	4.4	4.6											
Bnt	1-6			1	24	76	1.57	1.66	5.2	5.2											
Bt	6-9			0	20	80	1.42	1.45	2.2	2.2											
BCk	9-12			2	52	47															
Ck1	12-22			3	67	31															
Ck2a	22-32			6	67	27															
Ck2b	22-32			3	50	47															
Ck3	32-37																				

Site Number: BT 13a

Date: 21st August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform:

Aspect:

Slope:

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: Solodic Gray Luvisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-H	½-0					Litter
Ael	0-½					
Ae2	½-2½					
Bnt	2½-20½					C3COL
Bt	20½-23½					
BCk	23½-26½					
Ck	26½-38½+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP, bS	3/33 3/27
Understory	Alnus spp.	1/
	Salix spp.	1/
Ground	Ledum groen.	
	Epilobium ang.	
	Vaccinium v.i.	
	Petasites pal.	
	Pyrola spp.	
	Cladonia spp.	
	Hylocomium spl.	
	Vaccinium uli.	

Tree Cover : jP bS
Species comp.(%): 55 45
Crown closure(%): 60
Cutting class :
Age Distribution: under intermediate
History, etc. : uneven (bS), even (jP)
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: BT14

Date: 22 August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 552000 E 6404000 N

Landform: Esker-Kame Complex

Aspect:

Slope: Nil

Parent Material: Glacio-Fluvial

Climatic Zone: 2

Soil Subgroup: Degraded Dystric Brunisol

Soil Series: Clarke

Soil Profile: # 29

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
F-H	1-0	as				Litter
Ae	0-3	aw	GrS	10YR7/2	10YR6/1	C1PL
Bm1	3-4	aw	GrS	10YR6/6	5YR6/4	M2GR
Bm2	4-8	cw	S	10YR7/6	10YR5/6	SGR
BC	8-14	cs	S	10YR7/4	10YR6/6	SGR
C	14-30+		S	10YR7/4	10YR7/8	SGR

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	2/15
Ground	Cladonia alp.	4/70
	Cladonia rang.	2/20
	Vaccinium v.i.	1/2
	Vaccinium myrt.	1/2
	Vaccinium ulig.	1/3
	Cladonia spp.	2/0
	Ledum groen.	1/1
	Geocaulon spp.	1/2

Tree Cover : bS
Species comp.(%): 100%
Crown closure(%): 15%
Cutting class : mature
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	18		4.5	av.
bS	38			

SITE NUMBER: BT14 SUBGROUP: Degraded Dystric Brunisol

PROFILE NUMBER: 29 SERIES: Clarke

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
F-h	1-0	2.8					56.6	1.0	58.3	76.0	13.3	0.7	3.2	0.1	78.9	
Ae	0-3	3.8	.1				0.4	0.0	38.0	2.1	10.7		4.9	3.4	92.2	
Bm1	3-4	4.9	.0				0.9	0.0	30.3	7.0	4.6	2.3	1.4	7.2	47.9	
Bm2	4-8	5.3	.0				0.1	0.0	30.0	1.5	7.8	1.3	6.5	17.0	51.0	
BC	8-14	5.4	.0				0.1	0.0	20.0	0.8	7.5	2.5	12.5	32.5	61.3	
C	14-30+	6.7	.1							0.5	91.1	4.3	21.7	99.9	34.7	

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES			PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	1 d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
F-H	1-0										80	12	.09	12							
Ae	0-3	19	1/4	91	7	1															
Bm1	3-4	20	1/4	89	8	3															
Bm2	4-8	6	1/8	98	0	1															
BC	8-14			99	1	1															
C	14-30+	2	1/8	99	1	1															

Site Number: BT15a

Date: 22 August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 543000 E 6399000 N

Landform: Drumlinoidal Outcrop in Peat Plain

Aspect: SW

Slope: 6%

Parent Material: Lacustrine/Till

Climatic Zone: 2

Soil Subgroup: Cryic* Orthic Gray Luvisol

Soil Series: Missi Falls

Soil Profile: # 30

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	2-0	as				Litter
Ae	0-2	aw	CL	10YR75/3	10YR5/25	M3GR
AB	2-4	aw	CL	10YR7/2	10YR55/25	C2PL
Btnj	4-14	cs	CL	10YR7/2	10YR4/2	C3COL
Bt1	14-20	aw	C	10YR6/2	10YR45/2	C2COL
Bt2	20-24	aw	SCL	10YR6/3	10YR4/35	F2SBK
BC	24-25	as	SCL	10YR6/3	10YR4/3	A
Ck	25-41+			10YR7/4	10YR5/3	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	4/50
Understory	Alnus crispa	2/25
Ground	Ledum groen.	2/5
	Vaccinium v.i.	1/2
	Equisetum spp.	1/1
	Peltigère apht.	1/1
	Pleurozium schr.	3/26
	Cladonia rang.	2/15
	Cladonia alp.	2/15
	Petasites pal.	1/1
	Hypnum c.c.	1/1
	Dicranum spp.	1/
	Vaccinium myr.	1/1

Tree Cover : bS
Species comp.(%): 100%
Crown closure(%): 50-55%
Cutting class : not much/ mature
Age Distribution: uneven age
History, etc. : climax likely
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	31		3.0	
bS	31		4.5	

SITE NUMBER: BT15a SUBGROUP: Cryic* Orthic Gray Luvisol

PROFILE NUMBER: 30 SERIES: Missi Falls

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	2-0	2.9					36.7	.6	62.2	64.5	12.5	1.6	4.4	0.1	80.5	
Ae	0-2	3.8	.3				5.6	.2	37.5	24.5	18.8	11.2	1.6	1.6	57.8	
AB	2-4	4.0	.2				3.1	.1	31.2	20.7	26.7	13.3	1.5	3.2	40.2	
Btnj	4-14	5.6	.1				1.2	.1	17.3	13.9	65.9	19.1	1.8	4.8	27.0	
Bt1	14-20	5.9	.1				0.4	.0	10.8	18.6	80.5	24.1	2.4	0.8	11.5	
Bt2	20-24	7.0	.2				0.3	.0	10.3	13.1	93.7	26.6	2.5	4.3	3.1	
BC	24-25	7.4	.8	4.2	4		0.2	.0	11.5	7.5						
Ck	25-41	7.5	.3	10.8	11					4.9						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	2-0										88	14	.21	41							
Ae	0-2	6	1/8	31	38	30	1.31	1.32	1.7	2.4								45	24	1.4	4.83
AB	2-4	4	1/2	30	42	28	1.23	1.42	3.7	5.3								33	19	1.6	3.60
Btnj	4-14	4	1/4	32	37	31	1.78	1.89	17.8	26.3								27	14	1.9	4.34
Bt1	14-20			11	30	59	1.64	1.64	9.0	10.1								41	14	1.9	9.90
Bt2	20-24	8	1/4	48	19	33	1.65	1.65	11.4	22.1								29	11	2.0	6.73
BC	24-25	7	1/8	53	24	24															
Ck	25-41	7	1/4	59	36	5									15	10	4	20	8	2.1	4.06

Site Number: BT15b

Date: 22 August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 543000 E 6399000 N

Landform: Drumlinoidal Outcrop in Peat Plain

Aspect: SW

Slope: 6%

Parent Material: Lacustrine/Till

Climatic Zone: 2

Soil Subgroup: Cryic* Orthic Gray Luvisol

Soil Series: Missi Falls

Soil Profile: # 31

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	4-1	cs				Litter
F-H	1-0	aw				Litter
Aeh	0-1½	aw	C	10YR25/1	10YR5/2	M3GR
BA	1½-10	cs	CL	10YR7/3	10YR5/2	C3COL
Bt1	10-15	aw	C	10YR5/4	10YR5/3	C2COL
Bt2	15-18	aw	SICL	10YR5/4	10YR36/3	F2SBK
BC	18-20	as	CL	10YR7/35	10YR45/3	A
Ck	20-36+		SL		10YR5/25	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	
Ground	Ledum groen.	
	Vaccinium v.i.	
	Pleurozium spp.	
	Hyphnum spp.	

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT15b
PROFILE NUMBER: 31
SUBGROUP: Cryic* Orthic Gray Luvisol
SERIES: Missi Falls

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	4-1	3.3					50.0	.8	63.3	80.4	16.9	5.6	5.5	0.1	65.6	
F-H	1-0	3.2					30.8	.8	37.6	77.4	20.2	5.2	3.3	0.1	70.8	
Aeh	0-1½	3.6	.2				13.6	.4	31.7	51.9	16.3	8.6	1.0	0.7	66.7	
BA	1½-10	5.3	.1				0.6	.0	14.8	10.3	66.1	24.5	2.0	2.7	22.8	
Bt1	10-15	6.0	.1				0.4	.0	9.3	19.1	78.5	26.7	2.5	3.1	10.1	
Bt2	15-18	6.6	.1				0.3	.0	8.5	23.5	73.5	24.6	2.0	2.1	6.0	
BC	18-20	7.3	.1	2.4	2		0.2	.0	7.3	16.2						
Ck	20-36	7.6	.2	11.9	12					6.7						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	4-1										74	20	.12	7							
F-H	1-0										74	14	.44	40							
Aeh	0-1½			14	37	49	0.87	0.98	1.6	1.9											
BA	1½-10	3	1/4	40	32	28	1.93	1.98	11.3	18.9											
Bt1	10-15			7	31	62	1.72	1.75	5.4	5.8											
Bt2	15-18			7	59	34	1.61	1.66	14.7	17.2											
BC	18-20	5	1/8	42	24	34															
Ck	20-36	5	1/4	55	29	16															

Site Number: BT 16

Date: 22nd August '72

N.T.S. Map Sheet: Big Sand Lake

Location:

Landform:

Aspect:

Slope:

Parent Material: Organic

Climatic Zone: 2

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
Of	0-12	12" of Sphagnum over 4" Mesic				
Om	12-16					
C	16-27					
Cz	27+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	2/20
Understory	Picea mar.	
Ground	Ledum groen.	3/30
	Chamae. spp.	2/5
	Kalmia poli.	2/5
	Rubus cham.	2/5
	Sphagnum fus.	2/25
	Cladonia alp.	2/5
	Dicranum spp.	
	Vaccinium v.i.	1/2
	V. oxycoccos	
	V. uligonosum	1/1

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 10-20
Cutting class :
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: BT 17a

Date: 22nd August '72

N.T.S. Map Sheet: Big Sand Lake

Location:

Landform: Wooded Mineral Palsa

Aspect: E

Slope: 7%

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: a) Gleyed Solodic Gray Wooded
b) Gleyed Solod

Soil Series:

Soil Profile: # a (mound) + b (groove)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
a)						
L-H	2-0					Litter
Ae	0-2		C			
Bnt	2-14		C			
BCg	14-17		C			
Ckg	17-39		SIC			
b)						
L-H	4-0					
Aeh	0-2		C			
Ahe	2-6		C			
Bnt	6-8		C			
BCg	8-11		C			
Ckg	11+		SIC			

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, wB	3/33 3/27
Understory	Salix spp.	2/
	Alnus spp.	3/30
Ground	Epilobium ang.	1/1
	Ledum groen.	3/45
	Equisetum spp.	1/1
	Petasites pal.	
	Vaccinium v.i.	2/10
	Ribes grand.	
	Viburnum edule	2/5
	Rosa acic.	
	Peltigera aph.	
	Dicranum fus.	
	Hylocomium spp.	
	Cladonia alp.	

Tree Cover : bS wB
Species comp.(%): 55 45
Crown closure(%): 50-60
Cutting class : young
Age Distribution: uneven
History, etc. : fire-recent
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	3-15	40-60	3.5	av.

Site Number: BT18a

Date: 23 August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 2-90-10 W

Landform: Drumlinized Terrain

Aspect: W

Slope: 2%

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: Cryic* Solodic Gray Luvisol

Soil Series: Torrance

Soil Profile: # 33 (mound)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
Ae	0-3/4	aw	C	10YR8/1	10YR55/2	F2PL
AB	3/4-5	as	C	10YR7/15	10YR6/3	C2PL
Bnt1	5-15	cs	C	10YR7/2	10YR6/3	C3COL
Bnt2	15-25	cs	C	10YR7/2	10YR6/4	C2COL
Bt	24-28	cw	C	10YR5/2	10YR4/2	F2SBK
BC	28-31	cw	C	10YR6/2	10YR4/25	A
Ck	31-41	as	C	10YR6/2	10YR4/2	A
Cz	41+					

Vegetation:

Stratification	Species	Dom/Cover
Ground	Pleurozium schr.	5/90
	Vaccinium v.i.	2/25
	Ledum groen.	2/18
	Cladonia rang.	1/1

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT18a SUBGROUP: Cryic Solodic Gray Luvisol

PROFILE NUMBER: 33 SERIES: Torrance

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
Ae	0-1	4.0	0.2				11.5	.3	39.6	33.7	22.6	12.2	1.7	1.3	56.6	
AB	1-5	4.7	0.1				2.0	.1	20.3	21.5	41.4	16.8	1.7	2.0	29.7	
Bnt1	5-15	4.9	0.1				1.6	.1	17.8	23.1	54.1	16.3	2.0	2.0	26.3	
Bnt2	15-24	5.0	0.1				1.0	.1	12.9	28.3	60.3	19.3	1.9	1.7	15.2	
Bt	24-28	6.8	0.2				0.6	.1	9.1	32.6	77.2	20.8	1.7	1.6	3.4	
BC	28-31	7.1	0.7				0.6	.1	8.9							
Ck	31-41	7.5	0.5	13.5	14					19.1						
Cz	41+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
Ae	0-1	3	1/8	5	39	57	1.20	1.23	8.8	9.2								65	31	1.2	6.24
AB	1-5	4	1/4	3	39	57	1.39	1.43	19.4	20.0								44	26	1.5	4.58
Bnt1	5-15			3	32	65	1.27	1.53	7.6	7.8								45	24	1.6	6.04
Bnt2	15-24			1	17	82	1.51	1.67	4.1	4.1								51	21	1.7	9.62
Bt	24-28			1	7	93	1.43	1.60	6.9	6.9								62	18	1.9	14.80
BC	28-31			2	22	76	1.36	1.40	11.8	12.0								70	19	1.7	15.50
Ck	31-41			11	29	60	1.54	1.63	19.2	21.6					50	28	22	54	18	1.8	11.81
Cz	41+																				

Site Number: BT18b

Date: 23 August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 2-90-10 W

Landform: Esker-Kame Complex

Aspect: W

Slope: 2%

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: Cryic* Solodic Gray Luvisol

Soil Series: Torrance

Soil Profile: # 34 (groove)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	3½-0	cw		10YR7/2	10YR5/3	Litter
Ae	0-2	cs	C	10YR7/2	10YR5/3	F2PL
AB	2-5	cs	C	10YR7/1	10YR6/3	M3SBK
Bnt1	5-7	as	C	10YR8/2	10YR5/4	M3SBK
Bnt2	7-14	cs	C	10YR6/2	10YR4/4	C2COL
Bt	14-19	cw	C	10YR5/4	10YR4/3	F2SBK
BC	19-21	cw	C	10YR4/3	10YR3/3	A
Ck	21-30	as	C	10YR6/3	10YR5/4	A
Cz	30+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	2/20
Ground	Ledum groen.	2/20
	Vaccinium v.i.	2/5
	Equisetum spp.	1/1
	Rosa ang.	1/1
	Pleurozium schr.	4/70
	Peltigera aph.	1/3
	Cladonia spp.	2/10
	Hylocomium spp.)	1/
	Hypnum c.c.)	

Tree Cover : bS
Species comp.(%): 100%
Crown closure(%): 20-25
Cutting class : young
Age Distribution: uneven
History, etc. : fire regeneration
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT18b
PROFILE NUMBER: 34

SUBGROUP: Cryic Solodic Gray Luvisol
SERIES: Torrance

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	3½-0	3.0					39.2	.8	51.5	67.0	22.6	7.5	6.0	0.2	61.4	
Ae	0-2	3.8	.2				8.5	.2	37.1	37.0	16.9	11.2	2.0	5.9	56.6	
AB	2-5	3.7	.2				6.2	.2	34.4	31.5	11.8	9.2	1.6	2.0	63.7	
Bnt1	5-7	5.0	.2				2.0	.1	17.7	24.8	55.2	15.7	2.1	2.3	24.7	
Bnt2	7-14	5.3	.1				1.1	.1	13.9	28.8	59.8	18.4	2.3	1.8	15.0	
Bt	14-19	6.7	.2				0.8	.1	11.7	32.6	75.6	21.8	3.0	2.2	4.4	
BC	19-21	7.2	.5	0.4	0		0.7	.1	11.7	24.2						
Ck	21-30	7.5	.2	13.3	13					19.8						
Cz	30+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
L-F	3½-0										64	8	.14	39							
Ae	0-2	6	1/8	6	37	57															
AB	2-5			3	36	61	0.87		2.3	2.4											
Bnt1	5-7			4	33	63	1.17	1.20	14.7	15.2											
Bnt2	7-14			2	19	79	1.39	1.57	5.6	5.7											
Bt	14-19			0	7	92	1.37	1.64	4.3	4.3											
BC	19-21			1	15	84	1.32	1.51	7.3	7.3											
Ck	21-30			5	26	69	1.41	1.50	16.6												
Cz	30+																				

Site Number: BT19

Date: 24th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 473000 E 6330000 N

Landform: Bedrock Controlled Terrain

Aspect: ESE

Slope: 4%

Parent Material: Residual

Climatic Zone: 2

Soil Subgroup: Lithic Degraded Dystric Brunisol

Soil Series: Moss Lake

Soil Profile: # 37

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	3-0	aw				Litter
Ae	0-1	ad	LS	10YR	10YR4/2	F1PL
R						

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, jP, wB	5/48 2/6 2/6
Understory	Alnus crispa	2/18
	Vaccinium v.i.	2/5
Ground	Cladonia alp.	2/20
	Pleurozium schr.	1/1
	Dicranum spp.	1/1

Tree Cover : bS, jP, wB
Species comp.(%): 80 10 10(15)
Crown closure(%): 60%
Cutting class : young
Age Distribution: uneven
History, etc. : fire regeneration ± 40 yrs. old
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	25	47	4.1	dom.

SITE NUMBER: BT19 SUBGROUP: Lithic Degraded Dystric Brunisol

PROFILE NUMBER: 37 SERIES: Moss Lake

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	3-0	3.0					56.2	1.6	34.5	94.7	5.8	4.5	1.8	2.8	83.4	
Ae	0-2	3.3	.2				4.7	0.2	27.5	13.4	3.0	1.2	1.4	4.3	89.2	
R	2+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES			PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%		
L-H	3-0																			
Ae	0-2	8	1/8	79	14	7														
R	2+																			

Site Number: BT20

Date: 24th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 473000 E 6330000 N

Landform: Peat Plateau

Aspect:

Slope: Nil

Parent Material: Organic

Climatic Zone: 2

Soil Subgroup: Cryic Terric Mesisol

Soil Series: Issett

Soil Profile: # 38

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
Om1	0-1	aw				
Om2	1-5	as				
Oh1	5-11	as				
Om3	11-12	as				
Oh2	12-13	as				
Ohz1	13-15	aw				
Ohz2	15-35	as				
Cz	35-38+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, wB	5/29 1/1
Understory	Betula pap.	) 2/5
	Salix spp.	)
Ground	Ledum groen.	3/50
	Vaccinium v.i.	1/3
	Rubus cham.	1/1
	Cornus can.	1/1
	Kalmia pol.	1/1
	Equisetum spp.	1/1
	Cladonia alp.	3/40
	Pleurozium schr.	1/3
	Dicranum fus.	1/1
	Sphagnum fus.	2/10

Tree Cover : bS wB
Species comp.(%): 98 2
Crown closure(%): 30
Cutting class : young
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT20 SUBGROUP: Cryic Terric Mesisol

PROFILE NUMBER: 38 SERIES: Issett

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
Om1	0-1	2.9					52.6	1.1	49.6	99.2	11.5	4.3	2.2	.2	75.6	
Om2	1-5	3.1					50.7	1.4	37.5	135.3	40.5	6.1	1.4	.2	46.9	
Oh1	5-11	5.2					49.2	1.6	31.1	171.0	55.6	32.3	0.1	.1	19.6	
Om3	11-12	5.3					54.2	1.0	53.6	176.7	53.5	8.6	0.1	.2	36.1	
Oh2	12-14	5.3					54.8	1.5	37.3	199.0	63.1	8.4	0.0	.1	30.8	
Ohz1	14-15	5.4					57.0	1.4	39.6	174.4	77.2	11.2	0.1	.2	16.5	
Ohz2	15-35															
IICz	35-37+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
Om1	0-1										86	30	.18	5							
Om2	1-5										76	22	.16	3							
Oh1	5-11										34	4	.51	13							
Om3	11-12										92	40	.50	8							
Oh2	12-14										68	8	.45	9							
Ohz1	14-15										46	4	.35	8							
Ohz2	15-35																				
IICz	35-37+																				

Site Number: BT21

Date: 24th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 466000 E 6341000 N

Landform:

Aspect:

Slope: Nil

Parent Material: Acid Till/Rock

Climatic Zone: 2

Soil Subgroup: Lithic Degraded Dystric Brunisol

Soil Series: Moss Lake

Soil Profile: # 39

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	½-0	aw				Litter
Ae	0-1	aw	SL	10YR6/½5	10YR4/2	F2PL
Bm	1-3	aw	SL	10YR6/4	10YR3/35	M1GR
BC	3-4	aw	GrSCL	10YR7/3	10YR4/4	F1GR
C	4-8	aw	GrSL	10YR8/3	10YR5/4	A
R	8+					

Vegetation:

Stratification		Species	Dom/Cover
Tree		jP, wB, sB	4/25 2/9 1/2
Understory		Alnus crispa	2/15
Ground	(A)	Vaccinium myt.	1/1
		Cladonia alp.	3/55
		Empetrum her.	1/2
		Vaccinium ulg.	1/1
		Hypnum c.-c.	2/
		Pleurozium schr.	1/1
		Arctostaphylos u.-u.	1/3
		Needles & Litter	2/20
		Ledum groen.	1/2
	(B)	Rosa acic.	1/2
		Epilobium ang.	1/2

Tree Cover : jP, wB, bS
Species comp.(%): 70 25 5
Crown closure(%): 25-35-40
Cutting class : mature
Age Distribution: pine even age
History, etc. : fire regeneration, climax bS/Lichen
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jP	33	45	5	dom.
jP	27	43	4	cod.
bS	27	39	4.3	cod.

SITE NUMBER: BT21 SUBGROUP: Lithic Degraded Dystric Brunisol

PROFILE NUMBER: 39 SERIES: Moss Lake

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	½-0	3.4					43.0	1.0	42.6	45.0	25.8	2.4	5.8	0.1	57.7	
Ae	0-1	3.9	.2				3.1	.1	31.1	14.4	9.8	5.9	1.8	6.1	62.6	
Bm	1-3	4.6	.1				2.4	.1	29.4	13.3	21.0	4.8	1.1	3.8	54.7	
BC	3-4	4.7	.1				0.7	.0	17.8	9.5	19.8	4.8	1.2	6.0	42.4	
C	4-8	4.3	.0							7.3	6.3	6.0	1.1	12.0	49.2	
R	8+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	½-0										64	18	.11	28							
Ae	0-1			76	14	10															
Bm	1-3	11	1/4	65	23	12												36	23	1.5	3.14
BC	3-4	26	1/2	74	1	26															
C	4-8	25	1/8	63	29	8									17	15	1	19	11	2.0	1.94
R	8+																				

Site Number: BT22a

Date: 24th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 457000 E 6323000 N

Landform: Esker-Kame Complex

Aspect: ENE

Slope: 15%

Parent Material: Lacustrine/Glacio-fluvial

Climatic Zone: 2

Soil Subgroup: Cryic* Degraded Eutric Brunisol

Soil Series: Notigi

Soil Profile: # 40 (mound)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	½-0	cw				Litter
Ae	0-4	cw	C	10YR7/2	10YR5/3	F3GB
Bm1	4-8	aw	C	10YR6/1.5	10YR4/3	F3SBK
Bm2	8-13	cs	C	10YR6/2	7.5YR4/2	F3SBK
Bm3	13-21	cs	C	10YR5/1.5	5YR3/2	F2GR
BCk	21-23	as	C	10YR5.5/1.5	5YR4/2	F1GR
Ck	23-30+		SICL	10YR7/3	10YR6/3	A

Vegetation:

Stratification	Species	Dom/Cover
Ground	Linnaea bor.	1/5
	Vaccinium v.i.	1/1
	Hylocomium spl.	2/5
	Pleurozium sch.	1/1

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT22a

PROFILE NUMBER: 40

SUBGROUP: Cryic* Degraded Eutric Brunisol

SERIES: Notigi

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	½-0	4.1					47.3	1.5	32.2	48.5	7.2	5.5	2.3	1.2	78.5	
Ae	0-4	4.3	.2				4.4	0.2	21.9	28.2	45.1	5.5	4.5	3.3	49.4	
Bm1	4-8	5.1	.2				2.0	0.1	16.8	37.9	51.8	17.5	3.7	2.1	20.1	
Bm2	8-13	6.0	.1				1.9	0.1	17.6	36.7	68.6	20.0	3.0	1.7	10.2	
Bm3	12-21	7.0	.2				2.2	0.2	13.8	40.5	80.7	18.1	2.4	1.7	3.6	
BCk	21-23	7.3	.3	1.9	2		1.1	0.1	13.4	26.5						
Ck	23-30+	7.7	.2	12.2	12					10.3						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S.P.	D.R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	>d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	½-0										56	14	.12	20							
Ae	0-4			4	11	85															
Bm1	4-8			2	9	90															
Bm2	8-13			2	9	89															
Bm3	13-21			8	24	68															
BCk	21-23			3	28	69															
Ck	23-30+			3	63	34															

Site Number: BT22b

Date: 24th August '72

N.T.S. Map Sheet: Big Sand Lake

Location: 457000 E 6323000 N

Landform: Esker-Kame Complex

Aspect: ENE

Slope: 15%

Parent Material: Lacustrine/Glacio-fluvial

Climatic Zone: 2

Soil Subgroup: Cryic* Degraded Eutric Brunisol

Soil Series: Notigi

Soil Profile: # 41 (groove)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	5-2	cs				Litter
F-H	2-0	aw				Litter
Ae	0-5	cs	C	10YR6/2	10YR5/2	F2GR
AB	5-8	as	C	10YR5/2	10YR3/3	F3GR
Bm	8-12	cs	C	10YR5.5/2	7.5YR4/2	F2GR
BCk	12-17	as	C	10YR6/2	10YR4/3	F1GR
Ck	17-25+		SICL	10YR7/3	10YR5.5/3.5	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	wB, wS, bS	5/63 1/4 1/4
Ground	Cornus can.	3/30
	Viburnum edule.	1/1
	Hylocomium spl.	2/5
	Pleurozium sch.	1/1
	Pyrola sec.	1/1
	Ledum groen.	3/30
	Epilobium spp.	1/2
	Equisetum spp.	1/2
	Lycopodium ann.	1/5
	Linnaea bor.	
	Vaccinium v.i.	

Tree Cover : wB, wS, bS
Species comp.(%): 90 5 5
Crown closure(%): 70
Cutting class : young
Age Distribution: even
History, etc. : fire regeneration
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	40	84	8.7	dom.
bS			9.3	dom.
wS	20		5.5	

SITE NUMBER: BT22b

PROFILE NUMBER: 41

SUBGROUP: Cryic* Degraded Eutric Brunisol

SERIES: Notigi

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	5-2	3.6					59.1	1.8	33.4	95.6	34.4	12.7	6.5	0.7	44.1	
F-H	2-0	4.5					33.2	1.1	31.0	83.8	39.2	9.6	4.3	0.1	45.6	
Ae	0-5	5.6	.3				14.4	0.4	32.7	55.2	67.7	14.2	2.8	1.5	12.9	
AB	5-8	6.4	.3				8.4	0.4	23.9	49.8	77.5	15.2	2.1	1.6	8.0	
Bm	8-12	6.6	.2				2.1	0.1	16.0	34.8	80.0	20.8	3.0	1.9	6.3	
BCk	12-17	7.5	.4	6.0	6		0.8	0.1	11.4	22.9						
Ck	17-25	7.6	.3	10.2	10					10.2						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	5-2										80	8	.19	12							
F-H	2-0										40	4	.30	46							
Ae	0-5			8	17	75															
AB	5-8			13	26	61															
Bm	8-12			4	15	81															
BCk	12-17			6	33	61															
Ck	17-25			3	63	34															

Site Number: BT 23a

Date: 24th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform: Fen

Aspect: Nil

Slope: Nil

Parent Material: Organic/Lacustrine

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
9'6" peat	over	lacustrine				

Vegetation:

Stratification	Species	Dom/Cover
Understory	Larix l.	
	Salix spp.	
	Betula gland.	4/70
Ground	Drepanocladus spp.	
	Carex spp.	4/50
	Chamae. cal.	
	Equisetum spp.	
	Andromeda glau.	3/40

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: BT 23b

Date: 24th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform:

Aspect:

Slope: 10%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/70
Ground	Pleurozium s.	5/100
	Hylocomium spl.	1/1
	Cornus can.	1/1
	Vaccinium v.i.	1/1
	Petasites pal.	1/1

Tree Cover : bS (wB)
Species comp.(%): 100
Crown closure(%): 70
Cutting class : 4
Age Distribution: even
History, etc. : climax (after fire)
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	40-50		5-7	

Site Number: BT 24a

Date: 25th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform: Wooded Mineral Palsa

Aspect: Nil

Slope: Nil

Parent Material: Organic/Lacustrine

Climatic Zone: 2

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-F	15-12					Litter
Om)						
Oh)	12-0					
C	0-4					
Cz	4+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	wS, bS, wB	3/42, 2/6, 2/18
Understory	bS, wS	3/ 1/
Ground	Rubus spp.	2/5
	Epilobium ang.	1/3
	Pyrola sec.	2/10
	Ribes gland.	2/1
	Viburnum edu.	1/2
	Hylocomium spp.	3/25
	Pleurozium sch.	2/10
	Dicranum fus.	1/1
	Equisetum spp.	1/1

Tree Cover : wS, bS, wB
Species comp.(%): 70 10 20
Crown closure(%): 60
Cutting class : mature
Age Distribution: uneven
History, etc. : bS regeneration, possibly a fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
wS	53	67	11.0	cool
wS	39	60	7.4	av.

Site Number: BT 24b

Date: 25th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform: Fen

Aspect: Nil

Slope: Nil

Parent Material: Peat/Lacustrine

Climatic Zone: 2

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
3'9" Peat over lacustrine						

Vegetation:

Stratification	Species	Dom/Cover
Ground	Equisetum hye. Potentialla pal. Carex spp.	4/

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: BT25

Date: 25th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform: Esker

Aspect: Nil

Slope: Nil

Parent Material: Organic

Climatic Zone: 2

Soil Subgroup: Degraded Dystric Brunisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	1-0					Litter
Ahe	0-1		S			
Ae	1-3		S			
Bm_1	3-11		S			
Bm_2	11-18		S			
BC	18-22		CS			
C	22+		CS			

Vegetation:

Stratification	Species	Dom/Cover
Tree	wS, tA, wB, bS	2/18,2/18,2/18,2/6
Understory	bS	
Ground	Viburnum edu.	2/5
	Epilobium ang.	2/5
	Ledum groen.	2/5
	Juniperus com.	1/2
	Rubus pub.	1/2
	Geocaulon gla.	2/5
	Cornus can.	2/5
	Linnaea bor.	2/5
	Arctostaphylos u.u.	2/5
	Vaccinium v.i.	1/2
	Aralia nud.	2/5
	Hylocomium spp.	2/5
	Dicranum spp.	1/5
	Pleurozium spp.	1/5

Tree Cover : wS, tA, wB, bS
Species comp.(%): 30 30 30 10
Crown closure(%): 60
Cutting class : 4
Age Distribution: uneven
History, etc. : intermediate
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
wS	50	100	10.1	dom.
wS	35	43	8.2	

Site Number: BT26

Date: 25th August '72

N.T.S. Map Sheet: Granville

Location:

Landform: Drumlinized Terrain

Aspect:

Slope: 3 %

Parent Material: Lacustrine/Bedrock

Climatic Zone: 3

Soil Subgroup: Solodic Gray Luvisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	4-0					Litter
Ae	0-7		SIC			Shotty
Btnj	7-9		C			COL
Btnj	9-14		C			COL
BCk	14-18		C			F-ABK
Ck	18+		C			

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS wS	4/63 1/7
Understory	Picea mar.	3/15
Ground	Pleurozium sch.	5/95
	Hypnum c.c.	2/5
	Hylocomium spl.	2/5
	Ledum groen.	2/5
	Cornus can.	1/3
	Vaccinium v.i.	1/1

Tree Cover : bS, wS
Species comp.(%): 90 10
Crown closure(%): 60-70
Cutting class : mature
Age Distribution: even
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	55	100	7.0	cod
bS	59	110+	8.5	coa

Site Number: BT27

Date: 25th August '72

N.T.S. Map Sheet: Granville

Location:

Landform: Lacustrine plain (over drumlinized terrain)

Aspect: E

Slope: 11 %

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Solodic Gray Luvisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	2-0					Litter
Ae	0-3		SIC			
$Bntj_1$	3-6		C			
$Bntj_2$	6-12		C			
Bt	12-16		C			
BC	16-19		C			
Ck	19+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS jP	5/ 1/
Understory	Alnus cri.	5/
	Picea mar.	
Ground	Vaccinium v.i.	2/2
	Peltigera aph.	2/2
	Rosa spp.	1/1
	Pleurozium sch.	5/80
	Hylocomium spl.	1/5
	Dicranum spp.	1/1
	Hypnum spp.	1/1
	Linnaea bor.	2/2
	Cladonia spp.	1/1

Tree Cover : bS jP
Species comp.(%): 90 10
Crown closure(%):
Cutting class : mature
Age Distribution: even
History, etc. : fire regeneration-close to climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	65	105	8.4	dom.

Site Number: BT28

Date: 25th August '72

N.T.S. Map Sheet: Granville

Location:

Landform: Glacio-fluvial Outwash (Kames)

Aspect:

Slope:

Parent Material: Glacio-fluvial Sand

Climatic Zone: 3

Soil Subgroup: Degraded Dystric Brunisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	1½-0					Litter
Ae1	0-2½		S			
Bmj	2½-3½		S			
Ae2	3½-5½		S			
Bm	5½-12½		S			
BC	12½-15½		S			
C	15½+		S			

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP wB	4/54 2/18
Understory	Alnus cris.	2/20
Ground	Pleurozium sch.	4/60
	Epilobium ang.	1/1
	Vaccinium v.i.	1/4
	Geocaulon liv.	1/3
	Rosa spp.	1/2
	Linnaea bor.	1/2
	Viburnum edu.	1/1
	Dicranum spp.	1/1
	Lycopodium obs.	1/1
	Aralia nud.	2/4
	Pyrola virens	1/1
	Vaccinium myr.	1/3

Tree Cover : jP wB
Species comp.(%): 80 20
Crown closure(%): 55-60
Cutting class : even
Age Distribution: fire reg. some fire damaged trees
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jP	45-50	110		

Site Number: BT29

Date: 28th August '72

N.T.S. Map Sheet: Uhlman Lake

Location: 15-88-12 W

Landform: Wooded Mineral Palsa

Aspect: E

Slope: 2%

Parent Material: Lacustrine

Climatic Zone: 2

Soil Subgroup: Gleyed Cryic Orthic Gray Luvisol

Soil Series: Mynarsky

Soil Profile: # 45

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-F	7-6	aw				Litter
H	6-0	as				Litter
Ae	0-6	as	SIC	5Y6/2	10YR45/1	M2GR
Btg	6-12	as	C	5GY6/1	10YR4/2	F3SBK
BCkg	12-17	as	C	5GY6/1	10YR5/1	F2SBK
Ckg	17-23	as	C	5Y6/2	10YR45/1	A
Ckgz	23+					

Vegetation:

Stratification		Species	Dom/Cover
Tree		wB	5/80
Understory		Salix spp.	1/1
Ground	A	Epilobium ang.	1/3
		Lycopodium am.	2/8
		Ribes gran.	2/8
		Rubus spp.	2/5
		Ledum groen.	1/1
		Grasses	2/10
	B	Ledum groen.	5/90
		Pleurozium sch.	1/5
		Cladonia rang.	1/5

Tree Cover : wB
Species comp.(%): 100
Crown closure(%): 70-80
Cutting class : undermature
Age Distribution: even
History, etc. : fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
wB	46	30	7	
bS	29	40	4	

SITE NUMBER: BT29 SUBGROUP: Gleyed Cryic Orthic Gray Luvisol

PROFILE NUMBER: 45 SERIES: Mynarski

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-F	7-6	4.7					50.7	2.4	21.1	98.7	48.9	12.5	2.2	0.2	45.7	
H	6-0	4.4					50.8	3.1	16.4	147.9	38.0	5.7	0.1	0.1	40.4	
Ae	0-6	7.2	0.3	5.6	6		1.9	0.1	21.6	15.5						
Btg	6-12	7.5	1.3	2.2	2		0.5	0.0	11.5	17.5						
BCkg	12-17	7.5	0.7	13.7	14		0.5	0.1	9.6	19.4						
Ckg	17-23	7.5	0.4	14.4	14					19.5						
Ckgz	23+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	I d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-F	7-6												.22								
H	6-0												.56								
Ae	0-6			15	41	44												44	14	1.9	10.31
Btg	6-12			0	18	82												67	22	1.7	13.25
BCkg	12-17			15	37	48												65	20	1.7	14.49
Ckg	17-23			2	17	81									56	27	29	59	17	1.8	13.25
Ckgz	23+																				

Site Number: BT30

Date: 28th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform: Wooded Peat Plateau

Aspect: Nil

Slope: Nil

Parent Material: Organic

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
2'9" of organic over lacustrine at 1'4" permafrost						

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/10
Understory	Picea mar.	4/30
Ground	Ledum groen.	5/70
	Vaccinium v.i.	1/1
	Vaccinium oxy.	1/1
	Chamaedaphne spp.	1/2
	Kalmia spp.	1/2
	Cladonia rang.	2/5
	Cladonia alp.	3/30
	Sphagnum spp.	2/20
	Pleurozium sch.	2/5
	Dicranum spp.	
	Rubus cham.	1/2

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 10
Cutting class : young
Age Distribution: uneven
History, etc. : older bS spared by fire
Measurements : understory bS fire regeneration

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	5-12		1-2	av.

Site Number: BT31

Date: 28th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform: Wooded Palsa

Aspect: Nil

Slope: Nil

Parent Material:

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
Om	17					
Omz	17-65					
Cz	65+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS wB	5/75 2/5
Understory	Salix spp.	3/
	Picea mar.	2/10
Ground	Ledum groen.	4/50
	Vaccinium v.i.	2/5
	Pleurozium sch.	4/70
	Hylocomium spp.	3/30
	Sphagnum fus.	2/5
	Dicranum fus.	1/1
	Peltigera aph.	1/1
	Rubus cham.	

Tree Cover : bS wB
Species comp.(%): 90 5
Crown closure(%): 70-80
Cutting class :
Age Distribution: even
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	47	75	9.9	dom.
bS	44	90	5.1	cod

Site Number: BT32

Date: 28th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform:

Aspect: Nil

Slope: Nil

Parent Material: Lacustrine and alluvium/bedrock

Climatic Zone: 3

Soil Subgroup: Degraded Dystric Brunisol

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	3-0					Litter
Ae_1	0-3		S			
Ae_2	3-6		VFS			
Bmk	6-10		SI			
BC	10-13		SI			
C	13+		SI			

Vegetation:

Stratification	Species	Dom/Cover
Tree	wS,wB,bPo,tA	4/60,3/10,3/5,3/5
Understory	Alnus crispa	1/1
	wS, tA	3/15 2/5
Ground	Cornus can.	4/60
	Rosa acic.	2/5
	Viburnum edule	2/10
	Epilobium ang.	2/5
	Vaccinium v.i.	2/5
	Ledum groen.	1/1
	Mitella nuda	1/2
	Pyrola spp.	1/2
	Linnaea bor.	1/3
	Hylocomium spp.	1/2
	Pohlia nutans	1/1
	Pyrola virens	1/1
	Geocaulon liv.	1/1

Tree Cover : wS, wB, bPo, tA
Species comp.(%): 70 10 10 10
Crown closure(%): 70
Cutting class : 5-3
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
wS	50	85	11.2	cod.
wS	47	45	9.3	cod.
tA	45	50	6.8	dom.
wS	60+	100+	16"	dom.

Site Number: BT33

Date: 28th August '72

N.T.S. Map Sheet: Uhlman Lake

Location:

Landform:

Aspect: W

Slope: 12 %

Parent Material: Lacustrine/Bedrock

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	3-0					Litter
Ae	0-3		FS			
AB	3-6		SC			
Btnj1	6-9		C			
Btnj2	9-13½		C			
Bt	13½-19½		C			
BCk	19½-23		C-SIC			
Ck	23+		C-SIC			

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS jP	4/60 2/20
Understory	Alnus crispa	3/
	Picea mar.	2/
Ground	Linnaea bor.	2/
	Vaccinium v.i.	1/1
	Viburnum edule	3/
	Pleurozium sch.	5/90
	Hylocomium spl.	2/7
	Rosa spp.	2/
	Polytrichum com	1/
	Hypnum c.c	1/1

Tree Cover : bS jP
Species comp.(%): 80 20
Crown closure(%): 75-80
Cutting class : 4 (3)
Age Distribution: even
History, etc. : close to bS-Feathermoss climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	44	80	6.4	dom.
bS	42	80	6.1	

Site Number: BT34

Date: 28th August '72

N.T.S. Map Sheet:

Location:

Landform:

Aspect:

Slope: 20 %

Parent Material: Lacustrine/Bedrock

Climatic Zone:

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	2-0					Litter
Ae	0-4		C			Shotty
Bntj	4-7		C			C-BK
Bnt	7-13		C			M-BK
BC	13-19		C			
C1	19-46		varved			
C2	46+		varved			

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	5/100
Ground	Ledum groen.	2/5
	Rosa spp.	1/1
	Vaccinium v.i.	1/3
	Epilobium ang.	1/1
	Pleurozium spp.)	5/90
	Hylocomium spp.)	
	Cladonia alp.	1/5
	Peltigera spp.	1/1

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 100 with open spaces
Cutting class : 3-4-5
Age Distribution: uneven
History, etc. : climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

Site Number: BT35

Date: 29th August '72

N.T.S. Map Sheet: Uhlman Lake

Location: SW¼-33-84-16 W

Landform: Bedrock Controlled Terrain

Aspect: E

Slope: 5%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Degraded Eutric Brunisol

Soil Series: Costello

Soil Profile: # 46

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	1-0	aw				Litter
Ae	0-2	aw	SICL	10YR6/3	10YR45/3	C1PL
Bm1	2-7	as	SICL	10YR55/4	10YR35/3	M2GR
Bm2	7-11	as	SICL	10YR5/4	10YR35/25	M2GR
Ck1	11-17	cs	SIL	10YR7/35	10YR55/3	A
Ck2	17-21	aw	SIL	10YR7/4	10YR55/3	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, jP, wB	3/30 3/40 2/20
Understory	Alnus crispa	5/75
Ground	Linnaea bor.	
	Cornus can.	
	Arctost. u.-u.	
	Viburnum edule	
	Fragaria spp.	
	Epilobium ang.	

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT35 SUBGROUP: Degraded Eutric Brunisol

PROFILE NUMBER: 46 SERIES: Costello

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	1-0	5.9					32.3	.8	38.9	62.6	71.8	14.5	2.9	2.4	16.0	
Ae	0-2		.3				1.9	.1	21.8	21.2	71.5	22.8	1.9	1.5	9.1	
Bm1	2-7	6.6	.2				1.3	.1	16.8	20.9	78.5	23.8	2.0	1.6	6.2	
Bm2	7-11	7.3	.4				1.1	.1	14.1	21.1	83.5	25.1	2.0	1.6	0.6	
Ck1	11-17	7.7	.3	23.9	24					9.3						
Ck2	17-21	7.6	.3	20.9	21					6.9						
R	21+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	$\frac{-}{d}$ (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	1-0																				
Ae	0-2			3	64	33	1.31	1.35	6.1	97.2								44	20	1.7	7.45
Bm1	2-7			3	59	39	1.26	1.30	4.4	4.5								43	13	1.9	11.22
Bm2	7-11			3	59	38	1.50	1.54	10.6	10.9								44	14	1.9	10.65
Ck1	11-17			3	74	23	1.59	1.61	31.8	32.6					28	19	9	34	14	1.9	6.70
Ck2	17-21			8	68	24									26	19	7	32	14	1.9	4.80
R	21+																				

Site Number: BT36

Date: 29th August '72

N.T.S. Map Sheet: Nelson House

Location: 12-78-17 W

Landform: Drumlinized Terrain

Aspect:

Slope: Nil

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Solodic Gray Luvisol

Soil Series: Waboden

Soil Profile: # 47

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	3-0	as				Litter
Ae	0-3	aw	C	10YR6/3	10YR5/3	F1PL
AB	3-5	aw	C	10YR7/3	10YR6/25	C2PL
Bnt1	5-13	cs	C	10YR6/35	10YR45/3	C3COL
Bnt2	13-18	cs	C	10YR5/4	10YR4/3	C2COL
Bt	18-22	cs	C	10YR45/3	10YR3/3	M2SBK
BC	22-25	cs	C	10YR55/3	10YR4/3	A
Ck1	25-28+		C	10YR5/35	10YR35/3	A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, wB	4/63 2/9
Ground	Rosa acic.	2/5
	Cornus can.	1/1
	Vibrum edule	1/1
	Pleuronium schr.	4/70
	Hylocomium spp.	2/20
	Hypnum c.c.	2/
	Linnaea bor.	1/
	Dicranum spp.	

Tree Cover : bS wB
Species comp.(%): 90 10
Crown closure(%): 70
Cutting class :
Age Distribution: even aged
History, etc. : appears to be old fire regen.
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	41	83	4.6	cod.
bS	47	83	5.6	dom.

SITE NUMBER: BT36 SUBGROUP: Solodic Gray Luvisol

PROFILE NUMBER: 47 SERIES: Wabowden

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	3-0	3.6					59.4	1.0	62.5	86.4	15.9	14.3	5.9	1.8	63.8	
Ae	0-3	5.4	0.3				4.9	0.2	28.5	34.0	36.4	19.2	3.1	1.1	28.9	
AB	3-5	4.7	0.1				1.6	0.1	15.8	26.9	37.9	22.0	2.2	0.9	22.9	
Bnt1	5-13	5.1	0.1				0.8	0.1	11.1	31.8	47.8	35.2	2.1	1.2	15.3	
Bnt2	13-18	6.1	0.2				0.7	0.1	11.3	32.7	54.6	41.2	2.3	1.6	6.8	
Bt	18-22	7.0	0.2				0.6	0.1	8.6	33.1	47.2	44.0	2.2	1.6	3.7	
Bc	22-25	7.5	0.9	2.0	2		0.5	0.1	7.1	20.5						
Ck1	25-28	7.5	1.0	4.1	4					21.5						

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	3-0																				
Ae	0-3			7	30	64															
AB	3-5			5	28	67															
Bnt1	5-13			2	16	83															
Bnt2	13-18			2	15	84															
Bt	18-22			1	16	83															
BC	22-25			2	22	77															
Ck1	25-28			1	18	81															

Site Number: BT37

Date: 29th August '72

N.T.S. Map Sheet: Nelson House

Location:

Landform:

Aspect:

Slope:

Parent Material: Lacustrine/Bedrock

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-H	3-0	as				Litter
Ae	0-4	aw				F1PL
AB	4-6	aw				C2PL
Bnt1	6-13	cs				C3COL
Bnt2	13-19	cs				C2COL
Bt	19-24	cs				M2SBK
BC	24-27	cs				A
Ck1	27-29					A

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS, wS	4/60, 2/20
Understory	Alnus crispa	1/
	bS wS	3/20
Ground	Pleurozium sch.	5/80
	Hylocomium spl.	2/15
	Hypnum c.c.	2/8
	Vaccinium v.i.	1/2
	Linnaea bor.	1/2
	Viburnum edu.	1/2
	Rosa acic.	1/1
	Pyrola virens	1/1
	Pohlia nutans	3/
	Dicranum spp.	3/
	Mitella nuda	1/

Tree Cover : bS wS
Species comp.(%): 80 20
Crown closure(%): 60-70
Cutting class : 4-5
Age Distribution: relatively even
History, etc. : fire regeneration, climax
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
bS	75		12.6	dom.
wB	72	115	11.7	dom.

Site Number: BT38

Date: 30th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 23-79-1 W

Landform: Lacustrine Terrain

Aspect: N

Slope: 4%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Gleyed Solodic Gray Luvisol

Soil Series: Roe Lake

Soil Profile: # 48

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	
L-H	5-0	as				Litter
Ae	0-3	as	C	10YR7/3	10YR5/25	C1PL
Bnt	3-6	aw	C	10YR6/35	10YR5/35	M2COL
Bt	6-11	cs	C	10YR5/3	10YR4/3	F2GR
BCk	11-13	as	C	10YR55/4	10YR5/4	F1GR
Ck1	13-25	as	C	10YR65/35	10YR5/4	A
Ck2	25-31+	as	C	10YR7/3	10YR6/3	A
Ckz	54+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	bS	4/70
Understory	Salix spp.	2/8
Ground	Ledum groen.	2/13
	Vaccinium v.i.	1/2
	Geocaulon liv.	1/1
	Cornus can.	1/2
	Viburnum edule.	1/2
	Pleurozium schr.	5/80
	Hylocomium spl.	2/8
	Hynum c.c.	2/5
	Cladonia spp.	2/8
	Rosa acic.	1/1

Tree Cover : bS
Species comp.(%): 100
Crown closure(%): 70-60
Cutting class : young
Age Distribution: even
History, etc. : likely fire
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT38 SUBGROUP: Gleyed Solodic Gray Luvisol

PROFILE NUMBER: 48 SERIES: Roe Lake

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	5-0	4.0					52.4	.8	63.9	109.3	29.6	2.8	1.4	.6	56.3	
Ae	0-3	5.9	.3				4.5	.2	22.6	38.8	61.7	12.2	2.1	.4	13.1	
Bnt	3-6	6.0	.2				2.1	.1	16.5	37.2	69.4	16.1	2.1	.5	8.2	
Bt	6-11	6.9	.5				0.9	.1	9.7	36.6	77.1	19.3	2.4	.6	1.7	
BCk	11-13	7.5	.6	7.7	8		0.6	.1	8.2	22.3						
Ck1	13-25	7.6	.3	17.9	18					17.7						
Ck2	25-31+	7.6	.2	23.9	23					14.9						
Ckz	54+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN.)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
L-H	5-0																				
Ae	0-3			3	17	80															
Bnt	3-6			2	8	90												62	20	1.6	12.53
Bt	6-11			1	6	93												55	10	1.8	11.24
BCk	11-13			11	21	68												67	16	1.8	16.07
Ck1	13-25			3	18	79												62	17	1.8	14.25
Ck2	25-31+			3	25	72	1.53	1.58	15.2	15.7					35	27	8	59	18	1.8	13.04
Ckz	54+														47	25	22	54	17	1.8	13.67

Site Number: BT39a

Date: 30th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 32-80-2 E

Landform: Drumlinized Terrain

Aspect: E

Slope: 2%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Cryic* Degraded Eutric Brunisol

Soil Series: Witchai

Soil Profile: # 49(mound)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	5-0	as				Litter
Ae	0-4	as	SICL	10YR7/4	10YR5/4	C1PL
Bm	4-6	aw	SIC	10YR5/5	10YR4/4	F1GR
Ck1	6-18	cs	SIL	10YR7/3	10YR6/3	A
Ck2	18-29	as	SICL	10YR6/3	10YR5/4	A
Ck3	29-37	as	SI	10YR8/3	10YR7/3	A
R	37+					

Vegetation:

Stratification	Species	Dom/Cover
Ground	Rubus spp.	2/5
	Polytrichum com.	1/1
	Viburnum edule.	2/10
	Epilobium ang.	2/8
	Ledum groen.	3/40
	Cornus con.	2/5
	Petasites pal.	2/5
	Rosa spp.	2/5
	Linnaea bor.	1/3
	Mitella nud.	1/
	Vaccinium v.i.	1/1
	Pohlia nut.	1/4

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.

SITE NUMBER: BT39a SUBGROUP: Cryic* Degraded Eutric Brunisol

PROFILE NUMBER: 49 SERIES: Witchai

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	5-0	3.9					42.9	.9	45.6	94.6	32.3	4.6	1.0	.1	57.9	
Ae	0-4	5.7	.2				1.5	.1	18.3	20.8	54.9	19.3	1.3	.1	12.1	
Bm	4-6	6.7	.3				1.4	.1	15.7	24.2	68.5	27.8	1.1	.1	4.7	
Ck1	6-18	7.6	.3	36.3	36					6.7						
Ck2	18-29	7.6	.2	25.4	25					11.7						
Ck3	29-37	7.8	.2	47.1	47					2.2						
R	37+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S.P.	D.R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (1N.)	%	%	%	g/cc	g/cc	%	%	Unrubb.	Rubbed	(%) A	%				%			
L-H	5-0																				
Ae	0-4			4	60	36												37	15	1.8	6.71
Bm	4-6			4	57	39	1.51	1.58	7.0	7.3								40	13	1.9	9.40
Ck1	6-18			3	81	16	1.64	1.66	68.1	70.3								30	15	1.9	4.83
Ck2	18-29			4	62	34	1.49	1.52	17.7	18.3					28	18	9	35	13	1.9	8.19
Ck3	29-37			5	89	7									31	19	13	27	18	1.8	0.97
R	37+																				

Site Number: BT39b

Date: 30th August '72

N.T.S. Map Sheet: Sipiwesk

Location: 32-80-2 E

Landform: Drumlinized Terrain

Aspect: E

Slope: 2%

Parent Material: Lacustrine

Climatic Zone: 3

Soil Subgroup: Cryic* Degraded Eutric Brunisol

Soil Series: Witchai

Soil Profile: # 50 (groove)

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour Dry	Colour Moist	Struct.
L-H	4-0	as				Litter
Ahj	0-2½	ad	SIL	10YR55/3	10YR4/2	M1PL
Aej	2½-5½	aw	SIL	10YR6/3	10YR5/3	M1GR
Bt	5½-15	as	SICL	10YR5/35	10YR4/4	F1GR
BCk	15-23	as	SIL	10YR7/35	10YR6/3	A
Ck1	23-25	as	SIL	10YR8/2	10YR6/3	A
Ck2	25-37	aw	SIC	10YR7/3	10YR5/3	A
R	37+					

Vegetation:

Stratification	Species	Dom/Cover
Tree	jP, bS	3/17 1/3
Understory	Alnus crispa	3/20
	Betula pap.	1/3
Ground	Viburnum edule	2/10
	Epilobium ang.	2/8
	Ledum groen.	3/40
	Cornus can.	2/5
	Petasites pal.	2/5
	Rosa spp.	2/5
	Linnaea bor.	1/3
	Mitella nud.	1/
	Vaccinium v.i.	1/1
	Pohlia nut.	1/4

Tree Cover : jP, bS
Species comp.(%): 85 15
Crown closure(%): 10-20
Cutting class : undermature
Age Distribution: uneven
History, etc. : fire regeneration
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.
jP	28		3.5	
bS	28			

SITE NUMBER: BT39b
PROFILE NUMBER: 50

SUBGROUP: Cryic* Degraded Eutric Brunisol
SERIES: Witchai Series

HORIZON	DEPTH	pH	CONDUCTIV.	$CaCO_3$ EQUIV.	CALCITE	DOLOMITE	ORG. C	N	C/N RATIO	EXCHANGE ANALYSIS						$NaHCO_3$ SOLUBLE P
										C. E. C.	Ca	Mg	K	Na	EXCH. ACID.	
	IN.		mmho	%	%	%	%	%		me/100 gms	%	%	%	%	%	ppm
L-H	4-0	4.3					42.3	.9	47.0	89.6	43.1	2.7	1.4	.1	46.9	
Ahj	0-2½	5.9	.3				5.7	.2	29.8	34.1	58.3	14.0	0.5	.1	16.6	
Aej	2½-5½	6.1	.2				1.4	.1	22.5	16.6	65.9	15.7	0.5	.2	11.4	
Bt	5½-15	7.2	.4	0.9	1		0.7	.1	13.4	15.4						
BCk	15-23	7.6	.7	29.3	29		0.5	.1	10.8	9.9						
Ck1	23-25	7.8	.2	43.0	43					3.3						
Ck2	25-37	7.7	.3	28.2	28					12.2						
R	37+															

HORIZON	DEPTH	MECHANICAL ANALYSIS					BULK DENSITY		ERODIBILITY INDICES		ORGANIC ANALYSES				PLASTICITY			SHRINKAGE			
		G		S	Si	C	MOIST	DRY	S. P.	D. R.	FIBER %		PYRO-PHOS.	ASH	LIQUID LIM.	PLASTIC LIM.	INDEX	SAT.	LIMIT	RATIO	LINEAL (DISH)
	IN.	%	d (IN)	%	%	%	g/cc	g/cc	%	%	Unrubb	Rubbed	(%) A	%				%			
L-H	4-0																				
Ahj	0-2½			7	67	26															
Aej	2½-5½			7	71	22															
Bt	5½-15			4	58	38	1.46	1.49	17.3	18.1											
BCk	15-23			3	71	26	1.52	1.56	33.9	34.8											
Ck1	23-25			4	85	12	1.51	1.56	25.6	26.6											
Ck2	25-37			13	40	46															
R	37+																				

Site Number: BT 40a

Date: 30th August '72

N.T.S. Map Sheet: Split Lake

Location:

Landform: Wooded Peat Plateau

Aspect:

Slope:

Parent Material: Organic

Climatic Zone: 3

Soil Subgroup:

Soil Series:

Soil Profile: #

Horizon	Depth (in.)	Bdy.	Tex. Class	Colour		Struct.
				Dry	Moist	

Vegetation:

Stratification	Species	Dom/Cover
Understory	wS reg.	4/10
	bS reg.	2/2
	wB reg.	2/2
Ground	Polytrichum com	
	Epilobium ang.	
	Pohlia nutans	
	Vaccinium v.i.	1/
	Ledum groen.	
	Rubus cham.	
	Lycopodium ama.	
	Ribes gland.	

Tree Cover :
Species comp.(%):
Crown closure(%):
Cutting class :
Age Distribution:
History, etc. :
Measurements :

Species	Height (ft.)	Age (yr.)	DBH (in.)	D or Aver.