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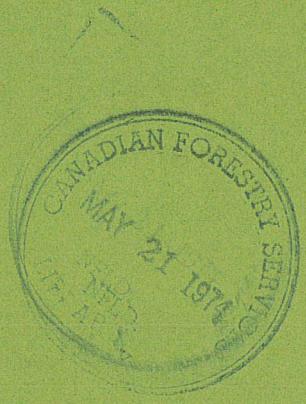
BIO-PHYSICAL SURVEY OF THE BADGER-DIVERSION LAKE AREA, NEWFOUNDLAND

Operational Project of the National Committee on Forest Land

by R.E. Wells and B.A. Roberts



NEWFOUNDLAND FOREST RESEARCH CENTRE
ST. JOHN'S, NEWFOUNDLAND
INFORMATION REPORT N-X-101

SEPTEMBER, 1973

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Biophysical Survey of the Badger-Diversion Lake Area, Newfoundland

by

R.E. Wells and B.A. Roberts

Part I - Introduction

1. Purpose of Survey

Guidelines for biophysical land classification were proposed in 1967 by the National Committee on Forest Land. The proposal was made in response to the need for a land classification system adapted to rapid reconnaissance survey, using aerial photographs as a major tool. The system has since undergone application and refinement leading up to recent operational surveys in British Columbia and Labrador.

The purpose of such surveys has been to provide the ecological information needed as a basis for land use planning at the regional level. However, it appears that more detailed information of this nature is needed for local forest land management decisions. Competition for alternate uses of forest lands and the prospect of increased demands for timber products are leading to an increased interest in intensive forest management within the forest industry. Increases in forest productivity required to meet the expected demands will probably have to come from those portions of existing timber limits which are most amenable to intensive management. In response to suggestions from both government and industry that the Biophysical Land Classification System be tailored for forestry purposes, the Canadian Forestry Service in 1972 initiated a detailed trial of the system for forest management purposes within the Price (Nfld.) Pulp & Paper Co. Ltd. timber limits in central Newfoundland.

To date, use of the biophysical guidelines has indicated that some revisions and modifications of the original concepts are needed, and that the purpose of the surveys should be broadened so that they can serve as basic environmental surveys (National Committee on Forest Land, 1971). Within that wider purpose, the aim of this present survey is to satisfy the need for a comprehensive and integrated knowledge of the environment at a level of ecological generalization that is useful to the practicing forester and land manager. As a result the main consideration has been to tailor, not the biophysical classification itself, but the size and content of the mapping units to make them acceptable both to the forester and the land classifier.

The level of generalization chosen for this survey is the Land Type. This is defined as an area of land having a fairly homogeneous combination of soil (at a level corresponding to the Soil Series*) and chronosequence of vegetation (Lacate, 1969). The land type is the basic biophysical land unit

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* A Soil Series is a group of soils having horizons similar in distinguishing characteristics and arrangement in profile and developed from the same parent material.

that can be interpreted to provide land evaluation data useful for planning and development. The mapping scale at the land type level ranges from 1:20,000 to 1:10,000. The dominant ecological variables are soil moisture regime physical and chemical soil properties, and microtopography.

The survey was carried out to determine 1) what land types are present in a reference area near Badger, central Newfoundland, 2) where they are located, and 3) how they can be used for forestry. Results of the survey are summarized in this report and include: a land type map at 1:15,840 scale, comprehensive descriptions of the land type mapping units, land capability ratings for forestry and agriculture, and preliminary interpretations for forestry management.

2. Survey Methods

Maps drawn up during the Provincial Forest Inventory and the Canada Land Inventory programs were used to select the reference area which included many of the land conditions found on the Price timber limits. Forest land capability boundaries at 1:50,000 scale provided the initial stratification of the area into land segments with characteristic patterns of potential forest use. Plot locations were selected within these boundaries and visited in the field. A total of 69 sample plots were described in detail, together with a number of observation points where only soil and forest type were checked. Complete information on landform, soils and vegetation was collected to characterize the biophysical land types.

The vegetation data included stand and ground flora descriptions and the assigning of a Damman (1964) forest type. Measurements of site-index and basal area were used to check the forest capability rating (McCormack, 1970) wherever stand conditions were suitable.

Soil descriptions included a complete profile description, notes on the parent material, texture, etc. (see sample of soil description card, Appendix II). The sixty-nine sample plots were found to belong to twenty separate soil series, and a total of eighty-three soil samples were selected for detail chemical analysis. (These analyses are not yet complete and will be published at a later date.)

Mapping of land types was done by interpretation of 1:15,840 scale aerial photographs in combination with the plot descriptions made during the field checking.

There was frequently a problem of delineating areas where different types are so intricately mixed and so small in size that they could not be shown separately on the map. Such areas are shown as complexes of two or at most three land types. These complex areas are, however, considered relatively homogeneous for most forestry purposes and should provide a useful framework for optimization of forest management and research activities.

Part II - Description of the Area

1. Location and Extent

The surveyed area includes 16,646 acres or approximately 26 square miles, and is located near Badger, central Newfoundland (Figure 1). The area comprises a two-mile-wide strip of land extending southeast approximately 13 miles from the Exploits River at Badger to Diversion Lake. The area centers on a woods road and was chosen for its accessibility as well as for being representative of a major portion of the Price timber limits.

2. Physiography

a) Topography and Geology

The surveyed area extends across a broadly rolling, ridged upland having elevations from 350 to just over 800 feet. Bedrock control of topographic pattern is most evident in the portion between the Exploits River and Coronation Brook. Undulating topography is dominant in this portion which is underlain mainly by basic lavas and sediments, but gently sloping topography occurs at several locations between Middle Brook and Coronation Brook and appears to be associated with gently inclined beds of slate. A section of hilly topography and steeply inclined bedrock is located along the height of land northeast of Beaver Pond. The remaining portion south of Coronation Brook is characterized by hummocky, strongly rolling topography and is underlain by acid intrusive rocks. Bedrock influence on topography is reduced here by thick glacial drift.

b) Geomorphology

Most of the landforms in the surveyed area are composed of glacial till deposited some seven to ten thousand years ago. Deposition during a period of active glaciation is indicated by a thin layer of till covering sections of terrace deposits along Sandy Brook and by the compact and generally homogeneous nature of the tills throughout the area.

Ground moraine predominates in the portion of the area underlain by lavas and sediments. The depth of these till deposits varies from less than one foot to over six feet. Texture ranges from loamy sand to sandy clay loam, but is usually sandy loam in undulating topography and silt loam in the gently sloping and hilly sections. Exposed bedrock occurs in the hilly relief northeast of Beaver Pond and at other scattered locations. Rock ledges can occasionally be found adjacent to drainage courses even in the smoothest sections.

Hummocky moraine tending toward ridged moraine is characteristic of the portion underlain by intrusive rocks. The associated strongly rolling topography is produced mainly by variations in till thickness which is everywhere greater than six feet. Till texture is generally coarser than in the portion north of Coronation Brook and ranges from sandy loam to sand. Extremely stony and bouldery sections are common throughout and usually occur on knolls and southwest-facing slopes.

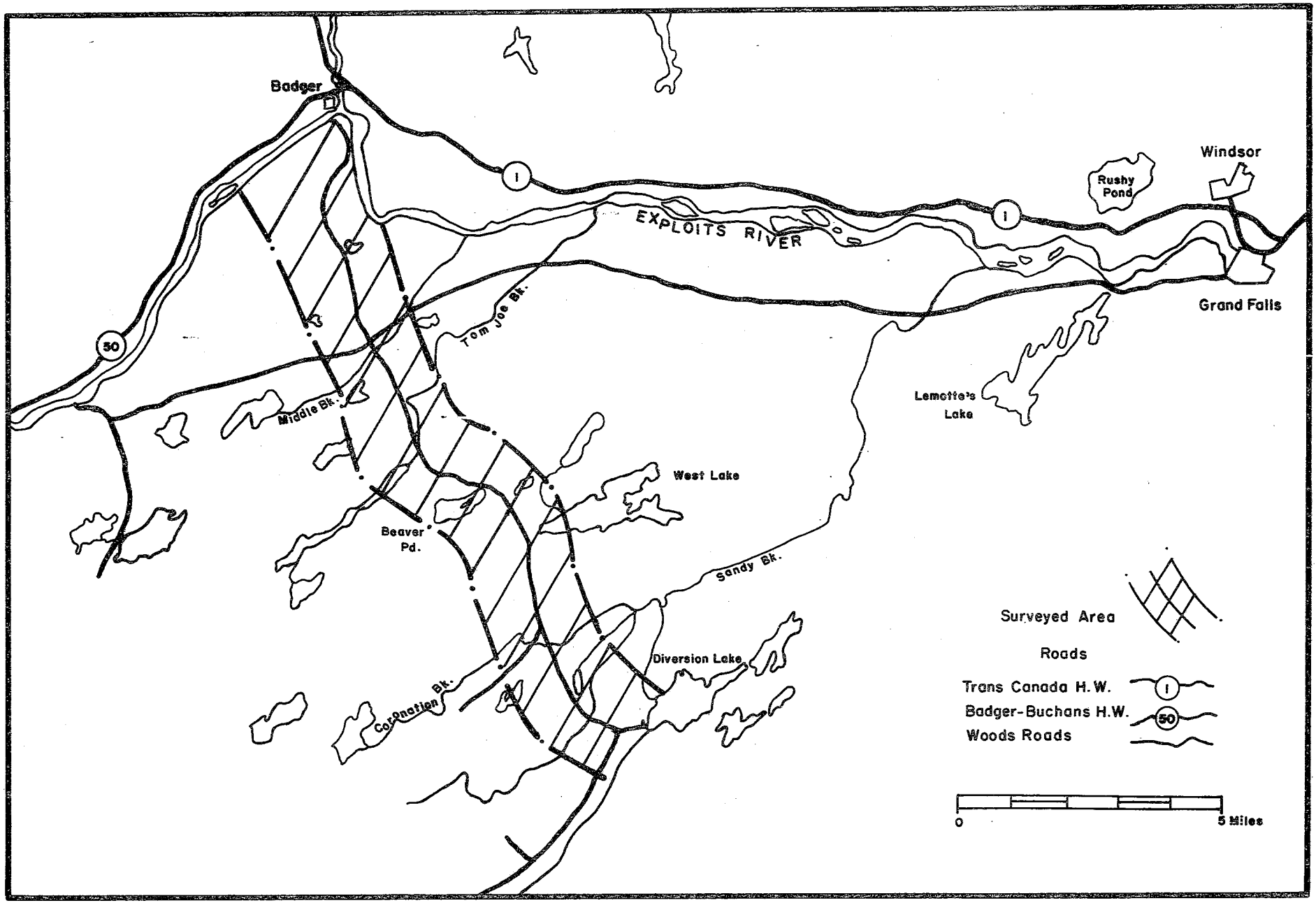

Fig. 1. Location of Badger-Diversion Lake Bio-Physical Survey Area.

Small sections of organic deposits occur in isolated depressions throughout the surveyed area. More extensive deposits are found mainly in low places along drainage courses.

c) Ecology

The forest communities of the surveyed area are typical of the Grand Falls Forest Section of the Boreal Forest Region (Rowe 1972) and have been described and classified by Damman (1964). Disturbance by fire has been a major factor influencing development of the forests over much of the area. As a result, pure stands of black spruce predominate on moderately coarse textured ground moraine, while open, dwarf shrub-black spruce forest occurs on the generally coarser textured hummocky moraine.

Balsam fir is dominant on medium textured ground moraine deposits, and relatively pure stands of fir occur on these materials at undulating to gently rolling locations or on steep slopes where there is seepage over bedrock. Abundant white birch and scattered white spruce are often present with the balsam fir on gently sloping topography. Such areas have moderate to poor drainage and are generally affected by seepage over a fragipan or compact till layer. Fire influence is shown by the presence of several relatively extensive stands of white birch which are confined mainly to the better drained portions of this smoother topography.

According to recent forest inventory maps,* forest conditions in the surveyed area can be divided as shown in Table 1.

Until recently, woods operations in the area generally involved the softwood stands composed mainly of balsam fir. In addition to pulpwood cutting, many of these fir stands were selectively logged to obtain timber for construction of dams and bridges. Some cutting of white birch was done to obtain timbers for mine support, but most seems to have occurred as a result of access roads being preferentially located in hardwood stands. Most of the recent cutting for pulpwood has been carried on in softwood stands and has removed much of the remaining mature balsam fir and black spruce in the area.

Part III - Biophysical Components

The main variables of the environment are climate, relief, parent material, living organisms (including man) and time. They are usually considered in terms of their pedogenic effect, but can also be listed as the interacting factors which influence and control natural forest development. It is generally assumed that wherever these factors are alike the forest is the same and that similar response can be expected on similar sites.

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*Newfoundland and Labrador Forest Inventory. 1968. Forest Type Maps, Badger (12A/16E) and Grand Falls (2D/13W) Map Sheets (1:15,840 scale).

Table 1.- Summary of the forest conditions in the survey area as shown by recent inventory maps.

	Acres	Square miles
Productive Forest Area		
Softwood stands	5,256	8.21
Mixed stands, softwood dominant	2,833	4.43
Mixed stands, hardwood dominant	1,025	1.60
Hardwood stands	3,740	5.84
	12,854	20.08
Non-productive Forest Area with some Tree Cover		
Softwood scrub	692	1.08
Hardwood scrub	46	0.07
Bog with trees	71	0.11
	809	1.26
No Tree Cover		
Open bog	2,170	3.39
Water (including lakes, small ponds, streams, and bog pools)	813	1.27
	16,646	26.01

Because these variables include both living and non-living influences they may be considered as biophysical components of forest ecosystems. The main biophysical components considered here are climate, landform (material as well as form), soil and vegetation. Their nature and influence within the surveyed area are briefly discussed in the following sections.

1. Climate

The climate of central Newfoundland is similar to that in several parts of continental eastern Canada and is not strongly affected by the cold Labrador current that is around the coast. The annual average of daily mean temperature is about 40°F. The coldest period, with average daily temperatures less than 10°F, is usually in February. The vegetative season begins around the middle of May and generally lasts until late October. The frost-free period is approximately 120 days, but local topography can reduce this considerably and is also responsible for lower than average winter temperatures at Badger.

The total mean annual precipitation in the vicinity of the study area is 40 inches, with October and November being the wettest months. Snowfall is usually greater than 100 inches. Moisture conditions are generally adequate for forest growth at well drained locations in the surveyed area, but moisture deficiencies do occur at rapidly drained positions with very shallow till over either bedrock or sand, and on coarse bouldery till or gravelly outwash.

2. Landforms

The landforms of the surveyed area were classified according to the scheme used by Fulton (1970). In this scheme, nine broad genetic categories are recognized, e.g. M - morainal; these are further described by a morphologic modifier, e.g. h - hummocky, and also by a textured modifier, e.g. s - sandy, when this latter information is available. Five of the nine categories were applicable to the study area. The landform units included in these five categories are described in Table 2. More specific information about the various units is given along with the landtype descriptions in Part IV.

3. Soils

The soils of the surveyed area were classified according to the scheme accepted by the Canada Soil Survey Committee (C.S.S.C.)(1970). Pedologic criteria were used to group the soils at the series level, but because the survey was carried out primarily for forestry purposes, greater emphasis was given to soil features significant in forest succession. As a result, the soil series groups used here to identify biophysical land types may in some cases be narrower than those used traditionally for general purposes. However, land use interpretations suggest that the soil series defined by this study are equally useful for agriculture and other purposes.

Table 2.- Characteristics of Landform Units in the Badger-Diversion Lake Area.

Landform Unit	Relief	Depth	Texture	Homogeneity of Deposition	Petrography
Mp - morainal plain; till deposit	Undulating to gently rolling	Approximately 6 ft. but often greater	Sandy loam to loamy sand	Uniform in 3 directions, i.e. basal till	Sandstone and some slate
Mp - morainal plain; till deposit	Gently sloping	"	Silt loam	"	Slate and/or fine-grained volcanics
Mh - hummocky moraine, and Mr - ridged moraine; till deposits	Strongly rolling	Generally much greater than 6 ft.	Loamy sand to sand	"	Quartz diorite
Mv - moraine veneer; till deposit	Undulating to hilly	Generally less than 2 ft.	Loam to silt loam	Generally uniform in 3 directions	Slate, and/or fine-grained volcanics
Mv/At - moraine veneer; till over alluvial terrace materials	Level to very gently sloping	Approx. one foot of till over deep alluvial sands	Loamy sand over sand	Homogeneous over stratified inclined	Quartz diorite over siliceous sand
Gp - glaciofluvial plain	Level to gently sloping	Greater than 6 ft.	Cobbly sand and gravel	Stratified	Mixed

Table 2.- Concluded

Landform Unit	Relief	Depth	Texture	Homogeneity of Deposition	Petrography
At - alluvial terrace	Level to gently sloping	Variable over gravel	Fine sandy loam to silt loam over sand and gravel	Stratified	-
Ap - alluvial plain	Level to depressional	Greater than 6 ft.	Fine sandy loam to silt loam	"	-
R - rock	Rolling to hilly ridges, or isolated ledges and knolls	Includes areas with till cover up to 4 in. thick	-	-	Sandstone, slate and fine-grained volcanics
O - organic; mesic peat mainly, but fibric & humic peats are also common	Level to depressional	Variable, usually greater than 2 ft.	-	-	-

Twenty soil series were recognized within the study area. Most of these are new series, but some are extensions of those recognized elsewhere in central Newfoundland (Wells and Heringa, 1972). In addition, seven of the recognized series were subdivided into soil phases, each of which is based on a non-taxonomic soil characteristic or a combination of such characteristics potentially significant for land use or management.

Six undifferentiated soil groups and one miscellaneous land unit are also included in the soil classification. These inclusions were necessary because ecological grouping and practical time considerations did not warrant further taxonomic separation; they involve alluvial and organic soils, and shallow rocky sections.

In Table 3 the soil series are grouped taxonomically into three Orders: Podzolic, Brunisolic and Gleysolic. No series were recognized in the Organic Order. Instead, organic soils were classified as oligotrophic, mesotrophic and eutrophic; these broad divisions, based on nutrient regime, correspond in general to the Fibrisol, Mesisol and Humisol Great Groups, respectively, of the C.S.S.C. classification.

Detailed descriptions of the soil series will be published later when laboratory analyses of soil samples have been completed. Subgroup classifications given in Part IV along with the descriptions of Land Types are therefore tentative and may change somewhat when results of the analyses are known.

4. Vegetation

The vegetation of the surveyed area was classified on the basis of synecological work carried out by Damman (1964) in central Newfoundland. Forest types were recognized by floristic composition together with associated soil conditions important to their successional status. They were identified at each of the locations visited in the area during the course of field survey. Once the types had been so identified, the field plots could be grouped in terms of known forest chronosequences. The knowledge of these chronosequences as they applied to the study area permitted the associated soil conditions to be meaningfully subdivided as soil series mapping units.

The floristic and edaphic characteristics of the various types (Damman, 1963) are summarized in Tables 4 to 7. The relatively few examples of undisturbed forest conditions remaining in the area made further vegetation analysis impractical for purposes of the biophysical survey.

Table 3.- Key to the Soils of the Badger - Diversion Lake Area

Parent Material	Podzolic Soils					Brunisolic Soils		Gleysolic Soils	
	Rapidly Drained	Well Drained	Mod. Well Drained	Imperfectly Drained	Poorly Drained	Mod. Well Drained	Imperfectly Drained	Imperfectly Drained	Poorly Drained
1. Glacial Till									
a. Thick till (depth greater than 2 ft.)									
(1) Without seepage									
(a) Extremely stony and bouldery loamy coarse sand (Mh, Mr)	Stony Brook				West Brook, peaty phase				
(b) Stony, gravelly loamy coarse sand (Mp)	Middle Brook	Pamehac Bk. Tom Brook		West Brook	"				
(c) Stony loamy sand to sand (Mp)	Caledonia Bk.			"	"				
(d) Very stony sandy loam to loamy sand (Mp)		Badger		"	"				
(e) Stony sandy loam (Mh, Mr, Mp)		Clipper Bk.		"	"				
(f) Very stony, fine sandy loam to loam (Mp)		Benton, stony phase		Wing Pond Home Pond	Home Pond, mucky phase				
(g) Stony loam, silt loam and sandy clay loam (Mp)				Wing Pond Home Pond	"				
(2) With seepage									
(a) Moderately stony or stony silt loam (Mp)			Benton Coronation Bk.			West Lake	Soulis Pond	Frenchmans Bk.	Frenchmans Bk., mucky phase Joe Brook
b. Thin till (depth less than 2 ft.)									
(1) Without seepage									
(a) Stony loam to silt loam (Mv)		Beaver Pond							
(2) With seepage									
(a) Stony silt loam (Mv)			Coronation Bk., shallow phase				Soulis Pond, shallow phase		
c. Very thin till (depth less than 1 ft.)									
(1) Without seepage									
(a) Stony or very stony loam (Mv + R)	Rocky land	Beaver Pond, shallow phase							
d. Thin till/Alluvial Materials									
(1) Without seepage									
(a) Stony, loamy sand over alluvial sand (Mv/At)	Diversion Lake								

Table 3.- Key to the Soils of the Badger - Diversion Lake Area (concluded)

Parent Material	Podzolic Soils					Brunisolic Soils		Gleysolic Soils	
	Rapidly Drained	Well Drained	Mod. Well Drained	Imperfectly Drained	Poorly Drained	Mod. Well Drained	Imperfectly Drained	Imperfectly Drained	Poorly Drained
2. Stratified Glaciofluvial Deposits									
a. Without seepage									
(1) Cobbly sand and gravel (Gp)	Sandy Brook								
3. Alluvial Deposits									
a. Sub-Recent (At)									
(1) With seepage									
(a) Fine sandy loam to silt loam						Exploits R.			
b. Recent (Ap)									
(1) With seepage									
(a) Fine sandy loam to silt loam								Alluvial soils	

Parent Material	Organic Soils
	Very Poorly Drained
4. Organic Deposits	
a. Thick (depth greater than 3 ft.)	
(1) Without seepage	
(a) Oligotrophic	Oo - oligotrophic organic soils
(b) Mesotrophic	Om - mesotrophic organic soils
(2) With seepage	
(a) Eutrophic	Oe - eutrophic organic soils
b. Thin (depth less than 2 ft.)	
(1) Without seepage	
(a) Ericaceous	Me - ericaceous muck soils

TABLE 4

BALSAM FIR - WHITE BIRCH FOREST (ABIETUM) - Central Newfoundland

<table>
<tr><td colspan="7">Balsam fir with an admixture of white birch, and sometimes black spruce and white spruce</td></tr>
<tr><td colspan="7"><u>Differential Species</u> with respect to Kalmia-conifer forests
Abies balsamea, Betula papyrifera, Maianthemum canadense, Monotropa uniflora, Streptopus amplexifolius, Dryopteris spinulosa, Clintonia borealis, Trientalis borealis, Linnaea borealis, Streptopus roseus, Dicranum majus.</td></tr>
<tr><td colspan="3"></td><td colspan="4">Viola incognita, Coptis groenlandica, Brachythecium salebrosum, Solidago macrophylla, Lycopodium annotinum, Acer spicatum, Mitella nuda, Hylocomium umbratum, Rubus pubescens, Brachythecium rutabulum.</td></tr>
<tr><td>Pleurozium schreberi (dominant)
Locally Cladoniae on forest floor:
(Clad. cristatella, Clad. pyxidata, Clad. rangiferina.)</td><td colspan="2"></td><td colspan="2">Carex trisperma
Dryopteris disjuncta
Equisetum sylvaticum
Habenaria obtusata
Sphagnum girgensohnii
Sphagnum warnstorfianum
Athyrium filix-femina
Dryopteris phegopteris</td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"><u>Hylocomium dominance:</u>
uniflora, Listera cordata, Goodyera</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"></td><td colspan="2"></td><td colspan="2">Dryopteris spinulosa (dominant)
Lycopodium annotinum
Viola incognita
Actaea rubra</td></tr>
<tr><td></td><td colspan="2"></td><td colspan="2"></td><td>Carex trisperma
C. brunnescens
Sphag. girgensohnii
Alnus rugosa
Mitella nuda
Circaea alpina</td></tr>
<tr><td colspan="7"><u>Constant Species</u>
Abies balsamea, Betula papyrifera, Pleurozium schreberi, Hylocomium splendens, Dicranum scoparium, Hypnum crista-castrensis.</td></tr>
<tr><td colspan="3"></td><td colspan="4">Cornus canadense, Dryopteris spinulosa</td></tr>
<tr><td>Gaultheria hispidula
(Pyrola secunda)
Dicranum undulatum</td><td colspan="2">Bazzania trilobata
(Linnaea borealis)</td><td>Gaultheria hispidula
Rubus pubescens
Clintonia borealis
Maianthemum canadense
Trientalis borealis
Lycopodium annotinum
Dicranum undulatum
Linnaea borealis
(Coptis groenlandica)
(Rhytidiadelphus triquetrus)</td><td>Gaultheria hispidula
Picea mariana
Clintonia borealis
Rubus pubescens
Viburnum edule
Viola incognita
Bazzania trilobata
Linnaea borealis
Coptis groenlandica
Polytrichum commune</td><td colspan="2">Streptopus amplexifolius
Trientalis borealis
(Maianthemum canadense)
(Acer spicatum)
(Hylocomium umbratum)</td></tr>
<tr><td><u>Soil Conditions</u>
Dry to well-drained loams and sandy loams
Iron podzol
Iron humus podzol
Lithosolic podzol
MR = 0-1</td><td>Moist variable texture
Podzols with seepage in lower B - B_2 well-developed
MR = 4</td><td>Moist to very moist variable texture
Seepage gleysolic soils with or without A_2, no well-developed B_2
MR = 4-5</td><td>Very moist variable texture
Gleysols
Seepage gleysolic soils with granular mor or greasy mor, A_H often of a mucky nature
MR = 4-5</td><td>Very moist variable texture
Gleysols with greasy mor
Mucky gleysols
MR = 5-6</td><td>Moist loams (rich)
"Rich" podzol (minimal podzol with slight rust mottling in C.
MR = 2-3</td><td>Very moist - wet
Gleysol or mucky gleysol
MR = 6</td></tr>
<tr><td><u>Cover Type</u>
Balsam fir or balsam fir and black spruce</td><td colspan="2">Balsam fir - with admixture of white birch</td><td>Balsam fir - (White birch) (Balsam fir - black spruce)</td><td>Balsam fir
Balsam fir - black spruce Black spruce</td><td>Balsam fir - white birch</td><td>Balsam fir - white birch + alders</td></tr>
<tr><td><u>Forest Type</u>
Fp
PLEUROZIUM-FIR FOREST
Abietum typicum</td><td colspan="2">Fh
HYLOCOMIUM-FIR FOREST
Abietum hylocomietosum
on podzol | on seepage gleysol soils</td><td>Fr
RUBUS - FIR FOREST
Abietum rubetosum</td><td>Fc
CAREX - FIR FOREST
Abietum caricetosum</td><td colspan="2">Fdl
LYCOPODIUM DRYOPTERIS - FIR FOREST
Abietum dryopteretosum
typical | wet variant</td></tr>
</table>

TABLE 5

KALMIA-CONIFER FORESTS - Central Newfoundland

Physiognomy:- Open black spruce forests with dense ground cover of dwarf shrubs		
Differential Species: - with respect to all other forests Rhododendron canadense, Kalmia angustifolia (dominant), Vaccinium angustifolium, Vaccinium vitis-idaea, Cladonia rangiferina, Cladonia sylvatica		
Gaultheria hispidula, Cornus canadensis, Dicranum scoparium, Hylocomium splendens, Abies balsamea		
	Sphagnum capillaceum (abund) Cladoniae - scattered	Cladonia alpestris Cladonia uncialis Cladonia verticillata Polytrichum piliferum Stereocaulon paschale Cetraria islandica Cornicularia aculeata Dicranum flagellare Rhacomitrium lanuginosum Dicranum spurium Cladoniae - very abundant Larix - frequent Red Pine - sometimes Pleurozium - present but rare
Constant Species: - Kalmia angustifolia, Vaccinium angustifolium, Cladonia rangiferina, Pleurozium schreberi, Picea mariana, Ledum groenlandicum		
Vaccinium vitis-idaea Hypnum crista-castrensis Dicranum majus Dicranum undulatum Gaultheria hispidula	Hylocomium splendens Sphagnum capillaceum Dicranum undulatum Gaultheria hispidula	Rhododendron canadense Cladonia sylvatica Cladonia pyxidata Cladonia uncialis Cladonia alpestris (Ledum groenlandicum)
Soil Conditions: - Dry to well-drained, Sandy loams and loams, Iron podzol, iron humus podzol. Locally ortstein may occur. MR = 1-2	 Wet peaty sites (Dry out during dry spells). Hydromorphic humus podzols, Molken podzol, Peaty gleysol. MR = 4	 Very dry sands (or rock outcrops), Iron humus podzol usually with ortstein and often with B/C hardpan, (occasionally iron podzol) MR = 0
Cover Type:- Black spruce with some white pine.	Black spruce with some larch and white pine.	Black spruce - larch with some white pine and sometimes red pine.
Forest Type:- KP Kalmia - black spruce Kalmieto-Piceetum typicum.	KPs Sphagnum-Kalmia-black spruce Kalmieto-Piceetum sphagnetosum.	KPc Cladonia-Kalmia-black spruce Kalmieto-Piceetum Cladonietosum

TABLE 6

BLACK SPRUCE - MOSS FORESTS - Central Newfoundland

Physiognomy:- Well-stocked black spruce forests with thick moss carpet dominated by Pleurozium schreberi				
Constant Species:- Hypnum crista-castrensis, Hylocomium splendens, Kalmia angustifolia, Gaultheria hispidula, Dicranum undulatum, Dicranum scoparium				
Soil Texture:- Sandy loam or loamy sand or fine-very fine sand	Medium to coarse sand	Loamy sand, sandy loam, loam	Variable but not too fine textured	Shallow soil over bedrock
Profile:- Iron podzol or iron-humus podzol with thin B_2h. Local ortstein patches but no cemented B_3 - C MR = 1-2	Iron-humus podzol or rarely iron podzol MR = 0	Seepage gleysolic soils with or without A_2 MR = 4	Hydromophic humus podzol (no iron B present) + normal raw humus layer MR = 4-5	Lithosols or lithosolic podzols MR = 0
Status:- Unstable forest type of fire origin	Unstable forest type fire origin	Unstable forest type of fire origin	Stable forest type	Stable forest type
Forest Type:- Black spruce forest on dry loam	Black spruce forest on dry sand	Black spruce forest on seepage soils	Black spruce forest on hydromorphic humus podzols	Black spruce forest on lithosols

TABLE 7

ALDER-CONIFER SWAMPS - Central Newfoundland

Physiognomy: Black spruce forest usually without or with few poorly growing alder.	Poorly growing alder under open black spruce forest	Dense and vigorously growing alder thickets with scattered balsam fir; white birch and white spruce.		
		sparse: Alnus rugosa		
		Differential species: Equisetum sylvaticum, Carex leptonervia, Thalictrum polygamum, Geum rivale, Cirsium muticum, Habenaria dilatata, Galium asprellum, Mitella nuda, Aster puniceus.		
Ledum groenlandicum, Kalmia angustifolia, Vaccinium angustifolium, Smilacina trifolia.				
sparse: Carex paupercula				
Carex vaginata, Rhamnus alnifolia, Carex disperma, Carex tenuiflora, Carex gynocrates, Vaccinium vitis-idaea				
Sphagnum recurvum, Sphagnum robustum, Sphagnum girgensohnii, Sphagnum magellanicum, Carex trisperma - dominant, Osmunda cinnamomea		Dryopteris spinulosa, Circaea alpina, Thuidium recognitum, Trillium cernum, Dryopteris disjuncta, Brachythecium salebrosum.		
		Diff. species with respect to other alder swamps: Lycopodium annotinum - abund., Gaultheria hispidula, Lycopodium lucidulum		Carex intumescens, Impatiens capensis, Carex debilis, Carex projecta, Carex stipata, Carex gracillima, Chelone glabra
Constant Species: Alnus rugosa, Acer spicatum, Viola incognita, Rhytidiadelphus triquetrus, Rubus pubescens, Galium triflorum, Cinna latifolia, Hylocomium umbratum.				
Carex trisperma, Smilacina trifolia, Sphagnum robustum, Sphagnum recurvum, Sphagnum magellanicum, Cornus canadensis, Linnaea borealis, Coptis groenlandica, Hylocomium splendens, Pleurozium schreberi, Hypnum crista-castrensis, Sphagnum capillaceum, Gaultheria hispidula	Carex trisperma, Carex disperma, Mitella nuda, Geum rivale, Mnium punctatum, Cornus canadensis, Linnaea borealis, Coptis groenlandica, Hylocomium splendens, Ledum groenlandicum, Carex vaginata, Rhamnus alnifolia, (Gaultheria hispidula)	Lycopodium annotinum, Carex trisperma, Cornus canadensis, Linnaea borealis, Hylocomium splendens, Gaultheria hispidula	(Tentatively) Carex trisperma, Mitella nuda, Carex leptonervia, Ribes lacustre, Athyrium filix-femina, Circaea alpina, Aster puniceus	Thalictrum polygamum, Chelone glabra, Thuidium recognitum, Aster puniceus, Carex leptonervia, Galium asprellum, Brachythecium salebrosum, Carex intumescens, Impatiens capensis, Carex debilis
Soil Conditions: Wet, Mucky peat, Oligotrophic muck. MR = 6	Wet, Muck soils - mesotrophic. MR = 6	Moist to very moist, Mucky gleysols, Muck soil (Seepage gleysolic soils). MR = 5-6	Wet, Muck soils. MR = 6	Wet. In summer, moist, except after heavy rain. Alluvial, periodically flooded soils. MR = 6
Cover Type: Black spruce	Black spruce swamp	Alder thicket with wS, wB and bF	Alder swamp with single wS and wB	Alder swamp with single wS and wB
Forest Type: APs. Carex-Sphagnum-black spruce type (Sphagneto-Piceetum caricetosum)	AP. Alder-black spruce type (Alneto-Piceetum)	Al. Lycopodium-alder swamp (Alnetum lycopodietosum)	Aw. Wet alder swamp	Ac. Carex-alder swamp (Alnetum caricetosum)

Part IV - Land Types

1. Introduction

The work carried out in Forest Section B.28a by Damman (1964) provided the ecological framework for integrating the landform, soil and vegetation data collected within the surveyed area. Each of the forest types described by Damman corresponds to a forest ecosystem identified by relatively uniform soil conditions at the Soil Family level. The contribution of the present survey has been to further refine the Damman forest types so that, within the surveyed area, each type can now be identified by a Soil Series*Unit. The forest ecosystems so identified constitute land types, the biophysical category designed for detailed survey and best suited for making ratings for intensive land use and management.

For this survey, land types are symbolized by abbreviations representing their identifying soil series. These symbols are used to designate areas delineated at 1:15,840 scale on the land type maps on pages 32 - 43 of the report.

Descriptions of the land types are given in terms of biophysical components and follow below in alphabetical order of their soil series names.

2. Land Type Descriptions

a. Land types identified by soil series:

Badger Land Type: bg

Landform:	ground moraine (Mp)
Soil parent material:	very stony, sandy loam to loamy sand till
Soil drainage:	good
Soil subgroup:	Orthic Humo-Ferric Podzol with discontinuous weak ortstein: (L), F, F + H, Ae, (Bfhc), Bfh, Bf, BC, C
Soil Series:	Badger (bg)
Topography/position:	undulating to gently undulating; upper slopes and knolls
Vegetation:	Black Spruce - Moss forest after fire, evolving toward Pleurozium - Balsam Fir forest (Fp)
Forest capability**:	5mf bS bF

*The Land Type is an area of land having a fairly homogeneous combination of soil (at a level corresponding to the Soil Series) and chronosequences of vegetation.

** Forest capability - see Appendix I for explanation of symbols used.

Benton Land Type: bn

Landform:	ground moraine (Mp)
Soil parent material:	moderately stony, silt loam till
Soil drainage:	moderate, with seepage
Soil subgroup:	Orthic Humo-Ferric Podzol: F, F + H, Ae, (Bhf), Bfh, Bf, BC, Cx
Soil Series:	Benton (bn)
Topography/position:	gently to moderately sloping; mid to upper slopes
Vegetation:	White Birch forest after fire, evolving to Dryopteris - Lycopodium - Balsam Fir forest (Fdl_t) which is normally stable after logging
Forest capability:	3f (high) bF

Benton (Stony) Land Type: bn.s

Landform:	ground moraine (Mp)
Soil parent material:	stony to very stony, fine sandy loam or loam till
Soil drainage:	good
Soil Subgroup:	Orthic Humo-Ferric Podzol: L, F, Ae, Bfh, Bf, BC, C
Soil Series:	Benton, stony phase (bn.s)
Topography/position:	undulating; upper slopes and rounded crests
Vegetation:	Hylocomium - Balsam Fir forest (Fh); Black Spruce - Moss or White Birch forest after fire
Forest capability:	5fm bF bS

Beaver Pond Land Type: bv

Landform:	veneer moraine (Mv), depth generally less than two feet
Soil parent material:	stony loam to silt loam till
Soil drainage:	good
Soil Subgroup:	Lithic Humo-Ferric Podzol: F, F + H, Ae, Bfh, Bf, BC, R
Soil Series:	Beaver Pond (bv)
Topography/position:	upper slopes of gently to strongly rolling, bedrock-controlled terrain
Vegetation:	Pleurozium - Balsam Fir forest (Fp); Black Spruce - Moss forest after fire.
Forest capability:	5rf bS bF

Beaver Pond (Shallow) Land Type: bv.r

Landform:	thin veneer moraine (Mv + R), depth generally less than one foot
Soil parent material:	stony or very stony loam to silt loam till
Soil drainage:	rapid
Soil Subgroup:	Lithic Humo-Ferric Podzol: L, F, Ae, Bfh, (Bf), R
Soil Series:	Beaver Pond, shallow phase (bv.r)
Topography/position:	upper slopes and crests of strongly rolling, bedrock-controlled terrain
Vegetation:	poor growing Black Spruce - Moss forest after fire, evolving toward Cladonia-Kalmia-Black Spruce forest (KPc)
Forest capability:	6r bS

Caledonia Brook Land Type: cd

Landform:	ground moraine (Mp)
Soil parent material:	stony, loamy sand to sand till
Soil drainage:	rapid
Soil Subgroup:	Orthic Humo-Ferric, Podzol, with ortstein: F, Ae, Bfh, Bf, Bfc, BC, C
Soil Series:	Caledonia Brook (cd)
Topography/position:	undulating to rolling; knolls and convex slopes
Vegetation:	Black Spruce - Moss forest after fire, evolving toward Cladonia-Kalmia-Black Spruce forest (KPc)
Forest capability:	6m bS

Clipper Brook Land Type: cb

Landform:	hummocky or ridged morain (Mh, Mr) and ground moraine (Mp)
Soil parent material:	thick, stony, sandy loam till
Soil drainage:	good
Soil Subgroup:	Orthic Humo-Ferric Podzol, no or incipient ortstein: F, F + H, Ae, Bfh, Bf, BC, C
Soil Series:	Clipper Brook (cb)
Topography/position:	undulating to strongly rolling; upper convex slopes
Vegetation:	Black Spruce - Moss forest after fire; Kalmia-Black Spruce forest (KP) after repeated fire; stable type is Pleurozium - Balsam Fir forest (Fp)
Forest capability:	5mf bS bF

Coronation Brook Land Type: co

Landform:	ground moraine (Mp)
Soil parent material:	moderately stony or stony silt loam till
Soil drainage:	moderate, with seepage
Soil Subgroup:	Orthic Humo-Ferric Podzol, marbled as a result of seepage: F, F + H, Ae, Bfh, Bf, BCg, (Cx), C
Soil Series:	Coronation Brook (co)
Topography/position:	mid to lower sections of gentle slopes
Vegetation:	Hylocomium-Balsam Fir forest (Fh); Black Spruce-Moss or White Birch forest after fire
Forest capability:	4f bF

Coronation Brook (Shallow) Land Type: co.r

Landform:	veneer moraine (Mv), depth generally less than two feet
Soil parent material:	stony silt loam till
Soil drainage:	moderate, with seepage
Soil Subgroup:	Lithic Humo-Ferric Podzol, marbled as a result of seepage: F, F + H, Ae, Bfh, (Bfhg), Bfg, (Cg), R
Soil Series:	Coronation Brook, shallow phase (co.r)
Topography/position:	mid to upper slopes on rolling, bedrock-controlled terrain
Vegetation:	Hylocomium-Balsam Fir forest (Fh); Black Spruce - Moss or White Birch forest after fire
Forest capability:	4fr bF

Diversion Lake Land Type: dk

Landform:	alluvial terrace with a thin cover of till (Mv/At)
Soil parent material:	stony, loamy sand till over alluvial sand
Soil drainage:	rapid
Soil Subgroup:	Orthic Humo-Ferric Podzol with ortstein: F, F + H, Ae, Bfh, Bfc, IIBC, IIC
Soil Series:	Diversion Lake (dk)
Topography/position:	level to gently sloping; all positions
Vegetation:	Cladonia-Kalmia-Black Spruce forest (KPc); Black Spruce - Moss forest after fire
Forest capability:	6m bS

Exploits River Land Type: ex

Landform:	alluvial terrace deposits (At)
Soil parent material:	fine sandy loam to silt loam over coarse sand and gravel
Soil drainage:	moderate, with seepage
Soil Subgroup:	Degraded Dystric Brunisol: L, Hi, Aej, Bm, IIC
Soil Series:	Exploits River (ex)
Topography/position:	level to gently sloping
Vegetation:	Dryopteris-Lycopodium-Balsam Fir forest (Fdl_t); present cover is trembling aspen
Forest capability:	3f bF

Frenchmans Brook Land Type: fr

Landform:	ground moraine (Mp)
Soil parent material:	moderately stony or stony silt loam till
Soil drainage:	imperfect, with seepage
Soil Subgroup:	Orthic Gleysol with moder humus: F, H, Ahj, Bg, (Cg), Cx
Soil Series:	Frenchmans Brook (fr)
Topography/position:	gentle mid to lower slopes
Vegetation:	White Birch forest after fire, evolving toward Rubus-Balsam Fir forest (Fr)
Forest capability:	3w bF

Frenchmans Brook (Mucky) Land Type: fr.m

Landform:	ground moraine (Mp)
Soil parent material:	moderately stony or stony silt loam till
Soil drainage:	poor, with seepage
Soil Subgroup:	Mucky Orthic Gleysol: Oh, (Ahj), Bg, (Cg), Cx
Soil Series:	Frenchmans Brook, mucky phase (fr.m)
Topography/position:	micro-depressions on gentle mid to lower slopes
Vegetation:	Lycopodium-Alder Swamp (Al) after fire or logging, evolving slowly toward Dryopteris-Lycopodium-Balsam Fir (wet variant) forest (Fdl_w)
Forest capability:	3w bF

Home Pond Land Type: ho

Landform:	ground moraine (Mp)
Soil parent material:	stony loam to sandy clay loam till
Soil drainage:	imperfect
Soil Subgroup:	Orthic (or Fera) Gleysol: F, F + H, (Aheg), Aeg, Bg or Bgf, (BC), (Cx), Cg
Soil Series:	Home Pond (ho)
Topography/position:	very gentle lower slopes and level to depressional sections
Vegetation:	Sphagnum-Balsam Fir forest (Fs)
Forest capability:	6w bF

Home Pond (Mucky) Land Type: ho.m

Landform:	ground moraine (Mp)
Soil parent material:	stony loam to sandy clay loam till
Soil drainage:	poor
Soil Subgroup:	Mucky Orthic (or Fera) Gleysol: Oh, Ahjg, Aeg, Bg or Bgf, BC, Cg
Soil Series:	Home Pond, mucky phase
Topography/position:	level to depressional
Vegetation:	Alder-Black Spruce Swamp (AP)
Forest capability:	6w bS

Joe Brook Land Type: jb

Landform:	ground moraine (Mp)
Soil parent material:	stony silt loam till
Soil drainage:	poor, with seepage
Soil Subgroup:	Mucky Rego Gleysol: Oh, Ahgj, Cg, Cx
Soil Series:	Joe Brook (jb)
Topography/position:	lower, very gentle slopes
Vegetation:	Dryopteris-Lycopodium-Balsam Fir (wet variant) forest (Fdl_w); Lycopodium-Alder Swamp (Al) after logging or fire
Forest capability:	3w bF

Middle Brook Land Type: mb

Landform:	ground moraine (Mp)
Soil parent material:	stony glacial till with gravelly, loamy coarse sand texture
Soil drainage:	rapid
Soil Subgroup:	Orthic Humo-Ferric Podzol with thin solum: F, F + H, Ae, Bfh, Bf, C
Soil Series:	Middle Brook (mb)
Topography/position:	undulating to gently rolling; upper convex slopes and knolls
Vegetation:	Cladonia-Kalmia-Black Spruce forest (KPc); Black Spruce - Moss forest after fire
Forest capability:	6m bS

Pamehac Brook Land Type: ph

Landform:	ground moraine (Mp)
Soil parent material:	stony glacial till with gravelly, loamy coarse sand texture
Soil drainage:	good
Soil Subgroup:	Orthic Humo-Ferric Podzol, incipient or weak ortstein: F, F + H, Ae, Bfhc, Bf, (BC), C
Soil Series:	Pamehac Brook (ph)
Topography/position:	undulating to gently rolling; upper and mid slopes
Vegetation:	Pleurozium-Balsam Fir forest (Fp); Black Spruce - Moss forest after fire
Forest capability:	5mf bS bF

Sandy Brook Land Type: sa

Landform:	stratified glaciofluvial deposits (Gp)
Soil parent material:	cobbly sand and gravel
Soil drainage:	rapid
Soil Subgroup:	Orthic Humo-Ferric Podzol, with ortstein: F, F + H, Ae, Bfh, Bfc, C
Soil Series:	Sandy Brook (sa)
Topography/position:	level to gently undulating
Vegetation:	Cladonia-Kalmia-Black Spruce forest (KPc); poor Black Spruce - Moss after fire
Forest capability:	6m bS

Soulis Pond Land Type: su

Landform:	ground moraine (Mp)
Soil parent material:	stony silt loam till
Soil drainage:	imperfect, with seepage
Soil Subgroup:	Gleyed Degraded Dystric Brunisol: F, F + H, Aeg, Bmgj; BC, Cg, Cx
Soil Series:	Soulis Pond (su)
Topography/position:	mid to lower sections of long, gentle to moderate slopes
Vegetation:	Hylocomium-Balsam Fir forest (Fh); White Birch forest after fire
Forest capability:	4f bF

Soulis Pond (Shallow) Land Type: su.r

Landform:	veneer moraine (Mv), depth generally less than two feet
Soil parent material:	stony silt loam till
Soil drainage:	imperfect, with seepage
Soil Subgroup:	Lithic Gleyed Degraded Dystric Brunisol: F, F + H, Aeg, Bmgj, BC, Cg, R
Soil Series:	Soulis Pond, shallow phase (su.r)
Topography/position:	mid to lower slopes on strongly rolling, bedrock-controlled terrain
Vegetation:	Hylocomium-Balsam Fir forest (Fh); Black Spruce - Moss or White Birch forest after fire
Forest capability:	4fr bF

Stony Brook Land Type: sk

Landform:	hummocky moraine (Mh) and ridged moraine (Mr)
Soil parent material:	extremely stony and bouldery loamy coarse sand till
Soil drainage:	rapid
Soil Subgroup:	Orthic Humo-Ferric Podzol; F + H, Ae, Bfh, boulders
Soil Series:	Stony Brook (sk)
Topography/position:	strongly rolling; upper slopes and knolls
Vegetation:	Cladonia-Kalmia-Black Spruce (KPc) forest; poor growing, dense Black Spruce Moss or Kalmia barren after fire
Forest capability:	7m bS

Tom Brook Land Type: tb

Landform:	ground moraine (Mp)
Soil parent material:	stony glacial till with gravelly, loamy coarse sand texture
Soil drainage:	good
Soil Subgroup:	Orthic Humo-Ferric Podzol with discontinuous weak ortstein: F, F + H, Ae, Bfh, (Bfhc), Bf, BC, C
Soil Series:	Tom Brook (tb)
Topography/position:	undulating; mid and upper slopes
Vegetation:	Hylocomium-Balsam Fir forest (Fh); Black Spruce Moss or White Birch forest after fire
Forest capability:	4fm bF bS

West Brook Land Type: wb

Landform:	ground moraine (Mp)
Soil parent material:	very stony, sandy loam to loamy sand till
Soil drainage:	imperfect
Soil Subgroup:	Gleyed Ferro-Humic Podzol: F, F + H, Aeg, Bhfg, Bfg, BC, Cg
Soil Series:	West Brook (wb)
Topography/position:	gentle lower slopes and level to depressional sections
Vegetation:	stable Black Spruce-Moss forest
Forest capability:	5fw bS

West Brook (Peaty) Land Type: wb.p

Landform:	ground moraine (Mp)
Soil parent material:	very stony, sandy loam to loamy sand till
Soil drainage:	poor
Soil Subgroup:	Gleyed Ferro-Humic Podzol with peaty surface organic layers: Of, Om, Aeg, Bhfg, Bfg, BC, Cg
Soil Series:	West Brook, peaty phase (wb.p)
Topography/position:	level to depressional, often along bog borders
Vegetation:	Sphagnum-Kalmia-Black Spruce forest (KPs)
Forest capability:	6fw bS

West Lake Land Type: wk

Landform:	ground moraine (Mp)
Soil parent material:	moderately stony silt loam till
Soil drainage:	moderate, with seepage
Soil Subgroup:	Degraded Dystric Brunisol with moder humus form: L, F + H, H, (Hi), Ahe, Bm, BC, Cg, Cx
Soil Series:	West Lake (wk)
Topography/position:	gentle straight slopes; mid to lower positions
Vegetation:	White Birch forest after fire, evolving to Dryopteris-Lycopodium-Balsam Fir forest (Fdl_t)
Forest capability:	3f (high) bF

Wing Pond Land Type: wg

Landform:	ground moraine (Mp)
Soil parent material:	stony loam to silt loam till
Soil drainage:	imperfect
Soil Subgroup:	Gleyed Humo-Ferric Podzol with thick ericaceous mor: F + H, Aeg, AB, Bhfg, Bfg or Bg, BC, (Cx), Cg
Soil Series:	Wing Pond (wg)
Topography/position:	level to depressional
Vegetation:	Sphagnum-Kalmia-Black Spruce forest (KP_s)
Forest capability:	6fw bS

b. Miscellaneous biophysical land types:

Alluvial Land Type: Av

Landform:	recent alluvial deposits (Ap)
Soil parent material:	fine sandy loam to silt loam alluvium
Soil drainage:	poor, with seepage
Soil Subgroup:	Mucky Orthic Gleysols: Oh, Bg, Cg
Soil Series:	not classified; grouped as undifferentiated alluvial soils (Av)
Topography/position:	level to depressional
Vegetation:	Carex-Alder Swamp (Ac)
Forest capability:	7w

Alluvial (Upland) Land Type: Av.u

Landform:	thin alluvial deposits over till (Av/Mp)
Soil parent material:	fine sandy loam to loam
Soil drainage:	poor or imperfect, with seepage
Soil Subgroup:	Mucky Orthic Gleysols; Terric Humisols: Oh, Bg, Cg
Soil Series:	not classified; grouped as alluvial soils, drier upland phase (Av.u)
Topography/position:	level to depressional; associated with shallow drainage channels in gently sloping ground moraine
Vegetation:	Lycopodium-Alder Swamp (Al), evolving toward Dryopteris-Lycopodium-Balsam Fir, wet variant (Fdl_w)
Forest capability:	3w bF

Ericaceous Muck Land Type: Me

Landform:	thin organic deposit (less than two feet) over ground moraine (O)
Soil parent material:	muck over compact, stony silt loam to sandy clay loam till
Soil drainage:	very poor
Soil Subgroup:	Terric Humisol, with acid ericaceous muck: (Of), Om, Oh, AB, Cg
Soil Series:	not designated; included as undifferentiated, acid muck soils: (Me)
Topography/position:	level to depressional; bog border position
Vegetation:	Sphagnum-Kalmia-Black Spruce forest (KPs), succeeded by Dwarf Shrub Bog after fire
Forest capability:	6fw bS

Eutrophic Peat Land Type: Oe

Landform:	organic deposits (O)
Soil parent material:	humic peat; depth 16 inches or greater
Soil drainage:	very poor, with seepage
Soil Subgroup:	dominantly Terric Humisols
Soil Series:	not designated; soils grouped as eutrophic organic soils (Oe)
Topography/position:	level to depressional

Vegetation:	Forest capability:
Wet Alder Swamp (Aw)	7w
Alder-Black Spruce Swamp (AP)	6w bS
Black Spruce Swamp	6w bS

Mesotrophic Peat Land Type: Om

Landform:	organic deposits (O)
Soil parent material:	mesic peat or fibric plus humic peat; overall depth generally greater than two feet
Soil drainage:	very poor
Soil Subgroup:	Mesisols dominant
Soil Series:	not designated; soils grouped as mesotrophic organic soils (Om)
Topography/position:	level to depressional
Vegetation:	open bog, devoid of trees
Forest capability:	7fw

Oligotrophic Peat Land Type: Oo

Landform:	organic deposits (O)
Soil parent material:	fibric peat; depth generally greater than two feet
Soil drainage:	very poor
Soil Subgroup:	Fibrisols with some inclusions of Mesisols
Soil Series:	not designated; soils grouped as oligotrophic organic soils (Oo)
Topography/position:	level to depressional
Vegetation:	predominantly dwarf shrub; trees absent
Forest capability:	7fw

Rocky Land Type: Rk

Landform:	rock and till (R + Mv)
Soil parent material:	very thin till; variable texture; depth less than four inches
Soil drainage:	rapid
Soil Subgroup:	Lithic Regosol: L + F, Ae, (Bfhj), R
Soil Series:	not recognized; differentiated as a miscellaneous land unit: Rocky land (Rk)
Topography/position:	crests and upper slopes of rolling to hilly bedrock-controlled terrain
Vegetation:	rock barren or very poor Black Spruce - Moss forest
Forest capability:	7r

LAND TYPE MAPPING LEGEND

SYMBOL	NAME	DESCRIBED ON PAGE
Av	Alluvial soils	31
Av.u	Alluvial soils upland phase	31
bg	Badger	17
bn	Benton	18
bn.s	" stony phase	18
bv	Beaver Pond	19
bv.r	" " shallow phase	19
cb	Clipper Brook	20
cd	Caledonia Brook	20
co	Coronation Brook	21
co.r	" " shallow phase	21
dk	Diversion Lake	22
ex	Exploits River	22
fr	Frenchmans Brook	23
fr.m	" " mucky phase	23
ho	Home Pond	24
ho.m	" " mucky phase	24
jb	Joe Brook	25
mb	Middle Brook	25
Me	Ericaceous muck	32
Oe	Eutrophic organic soils	32
Om	Mesotrophic organic soils	33
Oo	Oligotrophic organic soils	33
ph	Pamehac Brook	26
Rk	Rocky land	34
sa	Sandy Brook	26
su	Soulis Pond	27
su.r	" " shallow phase	27
sk	Stony Brook	28
tb	Tom Brook	28
wb	West Brook	29
wb.p	" " peaty phase	29
wg	Wing Pond	30
wk	West Lake	30

Explanation of Mapping Symbol:

Example - Sheet NO.1

$bv.r^{5}-Om^{3}-ph^{2}$

bv.r	- Beaver Pond (Shallow) Land Type	50%
Om	- Mesotrophic Organic Soils	30%
ph	- Pamehac Brook Land Type	20%

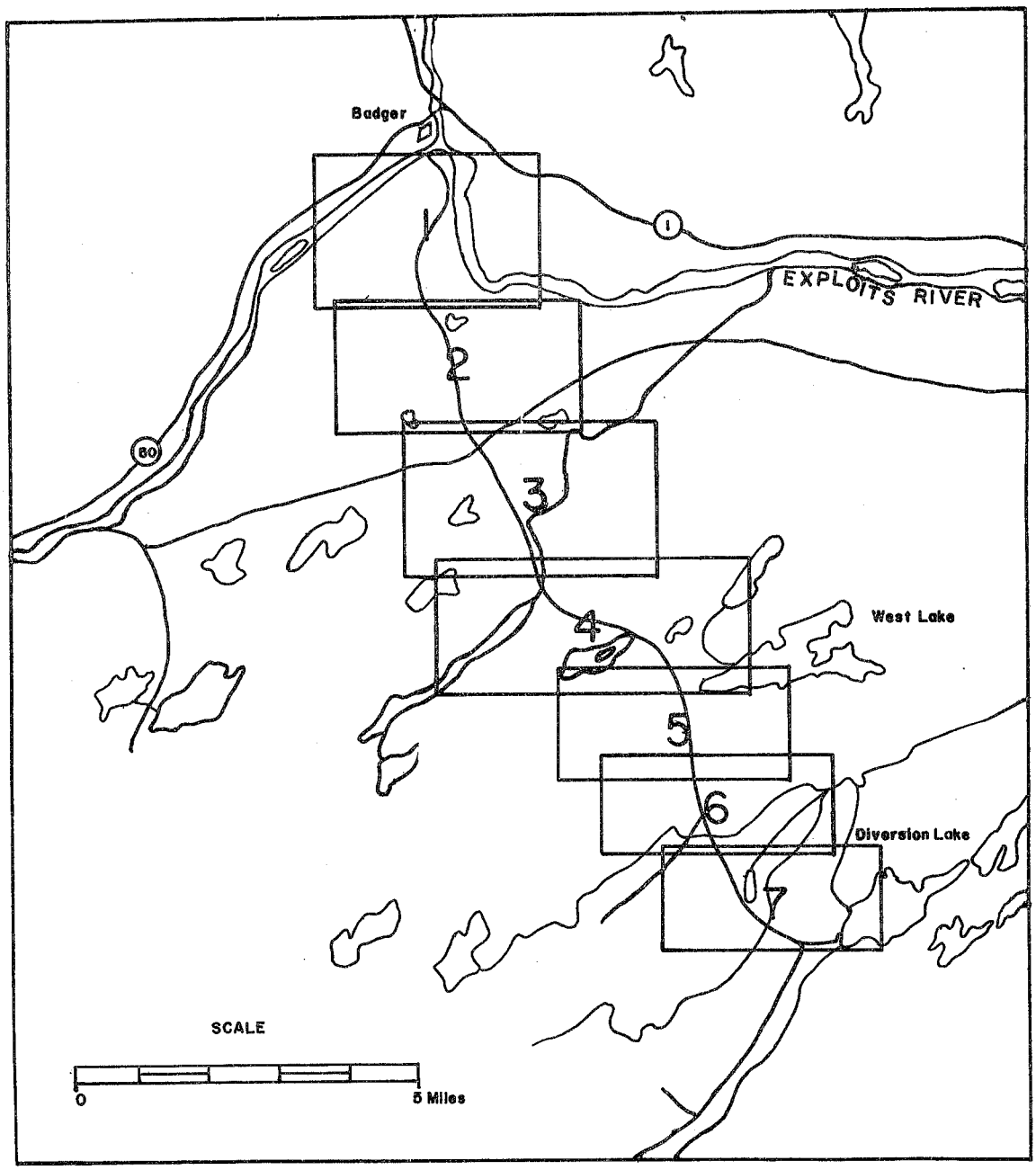


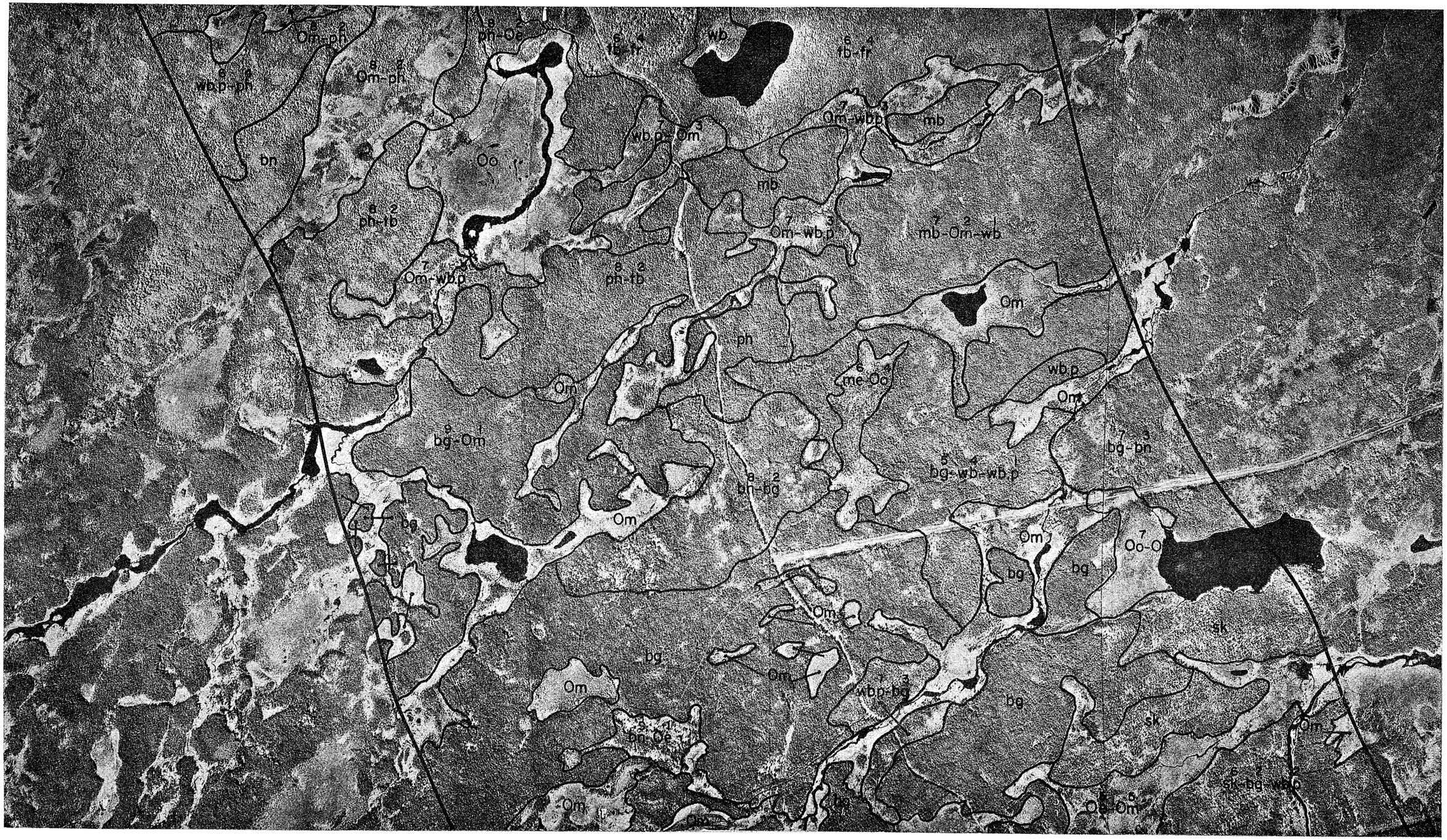
FIGURE 2. Index to Map Sheets

BADGER-DIVERSION LAKE AREA - SHEET NUMBER 1

SCALE 1:15,840 (APPROX.)

FEET 1000 0 1000 2000 3000 4000 5000 FEET

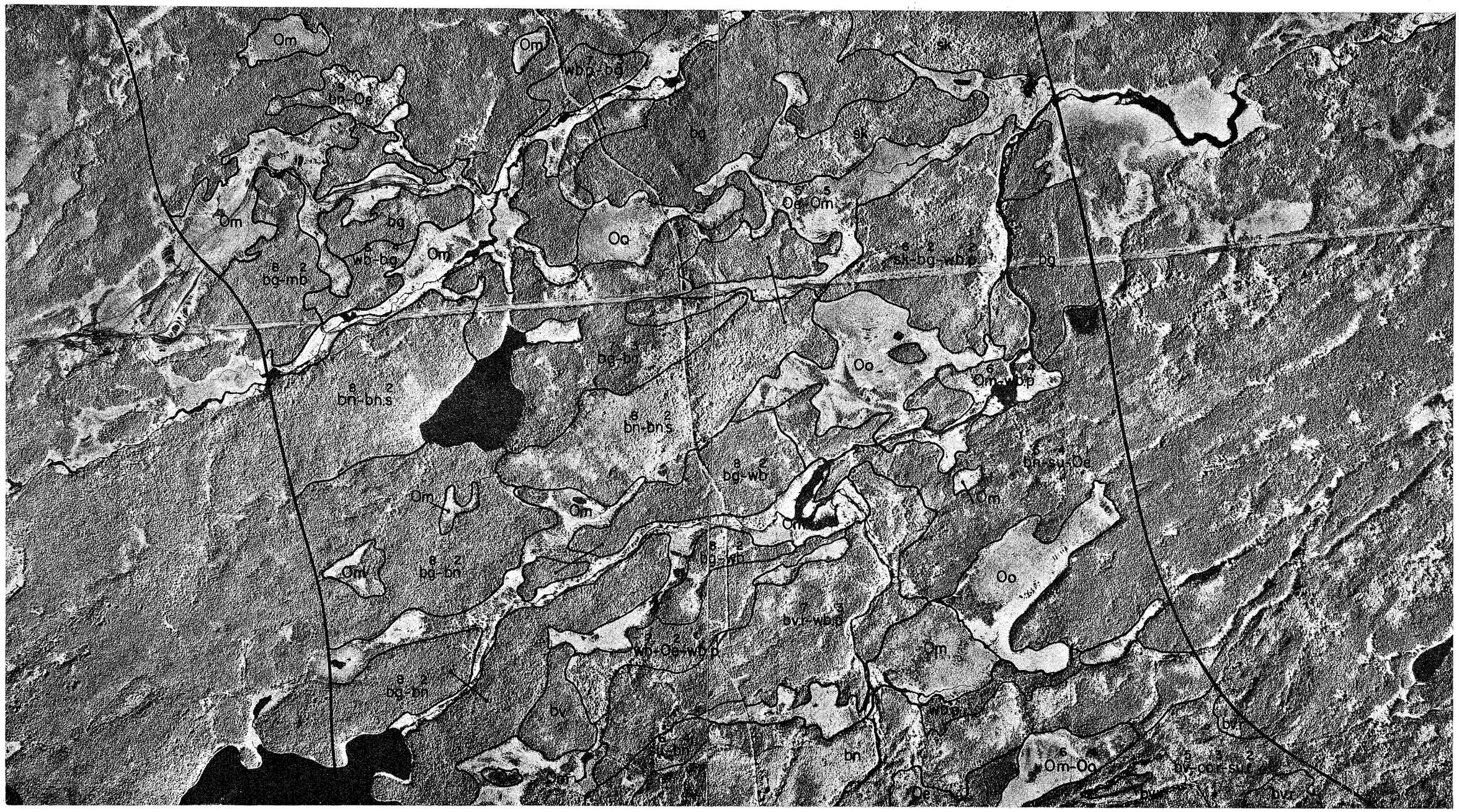
BADGER-DIVERSION LAKE AREA - SHEET NUMBER 2



SCALE 1:15,840 (APPROX.)

FEET 1000 0 1000 2000 3000 4000 5000 FEET

BADGER-DIVERSION LAKE AREA - SHEET NUMBER 3



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FEET 1000 0 1000 2000 3000 4000 5000 FEET

BADGER-DIVERSION LAKE AREA - SHEET NUMBER 4

SCALE 1:15,840 (APPROX.)

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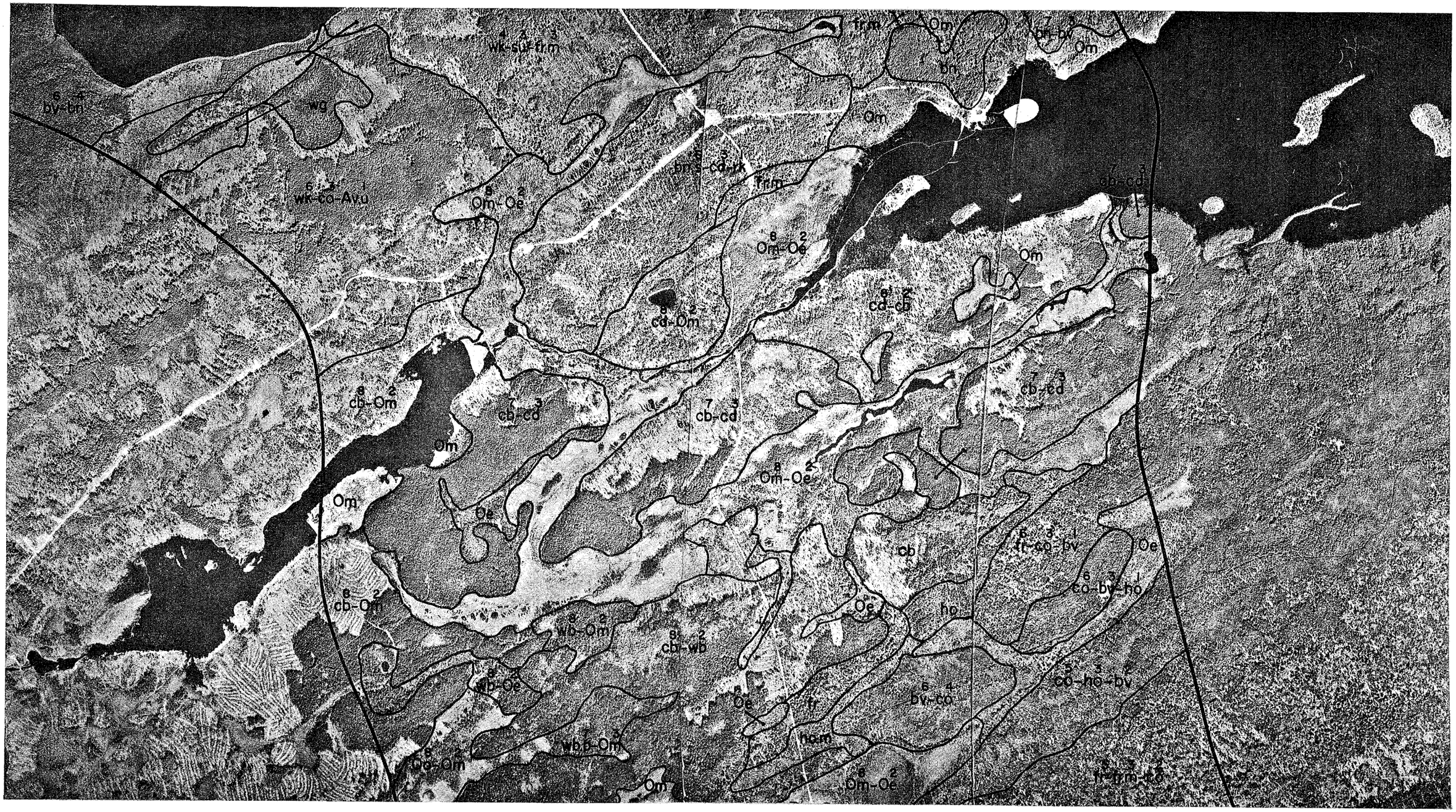

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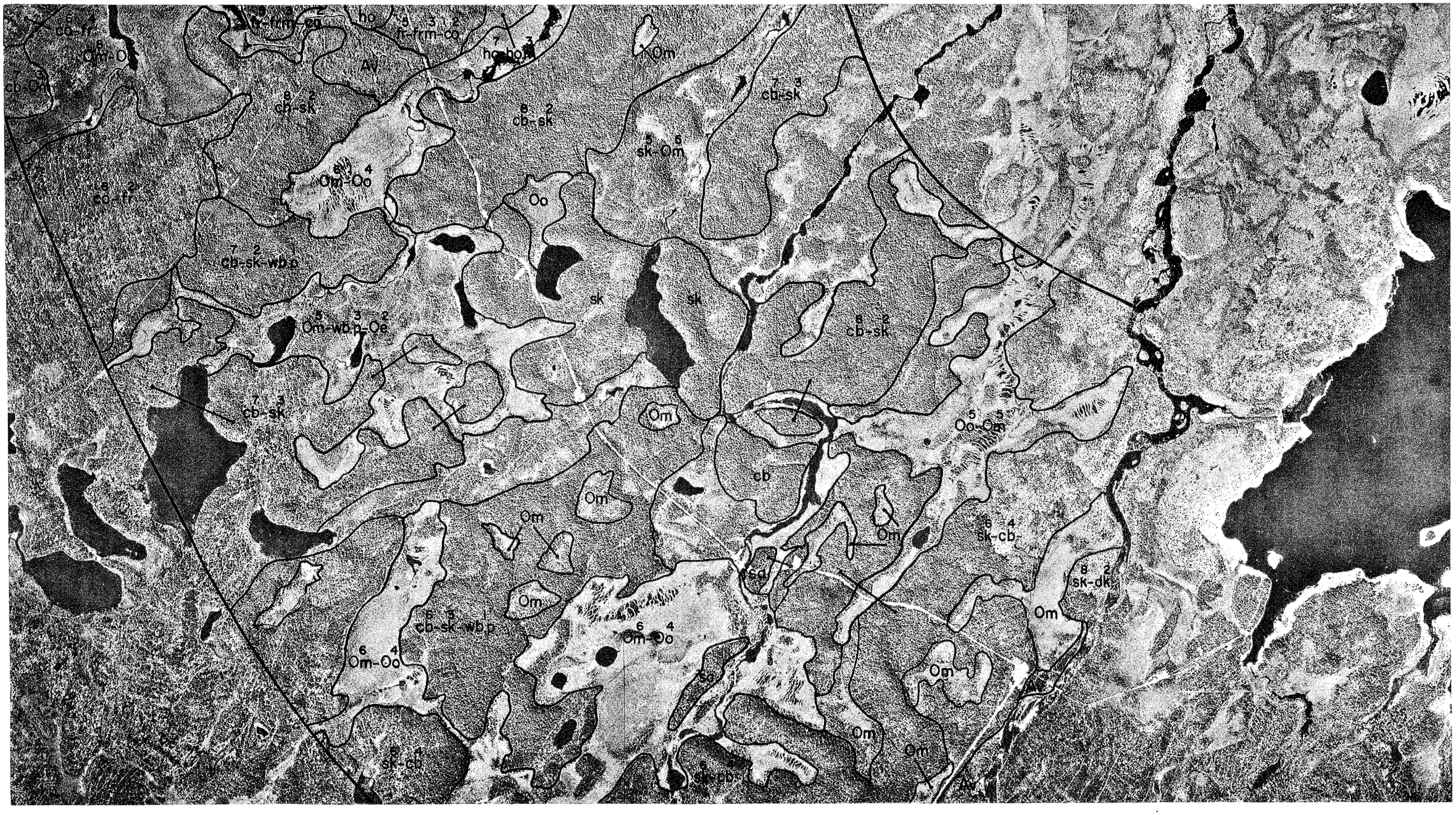

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Part V - Land Use Interpretations

1. Introduction

Previous sections of this report have dealt with the inventory of the land itself. This inventory included description, classification, and mapping of biophysical land characteristics integrated as land types. In this section the land types are interpreted to give the land user some idea of their value for forestry use and management.

2. Interpretations

Preliminary interpretations of the land types for forest management purposes are presented in Table 8. Forest capability interpretations are based to a large extent on the work carried out by the Newfoundland sector of the Canada Land Inventory,* while those for other purposes have been derived from observable land type characteristics and from measurements of experimental plots.

Although biophysical survey is a complete and detailed method of land inventory, all of the interpretations presented here should be regarded as inherently tentative. They are subject to change with increase in knowledge about the behaviour of the land types under different kinds and levels of forest management. The main advantage, however, of biophysical survey over other forms of land classification (excluding basic soil surveys) is that such revisions can easily be done without the need to repeat costly field work.

The basic nature of the biophysical survey also permits interpretation of the Land Types for purposes other than forestry. Soil capability ratings for agriculture are included in Table 8 as an example of interest to other land users in the Province.

Explanations of the various symbols and abbreviations used in Table 8 are given in Appendix I.

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*Delaney, B. (In preparation) Land capability for forestry. Canada Land Inventory Technical Bulletin. Dept. of Agriculture and Forestry, Province of Newfoundland.

Table 8.- Land Use Interpretations for Land Types of the Badger-Diversion Lake Area

		SOILS								INTERPRETATIONS									
Land Type	Series	Subgroup	Texture	Depth. Solum (in.)	Stoniness Vol. %	Moisture Regime	Humus Type	Humus Depth (in.)	Forest Vegetation Type	Forest Capability	Erosion Hazard	Equipment Restrictions	Vegetative Competition	Species Suitability	Logging Operation	Natural Regeneration	Trafficability	Ease of Road Construction	Agriculture Capability	Forest Nursery Suitability
bg-2-C very stony, sandy loam to loamy sand till; good drainage; 3 to 9T slopes	Badger	O.H.F.P.	sl	26	30-50	mD	hF	4	Fp	5mf	slight	nil	nil	bS,bF	N	H	G	B	5p	C
bn-32-C mod. stony silt loam till; good to mod. drainage, with seepage; 2-5% slopes	Benton	O.H.F.P.	sil	22-26	3-5	F	fH	2-3	Fdl_t	3f	sl. moderate	slight	slight	bF,bS,wS,	N	H	M	A	3fp	A
bn-5-2-C stony or very stony, fine sandy loam to loam till; good to mod. drainage; 2-5% slopes	Benton, stony phase	O.H.F.P.	fsl-l	18-20	10-30	mF	F	1-2	Fh	5fm	slight	slight	nil	bF,bS,wB	N	H	G	B	4pf	B
bv-2-C stony loam to silt loam till; good drainage; 5-30% slopes	Beaver Pond	L.H.F.P.	sil	14	10-15	mD	hF	2-3	Fp	5rf	moderate	slight	nil	bS,bF	N	H	M	D	7rt	D
bv.r-1-C stony loam to silt loam till; rapid drainage; 15-30% slopes	Beaver Pond shallow phase	L.H.F.P.	l-sil	8-12	10-15	D	F	2-6	KPc	6r	severe	mod.-severe	severe	bS	NR	L	M	E	7r	D
cb-2-C stony, sandy loam till; good drainage; 5-25% slopes	Clipper Brook	O.H.F.P.	sl	22-28	10-20	mD	hF	2-4	Fp	5mf	slight	slight	nil	bS,bF	N	H	G	B	7pt	D
cd-1-C stony, loamy sand to sand till; rapidly drained; 3-15% slopes	Caledonia Brook	O.H.F.P.	ls	20	5-15	D	F	4	KPc	6m	slight	nil	severe	bS	N	L	G	B	7md	D
co-3-c mod. stony or stony, silt loam till; mod. drainage, with seepage; 2-5% slopes	Coronation Brook	O.H.F.P.	sil	20-28	3-15	vF	hF	3	Fh	4fm	slight	slight	nil	bF,bS,wB	N	H	M	A	4p	B
co.r-3-c stony silt loam till; mod. drainage, with seepage; 9-30% slopes	Coronation Brook	O.H.F.P.	sil	16-20	3-15	vF	fH	5	Fh	4fr	mod.-severe	moderate	nil	bF,bS,wB	MN	H	M	C	7tr	D
dk-2-C stony loamy sand till over alluvial sand; rapid drainage; 0-3% slopes	Diversion Brook	O.H.F.P.	ls	25	15-30	D	hF	3	KPc	6md	slight	nil	severe	bS	N	L	G	A	7mp	D
ex-32-C fine sandy loam to silt loam over sand and gravel; good to mod. drainage, with seepage; 0-2% slopes	Exploits River	D.D.B.	sil	var.	1-2	F	H	1-2	Fdl	3f	slight	slight	moderate	bF,bS,wS, wB,tA	MN	M	M	C	4d	B

Table 8.- Land Use Interpretations for Land Types of the Badger-Diversion Lake Area (Cont'd)

	SOILS								INTERPRETATIONS									
Land Type	Series	Subgroup	Texture	Depth. Solum (in.)	Stoniness Vol. %	Moisture Regime	Humus Type	Humus Depth (in.)	Forest Vegetation Type	Forest Capability	Erosion Hazard	Equipment Restrictions	Vegetative Competition	Species Suitability	Logging Operation	Natural Regeneration	Trafficability	Ease of Road Construction	Agriculture Soil Capability	Forest Nursery Suitability
fr-4-C mod. stony or stony, silt loam till; imperfect drainage, with seepage; 1-3% slopes	Frenchmans Brook	O.G.	l-sil	12-14	3-15	M	fH	6-7	Fr	3w	slight	moderate	slight	bF,bS,wB	MN	H	P	C	5wp	C
fr.m-5-C mod. stony or stony, silt loam till; poor drainage, with seepage; 0-2% slopes.	Frenchmans Brook, mucky phase	M.O.G.	l-sil	12-14	3-15	vM	Oh	12-16	Fdlw	3w	slight	moderate	severe	bF,wB,wS	N	L	P	D	7wp	D
ho-4-C stony loam to sandy clay loam till; imperfect drainage; 0-2% slopes	Home Pond	O.G.	l	16	5-15	M-vM	F	3-4	Fs	6w	slight	moderate	nil	bF,bS	N	M	P	C	7wp	D
ho.m-5-C stony loam to sandy clay loam till; poor drainage, with seepage; 0-0.5% slopes.	Home Pond mucky phase	M.O.G.	sicl	16	5-15	vM	Oh	8-10	Ap	6w	slight	moderate	mod.-severe	bS	N	L	M	C	7wp	D
jb-5-C stony silt loam till; poor drainage, with seepage; 0.5-2% slopes	Joe Brook	M.R.G.	sil-sicl	2-4	3-15	vM	Oh	6	Fdlw	3w	slight	moderate	severe	bF,wB,wS	N	L	P	C	7wp	D
mb-l-C stony, gravelly, loamy coarse sand till; rapid drainage; 3-9% slopes	Middle Brook	O.H.F.P.	sl	12	10-15	D	hF	6	KPc	6m	slight	nil	mod.-severe	bS	N	L	G	B	7mp	D
ph-2-C stony, gravelly, loamy coarse sand till; good drainage; 3-6% slopes	Pamehac Brook	O.H.F.P.	sl	14-16	10-15	mD	hF	4	Fp	5mf	slight	nil	nil	bS,bF	N	H	G	A	5mp	C
sa-l-C cobbly sand and gravel; rapid drainage; 0-2% slopes	Sandy Brook	O.H.F.P.	ls	18	25-50	D	hF	3-4	KPc	6m	nil	nil	mod.-severe	bS	N	L	G	A	7md	D
sk-l-C extremely stony, loamy coarse sand till; rapid drainage; 15-30% slopes	Stony Brook	O.H.F.P.	csl	12+	50-90	vD	hF	4-5	KPc	7m	nil	mod.-severe	mod.-severe	bS	NR	L	M	E	7p	D
su-4-C stony silt loam till; imperfect drainage, with seepage; 2-7% slopes	Soulis Pond	G.D.D.B.	sil	18-20	10-15	M	fH	1-3	Fh	4f	moderate	moderate	nil	bF,bS,wB	MN	H	P	B	4wp	B
su.r-4-C stony, silt loam till; imperfect drainage, with seepage; 15-30% slopes	Soulis Pond	G.D.D.B.	sil	14	10-15	M	fH	1-3	Fh	4fr	mod.-severe	moderate	nil	bF,bS,wB	MN	H	M	D	7tr	D

Table 8.- Land Use Interpretations for Land Types of the Badger-Diversion Lake Area (Concl'd)

	SOILS									INTERPRETATIONS										
Land Type	Series	Subgroup	Texture	Depth. Solum (in.)	Stoniness Vol. %	Moisture Regime	Humus Type	Humus Depth (in.)	Forest Vegetation Type	Forest Capability	Erosion Hazard	Equipment Restrictions	Vegetative Competition	Species Suitability	Logging Operation	Natural Regeneration	Trafficability	Ease of Road Construction	Agriculture Soil Capability	Forest Nursery Suitability
tb-2-C stony, gravelly, loamy coarse sand till; good drainage; 3-7% slopes	Tom Brook	O.H.F.P.	l-sil	20-22	3-15	mF	fH	3-4	Fh	5fm	moderate	nil	nil	bF,bS,wB	N	H	G	A	4pt	B
wb-4-C stony or very stony, sandy loam till; imperfect drainage; 0-3% slopes	West Brook	G.F.H.P.	sl	20+	10-20	M	fH	6	BS-Moss	5wf	slight	moderate	nil	bS	N	H	P	C	7pw	D
wb.p-5-C very stony sandy loam to loamy sand till; poor drainage; level to depressed	West Brook, peaty phase	G.F.H.P.	sl	20+	15-50	M	Om	6-16	KPs	6fw	nil	mod.-severe	mod.-severe	bS	MN	L	P	D	7pw	D
wg-4-C stony silt loam to sandy loam till; imperfect drainage; 0-0.5% slopes	Wing Pond	G.H.F.P.	sil-sl	18-	3-15	M	fH	6+	KPs	6fw	slight	moderate	mod.-severe	bS	N	L	M	C	5wp	C
wk-3-C moderately stony silt loam till; moderate drainage, with seepage; 2-5% slopes	West Lake	D.D.B.	sil	18	3	F	rM	2-3	Fdlt	3f	moderate	slight	slight	bF,bS,wS, wB,tA	N	H	M	A	3fp	A
Miscellaneous Land Types:																				
Av-5-C fine sandy loam to silt loam alluvium; poor drainage, with seepage; 0-0.5% slopes	Undifferentiated alluvial soils	M.O.G.	fsl-sil	20+	0-0.1	vM	Oh	10-16	Ac	7w	nil	severe	severe	-	-	L	P	E	7w	D
Av.u-5-C fine sandy loam to loam alluvium over silt loam till; poor drainage, with seepage; 0-2% slopes	Undifferentiated alluvial soils, drier upland phase	M.O.G.	fsl-l	6-10	3-10	M	Oh	8-14	Al	3w	slight	moderate	severe	bF,wB,wS	N	L	P	C	5w	C
Oe-6-C eutrophic organic deposits; very poor drainage, with seepage; level to depressional	-	-	-	16+	-	W	Oh	16+	Aw	7w	slight	severe	severe	-	-	L	P	E	0	D
Om-6-C mesotrophic organic deposits; very poor drainage, with seepage; level to depressional	-	-	-	16+	-	W	Om	16+	AP	6w	slight	mod.-severe	mod.-severe	bS	MN	L	P	E	0	D
Of-6-C oligotriphic organic deposits; very poor drainage; level to depressional	-	-	-	24+	-	W	Oo	24+	Dwarf shrub	7fw	slight	severe	severe	-	-	-	P	E	0	D
Me-6-C acid, ericaceous peat; very poor drainage; level to depressional	-	TH	-	16+	-	W	Oo	16+	KPs	6fw	slight	moderate	severe	bS	MN	L	P	D	0	D
Rk-1-C exposed bedrock, moss covered bedrock and very thin till; rapidly drained. 15 to 30+% slopes	-	LR	var.	4-	10-30	vD	F	var.	KPc	7r	mod.-severe	severe	mod.-severe	-	NR	L	P	E	7r	D

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APPENDIX I

Key to Symbols and Abbreviations used in the Table of Land Use Interpretations

1. Land Type Symbol:

The complete symbol is in three parts and consists, first, of the abbreviation for the soil series name; second, the dominant and subdominant soil drainage class; and last, an upper case letter, C, indicating the Grand Falls Forest Section. The complete symbol is used here for purposes of comparison across the Province.

2. Soil drainage classes:

The classes are defined in terms of (a) actual moisture content in excess of field capacity, and (b) the extent of the period during which such excess water is present in the plant root zone. They are represented by numerals as follows:

1 - Rapidly drained - The soil moisture content seldom exceeds field capacity in any horizon except immediately after water additions.

2 - Well drained - The soil moisture content does not normally exceed field capacity in any horizon (except possibly the C) for a significant period of the year.

3 - Moderately well drained - Soil moisture in excess of field capacity remains for a small but significant period of the year.

4 - Imperfectly drained - Soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods during the year.

5 - Poorly drained - Soil moisture in excess of field capacity remains in all horizons for a large part of the year. This class includes peaty and mucky phases of soil series recognized in the surveyed area.

6 - Very poorly drained - Free water remains at or within 12 inches of the surface most of the year. The organic soils of the surveyed area generally fall within this category.

3. Soil Subgroup:

D.D.B.	-	Degraded Dystric Brunisol
G.D.D.B.	-	Gleyed Degraded Dystric Brunisol
G.F.H.P.	-	Gleyed Ferro-Humic Podzol
G.H.F.P.	-	Gleyed Humo-Ferric Podzol
L.H.F.P.	-	Lithic Humo-Ferric Podzol
L.R.	-	Lithic Regosol
M.O.G.	-	Mucky Orthic Gleysol
M.R.G.	-	Mucky Rego Gleysol
O.G.	-	Orthic Gleysol
O.H.F.P.	-	Orthic Humo-Ferric Podzol
T.H.	-	Terric Humisol

4. Soil texture:

ls	-	loamy sand
csl	-	coarse sandy loam
sl	-	sandy loam
fsl	-	fine sandy loam
l	-	loam
sil	-	silt loam
scl	-	sandy clay loam
sicl	-	silty clay loam
var	-	variable texture

5. Moisture regime: (includes soil drainage, texture, structure and climate)

vD	-	very dry
D	-	dry
mD	-	moderately dry
mF	-	moderately fresh
F	-	fresh
vF	-	very fresh
mM	-	moderately moist
M	-	moist
vM	-	very moist
W	-	wet

6. Humus type: (classification is according to the system proposed by Bernier, 1968)

F	-	Fibrimor
hF	-	humi-Fibrimor
fH	-	fibri-Humimor
H	-	Humimor
rM	-	Raw moder
Of	-	Fibric peaty mor
Om	-	Mesic peaty mor
Oh	-	Humic peaty mor

7. Forest Type:

Ac	-	Carex-Alder Swamp
Al	-	Lycopodium-Alder Swamp
AP	-	Alder-Black Spruce Swamp
Aw	-	Wet Alder Swamp
Fc	-	Carex-Balsam Fir
Fdl_t	-	Dryopteris-Lycopodium-Balsam Fir, typical
Fdl_w	-	Dryopteris-Lycopodium-Balsam Fir, wet variant
Fh	-	Hylocomium - Balsam Fir
Fp	-	Pleurozium - Balsam Fir
Fr	-	Rubus - Balsam Fir
Fs	-	Sphagnum - Balsam Fir
KP	-	Kalmia - Black Spruce
KPc	-	Cladonia-Kalmia-Black Spruce
KPs	-	Sphagnum-Kalmia-Black Spruce

8. Forest capability:

Mineral and organic soils are grouped into one of seven classes based upon their inherent ability to grow commerical timber. It should be noted that the productivity ranges given for each capability class are expressed in gross merchantable cubic foot volume increment per acre per year at breast height age 60 years; they are based on stems of 3.5 inches DBH or larger, to 3-inch top diameter inside bark and 6-inch stump.

Class 1 - Lands having no important limitations to the growth of commercial forests. No Class 1 lands are present in Newfoundland.

Class 2 - Lands having slight limitations to the growth of commercial forests. Areas of Class 2 land are very limited in occurrence. Productivity will usually be from 90 to 110 cubic feet per acre per year.

Class 3 - Lands having moderate limitations to the growth of commercial forests. The most productive forests of the Province generally fall within this class. Productivity will usually be from 71 to 90 cubic feet per acre per year.

Class - 4 Lands having moderately severe limitations to the growth of commercial forests. A large part of the productive forest of the Island falls into this class. Productivity will usually be from 51 to 70 cubic feet per acre per year.

Class 5 - Lands having severe limitations to the growth of commercial forests. This class includes both poor forests and those considered to be moderately productive. Productivity will be from 31 to 50 cubic feet per acre per year.

Class 6 - Lands having very severe limitations to the growth of commercial forests. The forests are often open stands in which black spruce, and sometimes larch, are the most important tree species. Productivity will be from 11 to 30 cubic feet per acre per year.

Class 7 - Lands having limitations so severe that they preclude the growth of commercial forests. Productivity will usually be less than 10 cubic feet per acre per year.

With the exception of Class 1, the forest capability classes are subdivided into subclasses on the basis of one or more kinds of limitations. The subclasses applicable to the surveyed area are as follows:

d - physical restriction to rooting by dense or consolidated layers other than bedrock

f - low soil fertility

m - soil moisture deficiency

r - restriction of rooting by bedrock

w - soil moisture excess

9. Species suitability:

General indication given by the variety of species occurring naturally on the site. Abbreviations used for the species are:

bF - balsam fir
tA - trembling aspen
wB - white birch
bS - black spruce
wS - white spruce

10. Logging operation:

N - normal; no special precautions or techniques needed.

MN - modified normal; minor precautions should be followed; usually means that logging should be avoided during seasons when soils are saturated and are subject to damage by heavy equipment.

NR - not recommended, generally because of excessive steepness and rockiness.

11. Natural regeneration:

H - high; regeneration to softwoods is usually adequate after cutting by conventional logging practices.

M - moderate; regeneration to softwoods is often somewhat inhibited by moderate vegetative competition.

L - low; regeneration to softwoods is moderately to strongly affected by adverse soil factors and vegetative competition.

12. Trafficability:

G - good; no restrictions to movement of heavy equipment

M - moderate; seasonal or continuous moderate restrictions to the movement of heavy equipment

P - poor; continuous severe restrictions to movement of heavy equipment

13. Ease of road construction:

A - no restrictions
B - slight restrictions
C - moderate restrictions
D - moderately severe restrictions
E - severe restrictions

14. Agricultural capability:

Mineral soils are grouped into seven classes according to their potential and limitations for agricultural use. The classification is not applied to organic soils.

Classes 1 and 2 - no or few limitations; capable of sustained production of a wide variety of crops. No soils in the mapped area fall into these two classes.

Class 3 - moderately severe limitations that restrict the range of crops or require special conservation practices. The most productive agricultural soils of the mapped area fell within this class.

Class 4 - severe limitations that restrict the range of crops or require special conservation practices. Most of the productive agricultural soils of the mapped area fell within this class.

Class 5 - very severe limitations that restrict their capability for producing perennial forage crops; however, improvement practices are feasible.

Class 6 - capable only of producing perennial forage crops, and improvement practices are not feasible. In Newfoundland this class is designated Class 7.

Class 7 - no capability for arable culture or permanent pasture.

O - organic soils

Subclasses are divisions within classes that have the same kind of limitations for agricultural use. The subclasses applicable to the surveyed area are:

d - undesirable soil structure and/or low permeability (excluding high water table or consolidated bedrock)
f - low fertility
m - moisture limitation
p - stoniness
r - consolidated bedrock
t - topography
w - excess water

15. Forest nursery suitability:

A - highly suitable
B - moderately suitable
C - low suitability
D - unsuitable

APPENDIX II

Soil description card used in the survey.

Soil Type	Date	Photo No.	Soil Type
Classification	Area		
Location		Elev.	
N. veg. (or crop)	Climate		
Parent Material			
Physiography			
Relief	Slope	Erosion	
Drainage	Gr. water	Permeability	
Moisture	Salt or alkali		
Stoniness	Root distribution		
Remarks:			File No.

Horizon	Depth	Thickness	Boundary	COLOR D(ry) M(oist)		Texture	Structure	Consistance	Reaction	Special Features	
					Mottling					Roots	
				D M							
				D M							
				D M							
				D M							
				D M							
				D M							
				D M							
				D M							
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