RECONNAISSANCE OF THE SOILS AND VEGETATION OF SOMERSET AND PRINCE OF WALES ISLANDS, N.W.T.

BY

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ABSTRACT

The soils and vegetation of Somerset Island, the northern half of Prince of Wales Island, and neighboring islands were investigated. Soil associations based on certain physical, chemical, and mineralogical characteristics of the soils were defined. Soil development resulted mainly in the formation of Regosolic Turbic Cryosol soils in the High Arctic Region, and Brunisolic Turbic Cryosol soils in the Mid-Arctic Region. Vegetation types and plant community types were described both in High and Mid-Arctic Regions. Arctic deserts dominate in the uplands of Somerset Island, and dwarf shrub communities are common elsewhere. Sedge meadows are restricted to lowland situations. The soil associations and plant community types were mapped at a scale of 1:125,000 and are presented as a combined soil-vegetation map.

Active layer and vegetation features make certain areas sensitive to disturbance. Cryoturbation, frost heaving, and mass wasting processes are common on both islands and could present problems for pipeline construction. The vegetation mat, albeit thin, insulates and stabilizes the ground. Scarce well-vegetated areas are important as muskox habitat, and the vegetation and land features make other areas attractive to caribou. Interference with key habitats by man must be avoided.

RESUME

On étudie les sols et la végétation dans l'île Somerset, dans la moitié septentrionale de l'île du Prince de Galles et dans les îles avoisinantes. D'après certaines de leurs caractérisques physiques, chimiques et minéralogiques, des groupes de sols furent identifiés. Au fil des années, le sol s'est développé pour donner principalement

deux types, soit le cryosol régosolique et turbique dans la région arctique supérieure et le cryosol brunisolique et turbique dans la région arctique moyenne. Dans ces deux mêmes régions, on a décrit divers types et communautés de végétation. Les hautes terres de l'île Somerset sont dominées par les déserts arctiques, et ailleurs on retrouve communément des communautés d'arbustes nains. Quant aux prés à laîches, ils sont limités aux basses terres. Les types d'association de sols et de communautés végétales furent cartographiés ensemble à l'échelle de 1:125,000.

La couche active (du sol) et les caractéristiques de la végétation, qui rendent certaines zones vulnérables aux déplacements sont décrites. La cryoturbation, le soulèvement dû au gel et la dégradation massive sont communs aux deux îles et pourraient nuire à la construction éventuelle de pipelines. Bien que le tapis de végétation soit mince, il isole et stabilise le terrain. Les rares zones de bonne végétation sont essentielles au boeuf musqué tandis que la végétation et les caractéristiques du terrain en d'autres zones attirent le caribou. L'homme doit éviter de s'ingérer dans ces habitats "clés".

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In Canada there are 2.5 million km^2 (900,000 miles^2) of land lying north of the tree line (Porsild 1964). Of these, 1.42 million km^2 constitute the group of islands known as the Canadian Arctic Archipelago which extends from Banks Island in the west to Baffin Island in the east. Somerset and Prince of Wales are adjacent islands in the central portion of the Canadian Arctic Archipelago (Fig. 1). Somerset Island (72°00' to 74°10'N, 90°00' to 96°00'W) lies just north of Boothia Peninsula and is separated from the latter by the narrow Bellot Strait. The area of Somerset Island is approximately 23,000 km^2 (8,900 miles^2). The area of Prince of Wales Island (71°20' to 74°05'N, 96°10' to 102°50'W) is estimated to be 31 000 km^2 (12,000 miles^2).

These islands, and especially Somerset Island, lie in the path of a gas pipeline proposed for the Canadian Arctic. The most likely route crosses Somerset Island (Fig. 1), but earlier sketches showed alternative routings through Prince of Wales Island. The history of gas discoveries in the region and the logistical problem of transporting gas to southern markets have been discussed in some detail by Rohmer (1973). Recently the important oil strike on Cameron Island confirmed the importance of the region as a reservoir of fossil fuels. Concern over the implications of energy development in the arctic have prompted the Government of Canada to sponsor social and environmental research, to which the present study is one contribution.

2. *OBJECTIVES*

The objectives of the present study were to provide reconnaissance information on the vegetation and soils of Somerset Island and the northern part of Prince of Wales Island and to identify problems and sensitive areas that require special consideration in routing or construction techniques of the proposed pipeline.

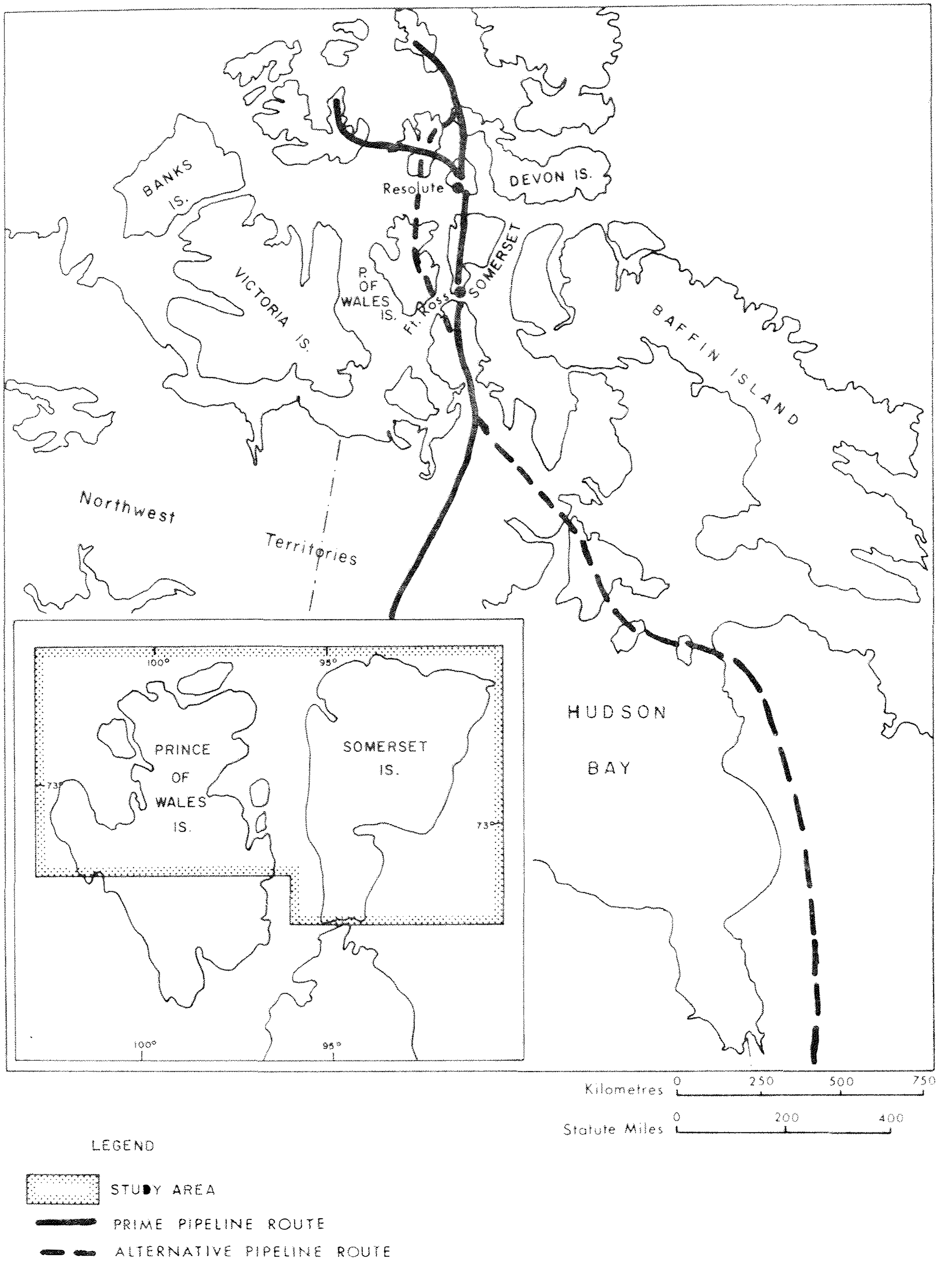


Figure 1. Study area with possible routings of gas pipeline.

3. *STATE OF KNOWLEDGE*

3.1 CLIMATE

Rae (1951) has dealt with the climate of the Canadian Arctic Archipelago in some depth. Meteorological data were collected at Fort Ross from 1938 to 1950, when the trading post was abandoned. As most of the land mass of Somerset Island is closer to Resolute on Cornwallis Island than to Fort Ross, data from Resolute may better characterize the climate of Somerset Island. On the other hand, the climate of Prince of Wales Island would be similar to that of Fort Ross, due to similarities in altitude and latitude.

According to Rae (1951), Somerset Island marks the western limit of winter cyclonic activities characteristic of the eastern Arctic Islands. Consequently, winter temperatures are consistently low; mild spells in midwinter are infrequent. Temperature recordings at Resolute and Fort Ross are summarized in Table 1.

The highest diurnal fluctuation of temperature occurs in March. Yet, on an annual basis temperatures fluctuate only over a mean of 38°C as a result of the maritime influence. Below-freezing temperatures occur in all months of the year (Rae 1951), and July is the only month in which mean daily minimum stays above freezing; these are two factors that are significant to vegetation survival.

Snow falls every month of the year, but the overall accumulated precipitation remains low. Most of the precipitation on both islands is in the form of snow. Rain falls only between May and September and the intensity is usually low. The precipitation data are summarized in Table 2.

The prevalent winter wind direction for the central Arctic Archipelago is northerly to northwesterly. In summer the entire Arctic Archipelago is often situated in a fairly uniform high pressure system; wind directions are thus influenced by local topography. The mean annual wind speeds of 19.6 km/h at Fort Ross and 17.0 km/h at Resolute are comparable to southern stations. Rae (1951) attributed the feeling of windiness in the Arctic to the lack of tree cover.

Table 1. Monthly and annual averages of daily mean temperatures (°C)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Range
Resolute[1]	-33	-34	-31	-23	-11	0	4	3	-5	-15	-24	-29	-16	38
Fort Ross[2]	-29	-32	-26	-22	- 9	0	4	2	-4	-12	-22	-26	-15	36

1 Atmospheric Environment Service (1975)

2 Rae (1951)

Table 2. Average monthly and annual precipitation

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Resolute[1]	Rainfall (mm)	0.0	0.0	0.0	0.0	T	5.8	23.4	25.7	3.8	T	0.0	0.0	58.7
	Snowfall (cm)	2.8	3.3	3.3	5.8	8.9	6.6	3.0	4.8	14.2	15.5	5.6	4.8	78.6
Fort Ross[2]	Rainfall (mm)	0.0	0.0	0.0	0.0	2.6	12.5	21.8	35.0	0.0	0.0	0.0	0.0	69.0
	Snowfall (cm)	17.0	7.6	20.0	8.4	11.2	13.5	1.0	1.5	29.2	31.2	23.0	8.2	160.0

1 Atmospheric Environment Service (1975)

2 Rae (1951)

3.2 GEOLOGY

The rock formations of Somerset and Prince of Wales islands are varied; they include igneous, metamorphic, and sedimentary rocks of three eras (Figs. 2 and 3). Paleozoic limestones, dolomites, and sandstones cover the majority of the area on both islands.

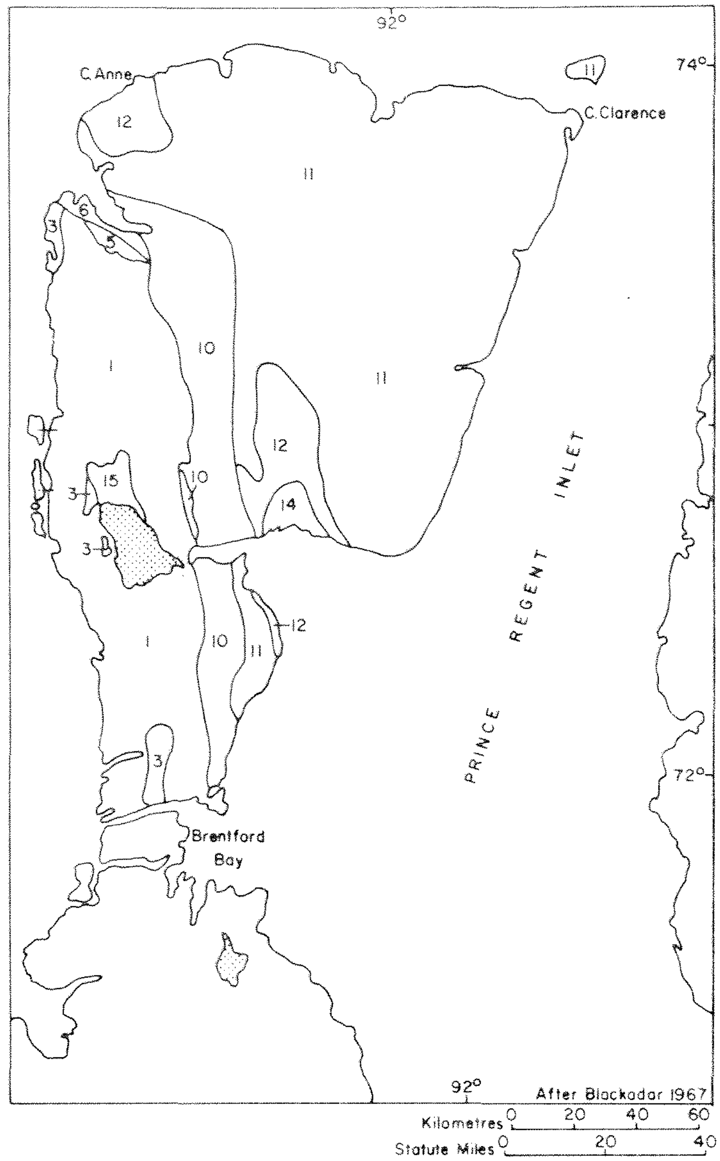
A series of tectonic upheavals, largely Devonian in age, have resulted in the Boothia Uplift, which is an elongate northward extension of the Canadian Shield (Kerr and Christie 1965). Blackadar (1967) reported that the older igneous rocks of Boothia-Somerset are similar to many areas of the southern Canadian Shield in being dominated by mafic and felsic gneisses that are either banded or homogeneous.

In two local areas, bedrock of the Eureka Sound formation (lower Tertiary age) occurs on Somerset Island. The bedrock consists of poorly lithified sandstone, with interbedded thin lignite seams (Netterville *et al.* 1976).

3.3 PHYSIOGRAPHY

Blackadar (1967) stated that the topography of Somerset and Prince of Wales islands is strongly influenced by the underlying bedrock. A full description of the terrain regions of Somerset and Prince of Wales islands is being undertaken by Netterville *et al.* (1976). The study area lies in three broad physiographic regions, two in the Arctic Lowlands and one in the Kazan Region (Blackadar 1967). These are described as follows.

Northern Somerset as a physiographic region is similar to the high plateau of Brodeur Peninsula described by Frontier *et al.* (1957). This plateau occupies the eastern two-thirds of Somerset Island as well as northeastern Prince of Wales Island. The topography gently undulates between 300 and 400 m asl, except near coastal areas where it ends abruptly, forming vertical sea cliffs. The plateau surface is covered with shattered rock fragments, and solifluction features are very common. The rivers have shallow broad valleys but near the northeastern coast they are embedded in deep gorges.



CENOZOIC
- QUATERNARY
- 14 Drift
- 15 Eureka Formation — shale, siltstone and sandstones

PALAEOZOIC
- SILURIAN AND DEVONIAN
- 12 Peel Sound Formation: conglomerate sandstone and siltstone
- SILURIAN
- 11 Read Bay Formation: limestone, limy dolomite, shaly dolomitic limestone, silty limestone
- 13 Limestone, dolomite, mainly carbonate, mixture of Peel Sound and Read Bay Formations
- CAMBRIAN AND ORDOVICIAN
- 10 Sandstone, sandy dolomite, dolomite, shaly dolomite, intrafomational conglomerate

PROTEROZOIC
- 6 Hunting Formation: dolomite, sandy dolomite; minor shale, sandstone, siltstone, chert
- 5 Aston Formation: quartzite, minor shale, limestone, conglomerate
- 3 Granitic Rocks
- 1 Mafic and Felsic Gneiss

Figure 2. Geology of Somerset Island.

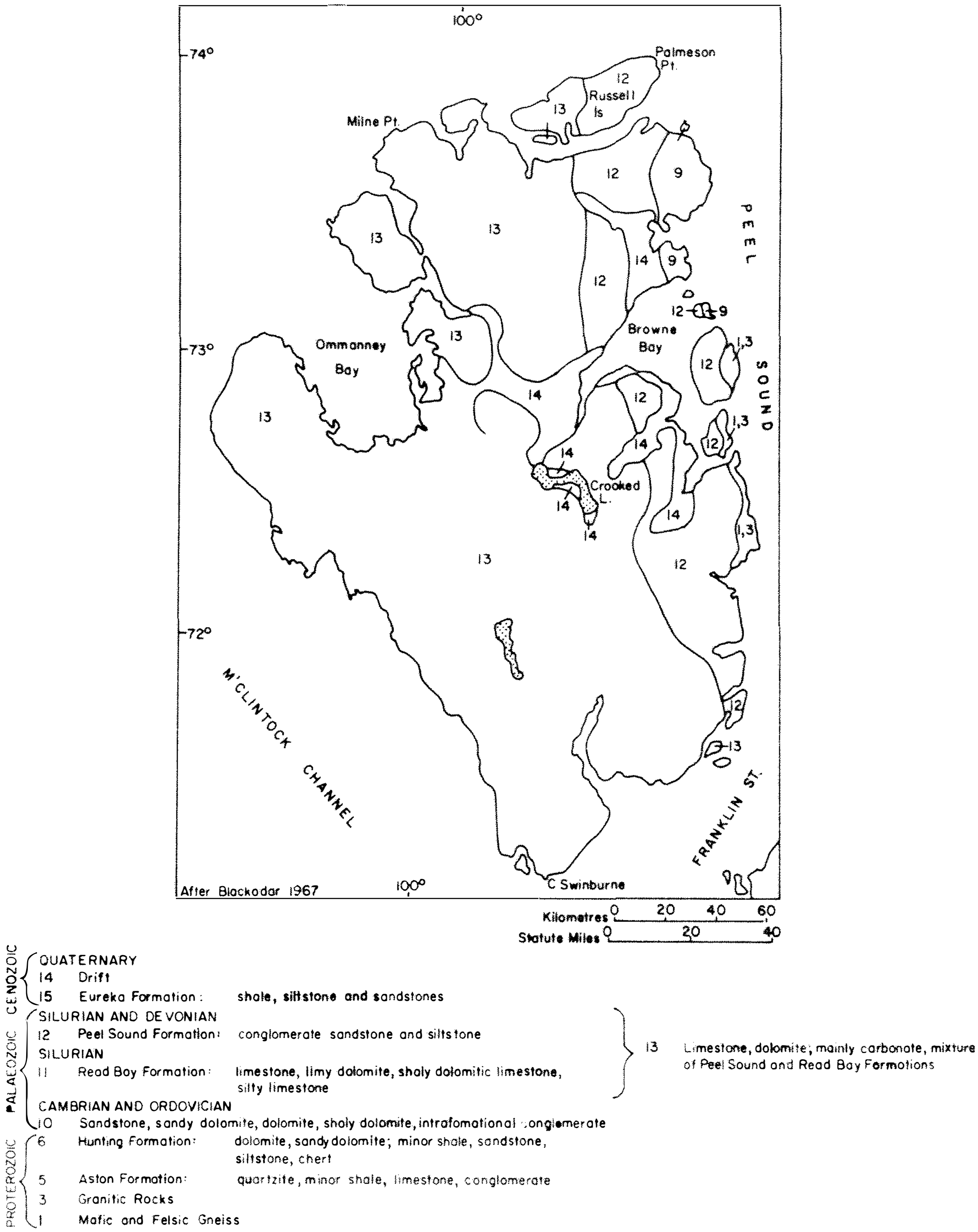


Figure 3. Geology of Prince of Wales Island.

The second physiographic region covers most of Prince of Wales Island, except the northeast corner and parts of the east coast. Here, glacial drift is continuous and the landscape is characterized by glacial landforms. Craig (1963) reported the location of kames, eskers, and moraines on Prince of Wales Island.

The third region consists of Precambrian crystalline rocks of the Kazan Physiographic Region, extending for the most part along the coasts bordering Peel Sound. This unit occupies only a limited area along the east coast of Prince of Wales Island. On Somerset Island a 10-km wide strip along the west coast is characterized by rounded hills and northeast-southwest trending lakes and rivers. However, farther inland and above 300 m asl, northerly trending ridges and felsenmeer are the dominant features.

3.4 GLACIAL HISTORY

The Quaternary geology of the study area is under review on the basis of new field evidence. Prior to the summer of 1975, it was thought that the entire study area had been overridden by the late Wisconsin Laurentide ice sheet (Craig 1963). Netterville *et al.* (1976) did not find evidence of this ice sheet on much of northern Somerset and northeast Prince of Wales islands, but did find evidence of an old glaciation that spread scattered erratic rocks over both islands. Much of the surface in the northern parts of the islands presents a deeply weathered aspect, such as the occurrence of torlike structures (Dyke 1976), accumulation of large amounts of weathering products rather than till, and severe solution features on limestones, as confirmed by Smith (1972). The surface material in the northern parts of the islands is derived mainly from the underlying bedrock, being frost-shattered and chemically weathered material brought to the surface and mixed with the original till by cryoturbation.

The initial glaciation was followed by a severe depression of the land by the weight of the ice. Marine sediments and shells were found to an elevation of about 325 m on Somerset Island (Fig. 4). Prince of Wales Island was completely submerged by the sea, as was a large part of Somerset Island.

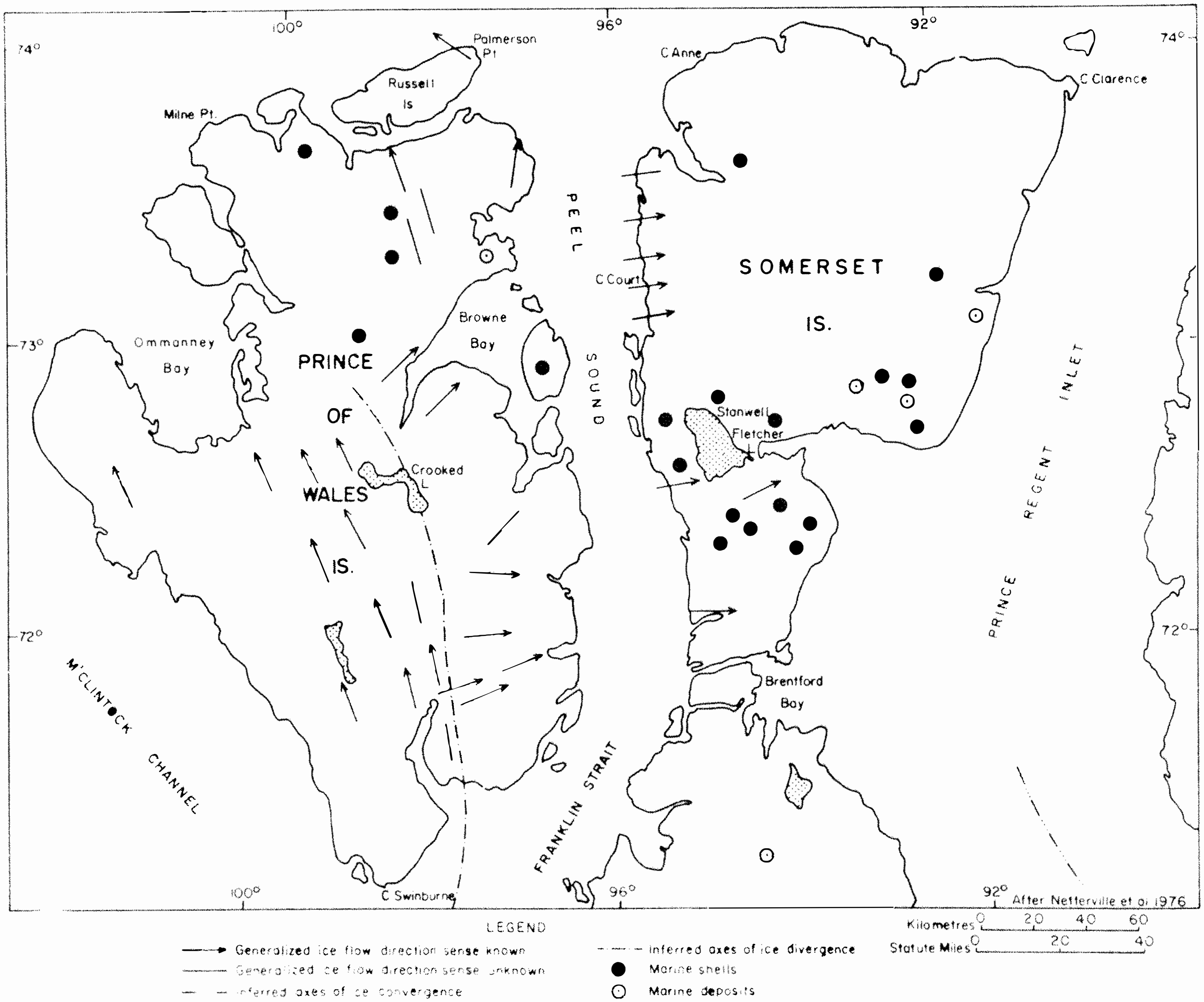


Figure 4. Movement of glacial ice, and occurrence of marine sediments and fossils above the Quaternary marine limit.

Fresh, glacially eroded landforms in southern Somerset Island and most of southern Prince of Wales Island indicate a transgression by the Laurentide ice sheet during late Wisconsin times (Fig. 4). At the same time, another ice sheet, the Innuitian, formed on the northern Arctic Archipelago (Blake 1970; Andrews 1970). The southern limit of this ice sheet was placed in the Barrow Strait, north of the study area (Blake 1970). Although this ice sheet did not reach Somerset and Prince of Wales islands, its weight, combined with the weight of the Laurentide ice sheet in the south, depressed the crust of the earth by about 150 m in the study area. This resulted in the inundation of large portions of Somerset and Prince of Wales islands, as shown by well-developed raised beaches and marine sediments within the Quaternary marine limit.

3.5 SOILS

No soil studies had been done on Somerset and Prince of Wales islands prior to the present study, and very few on the neighboring areas. Cruikshank (1971) mapped the soils and terrain units around Resolute on Cornwallis Island using a system of classification developed by Tedrow (1966). A soil mapping project has just been completed on the Boothia Peninsula to the south (Tarnocai and Boydell 1975; Tarnocai *et al.* 1976). A number of site-specific soil studies were conducted on Devon Island in connection with intensive ecological studies (Bliss 1972; Walker 1976). Pawluk and Brewer (1975) studied the micromorphology of some soils on Devon and King Christian islands.

The nature of soil development in arctic environments was a subject of great interest, especially in the midsixties. In North America the system of classification developed by Tedrow (1966) enjoys the most popularity, but it differs considerably from the Soviet classification developed by Ivanova (1963) and her colleagues. Recently, the Canada Soil Survey Committee (1976) developed a classification system of permafrost soils for use in northern Canada.

The opinions of Tedrow and colleagues may be found in their many publications (Tedrow and Douglas 1964; Hill and Tedrow 1961; Tedrow and

Cantlon 1958; Tedrow and Brown 1962). According to this view the Alaskan Arctic Brown soil is the zonal soil of the tundra and the Polar Desert Soil is the zonal soil of the High Arctic. Pedogenic processes in both cases are identical except the latter is the result of a "weakening of soil-forming potential" (Tedrow 1966). Arctic Brown is formed on well-drained sites, and by processes which are equivalent to weak podzolization; in other words, there is no qualitative difference in soil formation between temperate and arctic environments. Since a criterion in the establishment of zonality is the maturity of the soil in question, gleyed soils which were previously thought to be zonal were rejected as being arrested in their development. Tedrow (1962) also considers the influence of frost to be strictly a physical process. Cryoturbation is thought to be largely responsible for the erasure of soil horizons and therefore has no benefits to pedogenesis.

Soviet workers (Ivanova 1963; Fedorova and Yarilova 1972), on the other hand, recognize the uniqueness of the Arctic environment in soil classification. It is realized that the poor drainage conditions of tundra are due to the presence of the permafrost acting as an impervious layer; therefore, permafrost can no longer be considered as inactive in soil development. Zonality can thus be based on the occurrence of permafrost. Frost processes, including cryoturbation, are considered to be important pedogenic processes, and the term cryopedogenesis is generally accepted.

The Canadian viewpoint has been presented by Pettapiece (1974) and Tarnocai *et al.* (1973). It supports the contention that pedogenesis in the permafrost regions is unique in character because of the influence of active layer processes and permafrost on the physical and chemical characteristics of the soil. The presence of permafrost is regarded as the pedological expression of a cold environment and is used as a diagnostic feature. Features associated with soils of cold regions (e.g., permafrost, impeded drainage, cryoturbation, cold soil temperatures, etc.) are accepted as factors contributing to soil development and used to classify arctic soils (Canada Soil Survey Committee 1976).

3.6 VEGETATION

Savile (1959) made initial contributions to the botany of Somerset Island. While few of the collection sites were far from the coast, 90 vascular species and 28 fungi were collected. No separate published work exists for Prince of Wales Island, although Porsild (1964) indicates some collection locations. Collections made for the present study in the summer of 1975 indicated that the flora of the two islands is similar. Savile (1959) described seven habitat types, some of which represent community types which are quite dominant in the area. These are limestone barrens (polar desert) characterized by *Dryas integrifolia* and *Saxifraga oppostifolia*, and gravel tundra (polar semi-desert) characterized by *D. integrifolia* and *S. oppostifolia*, and additional species of *Draba*, *Pedicularis*, and *Salix*. On river terraces of sand and gravel *Alopecurus alpinus*, *Cerastium beeringianum*, and *Arenaria rubella* can be found. The sedge meadows are characterized by *Eriophorum triste*, *Carex misandra*, *C. membranacea*, *Arctagrostis latifolia*, and *Dupontia Fisheri*. On the marine beaches and tidal flats Savile reports no characteristic flora, but *Cochlearia officinalis*, *Puccinella Bruggemannii*, and *Stellaria humifusa* occur on the tidal flats, and *Cerastium beeringianum*, *Arenaria Rossii*, and *A. rubella* inhabit the areas above the storm line.

Savile (1959) also collected fungi on Somerset Island, in particular the parasitic species. He observed that the best sites for vascular plants are also the richest sites for parasitic fungi.

Botanical studies in adjacent areas have been conducted by Thannheiser (1972), who provided a species list for Boothia Peninsula and King William Island, while Schofield and Cody (1955) did a reconnaissance survey on Cornwallis Island. Bryophyte studies include the work of Brassard and Steere (1968) on Bathurst Island, Brassard (1967) on Melville Island, and Steere (1951) on Cornwallis Island. Thomson (1972) reviewed the distribution of Arctic lichens including the Central Arctic Islands. Savile (1961) also examined the phytogeography of the northwestern Queen Elizabeth Islands and its implication on Pleistocene events.

3.7 FAUNA

The fauna of Somerset Island is not well known, but Prince of Wales Island was investigated in some detail (Manning and Macpherson 1961). Muskoxen (*Ovibos moschatus*) are numerous on Prince of Wales Island, but only one small herd is known to exist on Somerset Island (Russell and Edmonds 1976). Barren ground caribou (*Rangifer tarandus*) apparently winter on Somerset Island, but only visit Prince of Wales Island in the summer. Wolves (*Canis lupus*) are scarce, but arctic fox (*Alopex lagopus*) are abundant in some years. Brown lemming (*Lemmus sibiricus*) and collared lemming (*Dicrostonyx torquatus*) experience wide fluctuations in population. Arctic hare (*Lepus arcticus*) is known to occur on Prince of Wales Island and probably on Somerset Island.

Polar bear (*Ursus maritimus*) occur on both islands, and maternity dens are known from Somerset Island (Nettleship and Smith 1975). Important white whale (*Delphinapterus leucas*) calving areas were identified in several major bays around Somerset Island (Nettleship and Smith 1975). Narwhals (*Monodon monoceros*), ringed seals (*Phoca hispida*), bearded seals (*Erignathus barbatus*), and walrus (*Odobenus rosmarus*) were reported from the sea around Prince of Wales Island (Manning and Macpherson 1961) and they probably also occur around Somerset Island.

Prince Leopold Island and the neighboring sea cliffs are inhabited by very large colonies of birds (Nettleship and Smith 1975). Thousands of nests were found here (Barry 1960); fulmars (*Fulmarus glacialis*), murres (*Uria lomvia*), and kittiwakes (*Rissa tridactyla*) were the most common. The common waterfowl on Prince of Wales Island (Manning and Macpherson 1961) are king eider (*Somateria spectabilis*) and oldsquaw (*Clangula hyemalis*). Sanderlings (*Crocethia alba*), Baird's sandpiper (*Erolia bairdii*), black-bellied plover (*Squatarola squatarola*), and ruddy turnstone (*Areneria interpres*) are common shorebirds on Prince of Wales Island (Manning and Macpherson 1961). Lapland longspur (*Calcarius lapponicus*) and snow bunting (*Plectrophenax nivalis*) are the common inland birds. The long-tailed jaeger (*Stercorarius longicaudus*) is the most common predatory bird, and a low number of rough-legged hawk (*Buteo lagopus*) and peregrine falcon (*Falco peregrinus*) represent the raptors.

Danks and Byers (1972) collected terrestrial arthropods on Bathurst Island and listed 78 species in total. There are 14 species of spiders (*Arachnida*), 13 mites (*Acarina*), and 61 insects (*Insecta*), of which 30 are choronomids. On Somerset and Prince of Wales islands the list of arthropods will likely be longer because much of the land area lies within the mid-arctic zone where climate is more favorable (Downes 1964).

4. *METHODOLOGY*

4.1 SAMPLING

During the 1975 field season, Somerset and northern Prince of Wales islands were studied with the logistical support of the Terrain Sciences Division of the Geological Survey of Canada. The bulk of the data was collected during helicopter traverses in which ground stops were selected subjectively on air-photo mosaics. A total of 133 soils traverse sites was examined (Fig. 5). At each stop a pit was dug to the frost table and the thickness of the active layer measured. Soil morphology, drainage conditions, and site descriptions of slope, patterned ground type, and deposition mode were recorded. Soil colors were determined using a Munsell color chart. A sample of the soil parent material was collected for laboratory analyses.

Vegetation data were collected at each ground stop. Naturally occurring units formed by microtopography and vegetation were used as sampling units. This is in accordance with sampling theory which demands that the sampling unit correspond to the natural rhythm of variation, which in the present situation is the mean size of the patterned ground unit (polygons, circles, nets, or stripes) (Washburn 1956). Thus, in places where there was recognizable patterned ground, the sampling unit was the approximate mean size of the patterned ground unit itself; this approach is consistent with the use of the "pedon"[1] as the basic sampling unit in the study of cryoturbated soils. Where no obvious pattern could be detected, a visually estimated 2-m diameter circular quadrat was used.

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[1] A pedon is a three-dimensional unit of soil (Canada Soil Survey Committee 1976).

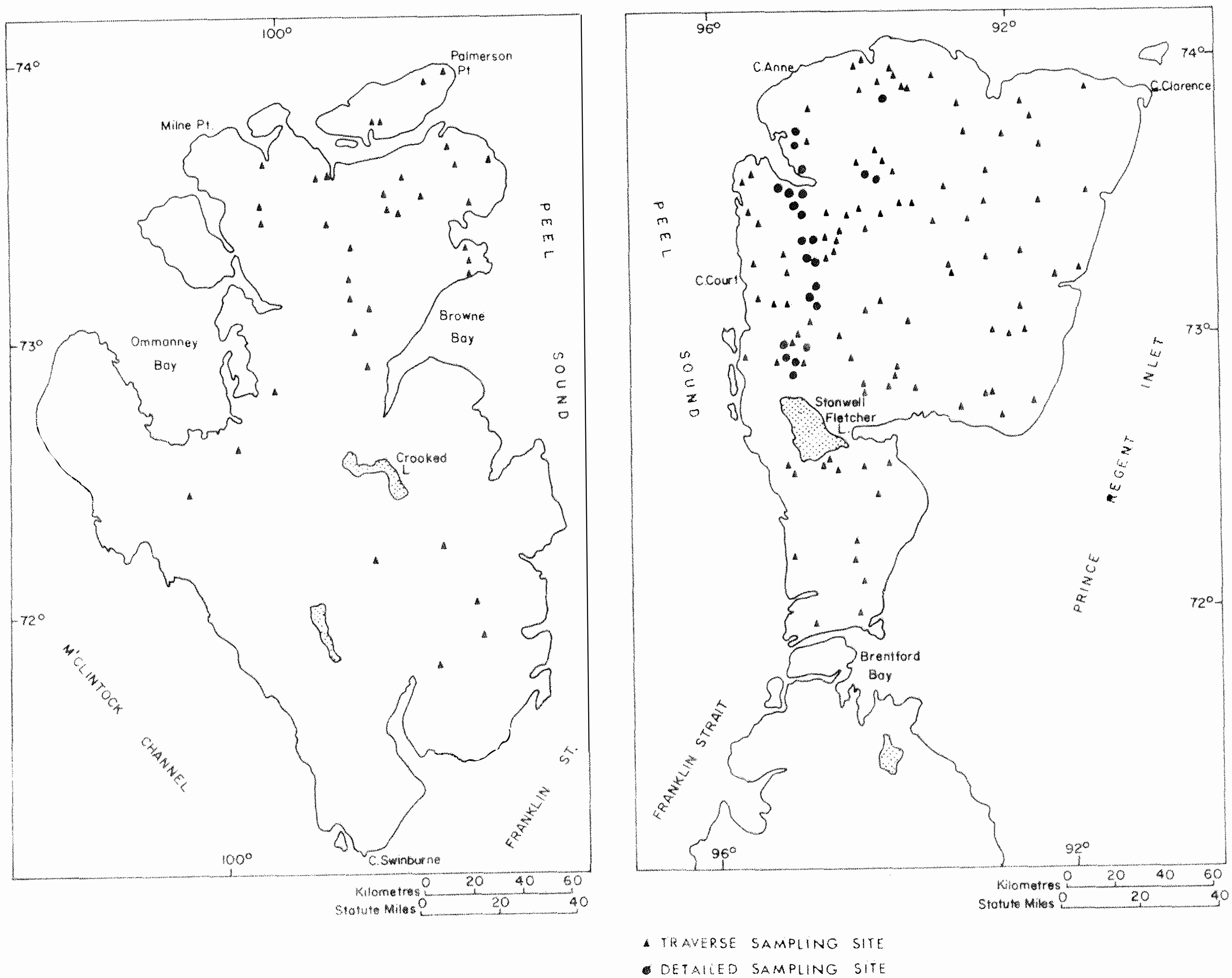

Figure 5. Sampling locations on Somerset and Prince of Wales islands.

The overall vegetation cover at each of the over 200 vegetation traverse sites was estimated visually. The abundance of each species was also estimated and expressed by a modified Domin scale (Table 3). The distribution of various species on different parts of a patterned ground was also noted.

4.2 DETAILED SITES

A total of 23 detailed sites was studied in the field. These sites were selected to exemplify various soil associations. At each site a pit was dug to about 50 cm into the permafrost to expose a control section in a trench over 1 m long. The morphology of each horizon was then described and bulk samples were taken. Samples of known volume were also taken for determination of water and ice content. Soil temperature readings were taken with a thermistor at various levels in the active layer.

Table 3. A modified Domin scale used to indicate abundance of each species (after Kershaw 1973)

	Domin Class		Domin Class
Cover about 100%	10	Abundant, cover 10-25%	5
Cover >75%	9	Abundant, cover 5-10%	4
Cover 50-75%	8	Scattered, cover small	3
Cover 33-50%	7	Isolated, cover small	2
Cover 25-33%	6	Barren	1

4.3 LABORATORY ANALYTICAL PROCEDURES

The calcite and dolomite contents of soil samples were determined manometrically (Skinner *et al.* 1959). The Walkley-Black wet oxidation method with dichromate was used to determine the organic carbon content (Greweling and Peech 1965). The total nitrogen content was obtained by the modified marco-Kjeldahl method (Jackson 1958). The pH was determined electrometrically in a soil-0.01 M $CaCl_2$ (1:2) paste when the soluble salts were not determined (Peech 1965), and in a saturated soil paste (McKeague 1976) when soluble salts were also determined. Soluble salts were obtained by a conductivity method, using a saturation extract (McKeague 1976); Ca, Mg, Na, and K with an atomic absorption spectrophotometer; Cl potentiometrically (Jackson 1958); and SO_4 by a turbidimetric method (Chesnin and Yien 1951). Cation exchange capacity and exchangeable cations were measured in leachates extracted by ammonium acetate, as outlined by Atkinson *et al.* (1958). Leachate was analyzed by Ca, Mg, Na, and K by atomic absorption, and H by NH_4OH titration (Atkinson *et al.* 1958).

Coarse fragment contents were obtained by sieving the dry soil. For particle size analysis organic matter was removed with H_2O_2, and the soluble salts were removed by washing with water (Day 1965). Total sand was fractioned by dry sieving. The silt and clay contents were determined on some samples by the Bouyoucos hydrometer sedimentation technique, and on other samples by the pipet sampling method. Moisture content was determined by drying the samples at 110°C and measuring the weight loss.

4.4 SYSTEM OF SOIL CLASSIFICATION

The classification of soils in the study area follows a system adopted at the Ninth Meeting of the Canada Soil Survey Committee (Tarnocai *et al.* 1973). All soils examined in the study area belong to the Cryosolic Order, having a permafrost table within 1 m of the surface[2]. The majority of the soils are in the Turbic Cryosol Great Group, as they display horizon disruptions exceeding one-third of the pedon. Indications of cryoturbation are organic smears and intrusions in the mineral layers, frost sorting of materials of various particle sizes, and the development of patterned ground on the surface. A smaller proportion of soils belongs to the Static Cryosol Great Group. In these soils disrupted horizons constitute less than one-third of the pedon. Organic Cryosol soils do occur but their distribution is very limited.

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[2] At the recent Tenth Meeting of the Canada Soil Survey Committee, a permafrost table 2 m deep was adopted as the diagnostic horizon for the Cryosolic Order if the soils are strongly cryoturbated.

Three subgroups are encountered in the study area. The Regosolic Subgroup lacks a B horizon and is, in fact, undifferentiated parent material. The Brunisolic Subgroup has a Bm horizon differentiated from the parent material in structure and/or color. The Bm horizon either has a stronger chroma or it develops a granular structure with clay films surrounding the aggregates. Often on a silty parent material a layer with a vesicular structure can be found within 20 cm of the surface. This structure is probably related to the formation of small ice crystals during a slow freezing process. Chemical analyses show that this vesicular layer is often but not always different from underlying material in carbonate content. In this study, this layer is designated as Bmjy for it is considered to be an initial indication of cryogenesis. Micropedological studies indicate (Tarnocai, pers. comm.) that the vesicles are coated with silt, showing that they are fairly permanent pedogenic features. Such soils are classified as Brunisolic Turbic Cryosols[3].

Lastly, a significant number of soils belong to the Gleysolic Subgroup. These are soils in which the profile is dominated by gleization, as expressed by low chroma or distinct mottles in the control section. About 80% of the Gleysolic Cryosol soils belong to the Turbic Great Group; Gleysolic Static Cryosol soils are rare. Two modifiers, Lithic and Saline, are also used in conjunction with the Subgroups in accordance with the official rules.

4.5 SOIL MAPPING

Soil-vegetation maps have been prepared for the study using National Topographic Series maps at a scale of 1:125,000 as base maps (Fig. 6). These maps have been prepared with the aid of field observations and photo-interpretation of 1:63,360 air photos, photomosaics at a scale of 1:125,000, and LANDSAT B & W and color composite imagery. Each map

[3] The Canada Soil Survey Committee (1976) made recent changes in the Cryosolic Order that are not adopted here. It should be pointed out that the dominant soils of the High Arctic would be classified as Regosolic Turbic Cryosols under either system. In the Mid-Arctic portion of the study area the dominant soils would be classified as Orthic Turbic Cryosols, but they would be Brunisolic Turbic Cryosols under the 1973 System; the new system classifies the dominant soils of the Low Arctic and Subarctic as Brunisolic Turbic and Static Cryosols.

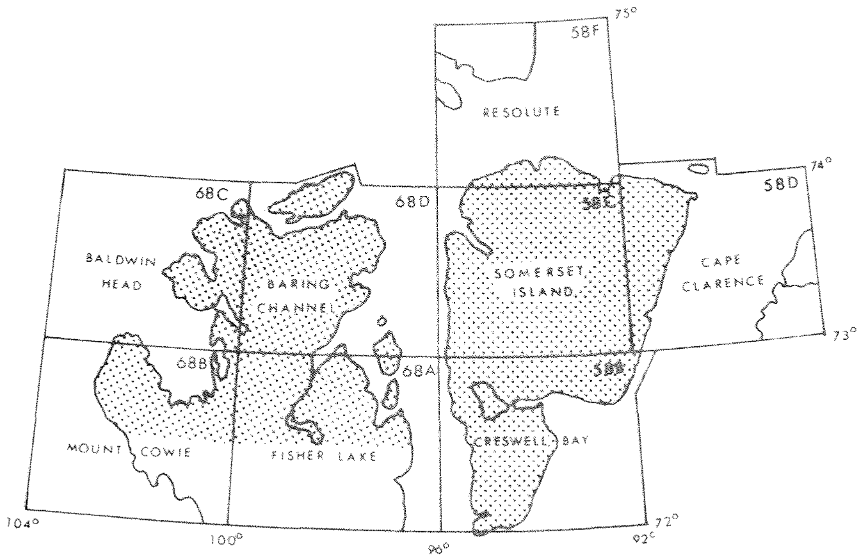


Figure 6. Index map of study area (shaded) showing individual mapsheets.

unit represents a qualitative change in soils and/or vegetation; information is also given on general relief changes, internal drainage conditions, and overall vegetation cover.

The soils were mapped as soil associations. A soil association is a suite of soils of about the same age that has developed on parent material of similar origin and physical and chemical characteristics, but having unlike profile characteristics because of variation in relief and drainage (Canada Soil Survey Committee 1976). The criteria for establishing soil associations were chemical characteristics, texture, depth over bedrock, and mode of origin of the parent material. In each map unit the parent material of the soil may be considered to be generally uniform. A variety of soils that can be classified into the various subgroups of Cryosols (Section 4.4) may develop on these parent materials.

4.6 NOMENCLATURE AND IDENTIFICATION OF PLANT SPECIES

The nomenclature of vegetation follows that of Porsild (1964) with the exception of *Papaver radicatum*, which has been named *P. lapponicum* (Tolm.) Nordh. ssp. *occidentale* (Lundstr.) by Kiger (1975). The authors made initial identifications on the vascular species. These were subsequently checked by G.M. Keleher of the University of Manitoba and W.S. Cody of Canada Department of Agriculture, Ottawa. Dr. D.H. Vitt of the University of Alberta identified the bryophytes and lichens.

4.7 VEGETATION MAPPING

The vegetation component of the soil-vegetation maps was determined from aerial photographs on the basis of ground studies and observations during overflights. The combined maps are presented at a scale of 1:125,000 (Fig. 6). The map units reflect relatively homogeneous vegetation and soil conditions. Crustose lichens were generally exempted when making an estimate of overall vegetation cover, except in the case of *Polyblastia* spp. Their ubiquitous occurrence in certain areas makes them worthy of note.

The mapping units of vegetation are the "Community Types", defined as plant communities of definite floristic composition that can be recognized at the level of detail imposed by the scale of mapping. In a Community Type the species composition of individual stands or areas may vary somewhat, but there are always a few recurring species which are said to be constant. The Community Type is named after the species that are both constant and dominant in the plant communities. The Community Types can be grouped into broader classes, referred to here as "Vegetation Types". In this study four Vegetation Types were recognized; these are polar desert, moss-grass, arctic dwarf shrubs, and sedge meadows.

Each map symbol shows the numerical symbol of the Community Type most common to the area. Where complexes of Community Types occur, they are symbolized in the same way the soil complexes are. In addition, the ground cover is indicated by the Domin class.

4.8 ECOLOGICAL REGIONS AND DISTRICTS

When one examines the biophysical characteristics of a large area, certain differences in plant distribution, frequency, or successional patterns become evident on similar physiographic areas. Such differences may be recognized as ecological regions (or zones), which may be defined as land areas within which vegetaion growth and pedogenic processes will be similar on similar physiographic sites, being influenced by a uniform regional climate (Zoltai and Pettapiece 1973). The terms "ecological region", "ecoregion", and "ecological zone" are synonymous and are equivalent to the "site region" of Hills (1960) and the "land region" of Lacate (1969).

Physiographic differences within ecoregions make it possible to subdivide them into districts. These districts are equivalent to the "site districts" of Hills (1960) and the "land districts" of Lacate (1969), who defined them as subdivisions of land regions based primarily on the separation of major physiographic and/or geologic patterns that characterize the region as a whole. Thus, ecological districts are subdivisions of ecological regions based on significant changes in the nature and relief of surficial materials.

5. *RESULTS*

5.1 ECOLOGICAL REGIONS AND DISTRICTS

On the basis of these criteria, the study area was divided into two ecological regions, the High Arctic and the Mid-Arctic. The differences between the regions are manifested both in vegetation and in soil development. The vegetation differences on similar soil moisture and material classes are manifested in greater ground cover. In the Mid-Arctic there is a greater vegetation ground cover on similar soils than in the High Arctic, although the species composition of the communities may be nearly identical. There are also indications that some southern species are more abundant in or are restricted to the Mid-Arctic Region. The modal soils in the High Arctic Region of the study area are classed as Regosolic Turbic Cryosols, while in the Mid-Arctic Region Brunisolic Turbic Cryosols are more common.

The Ecological Districts of Somerset and Prince of Wales islands (Zoltai and Woo 1976) are shown in Figs. 7 and 8, and their characteristics are summarized in Tables 4 and 5.

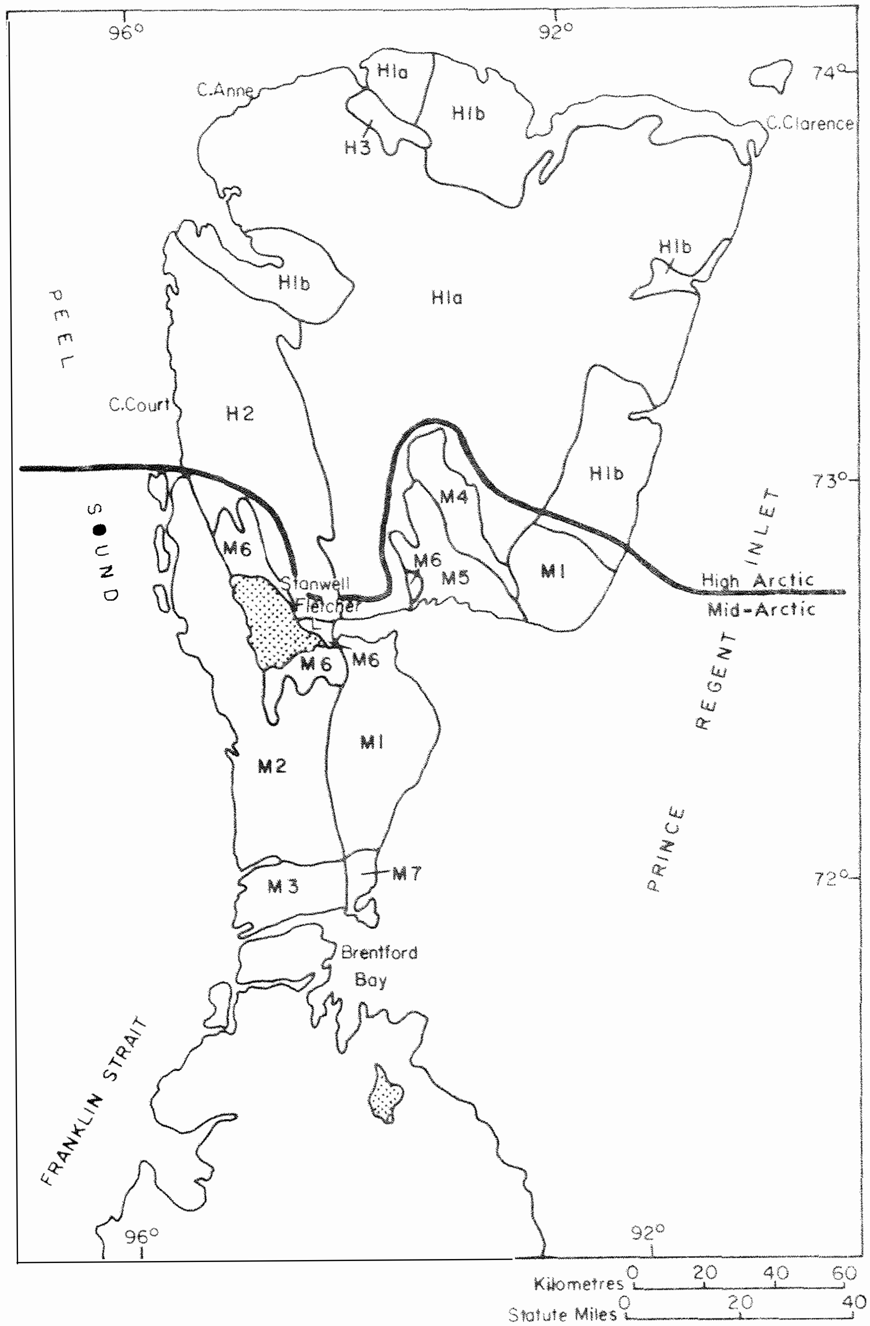
5.2 SOIL ASSOCIATIONS OF SOMERSET AND PRINCE OF WALES ISLANDS

A description of the soil associations follows listed alphabetically by name. Descriptions of the soil profile are given for the most common soil associations, and chemical and physical analyses are presented in the Appendix. The maps prepared in conjunction with this report (Fig. 6) show their distribution in the study area.

The soil associations are summarized in Tables 6 to 13 according to the type of material upon which they developed. Descriptions of soil associations named in Boothia Peninsula (Tarnocai *et al.* 1976) and used in this report are presented in a summary form in Table 14.

5.2.1 Aston Bay Association (Map symbol: As)

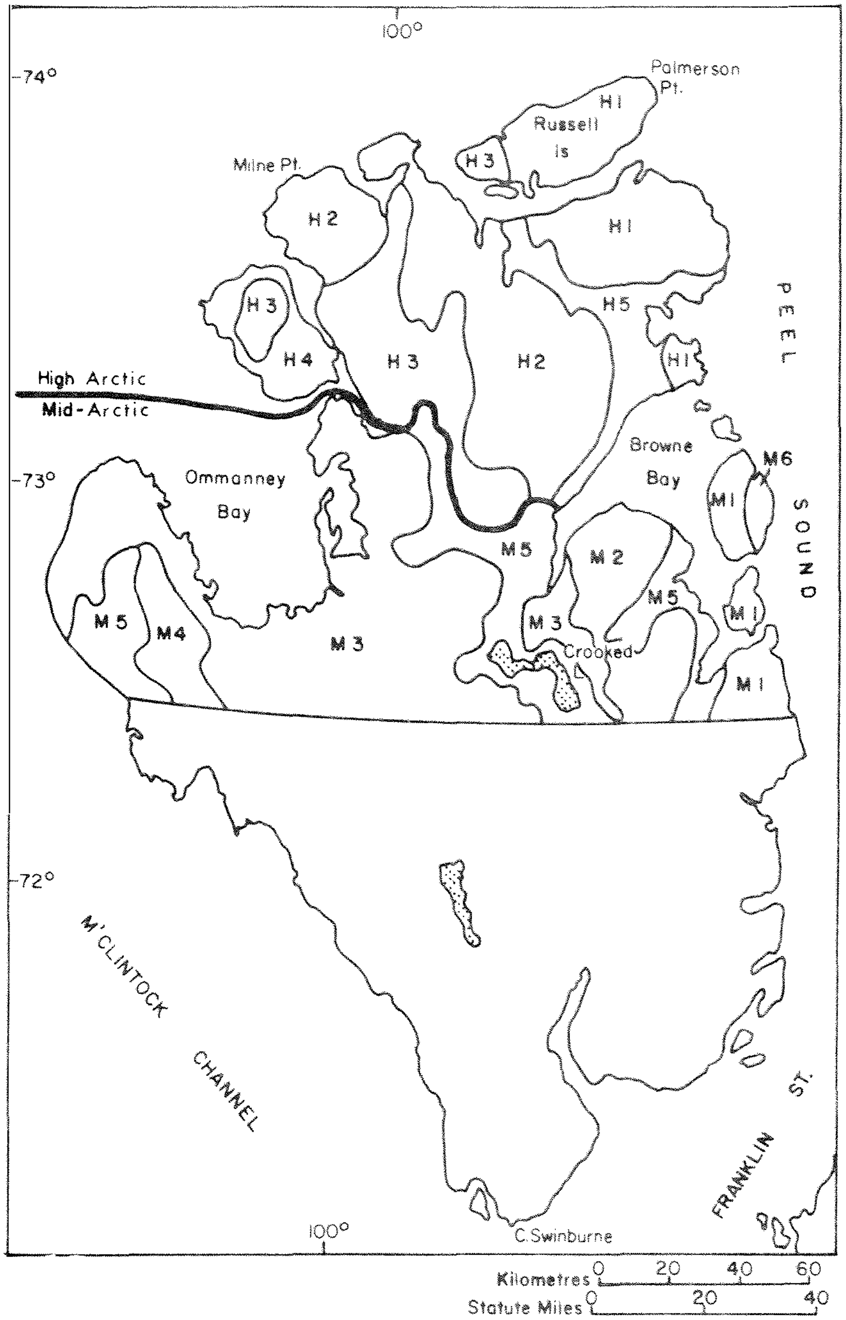
The Aston Bay Association comprises soils of Regosolic Turbic Cryosol and Regosolic Static Cryosol subgroups in the High Arctic Region, developed on alluvial terraces in sedimentary bedrock areas. Gleysolic



H1a&b Northwest Plateau
H2 West Somerset Upland
H3 Cunningham Inlet

M1 Cape Gorry Plateau
M2 South Somerset Till Plain
M3 South Somerset Ranges
M4 Central Creswell Valley
M5 Creswell Lowland
M6 Stanwell-Fletcher Basin
M7 Hazard Inlet Beaches

Figure 7. Ecological Districts of Somerset Island.



H 1 Cape Hardy Highlands
H 2 North Central Uplands
H 3 Drake Bay Uplands
H 4 Mount Clarendon Lowlands
H 5 Back Bay Lowlands

M 1 East Prince of Wales Highlands
M 2 Cape Henry Kellett Uplands
M 3 Central Prince of Wales Lowlands
M 4 Mount Cowie Lowlands
M 5 Fisher Lake Lowlands
M 6 Prescott Island Uplands

Figure 8. Ecological Districts of Prince of Wales Island.

Table 4. Characteristics of Ecological Districts on Somerset Island

Ecoregion	Ecological District	Soil Subgroup[1] (% area)		Vegetation Type (% area)		% Ground Cover
High Arctic	H1a & H1b	Rego. T. Cryosol	80	Polar desert	80	1
	Central Plateau	Brun. T. Cryosol	10	Dwarf shrubs	10	10
		Gley. T. Cryosol	10	Moss-grass	10	50
High Arctic	H2	Rego. T. Cryosol	30	Polar desert	20	10
	West Somerset	Lith. R.T. Cryo.	30	Crustose lichens	30	70
	Upland	Brun. T. Cryosol	30	Dwarf shrubs	30	25
		Gley. T. Cryosol	10	Sedge meadows	20	90
High Arctic	H3	Rego. T. Cryosol	50	Polar desert	30	10
	Cunningham Inlet	Brun. T. Cryosol	20	Dwarf shrubs	40	30
		Gley. T. Cryosol	30	Sedge meadows	30	100
Mid-Arctic	M1	Brun. T. Cryosol	50	Dwarf shrubs	50	30
	Cape Garry Plateau	Rego. T. Cryosol	40	Polar desert	50	10
		Gley. T. Cryosol	10	Sedge meadows	10	100
Mid-Arctic	M2	Brun. T. Cryosol	30	Dwarf shrubs	50	50
	South Somerset Till	Lith. R.T. Cryo.	20	Crustose lichens	20	75
	Plain	Rego. T. Cryosol	30	Polar desert	20	50
		Gley. T. Cryosol	20	Moss-grass	20	60
Mid-Arctic	M3	Brun. T. Cryosol	40	Dwarf shrubs	40	40
	South Somerset	Rego. T. Cryosol	40	Polar desert	40	10
	Ranges	Gley. T. Cryosol	20	Meadow	20	100
Mid-Arctic	M4	Brun. T. Cryosol	50	Dwarf shrubs	80	50
	Central Creswell	Rego. T. Cryosol	30			
	Valley	Lith. R.T. Cryo.	10	Crustose lichens	10	30
		Gley. T. Cryosol	10	Sedge meadows	10	100
Mid-Arctic	M5	Gley. T. Cryosol	60	Sedge meadows	60	100
	Creswell Lowland	Brun. T. Cryosol	30	Dwarf shrubs	40	45
		Rego. T. Cryosol	10			
Mid-Arctic	M6	Brun. T. Cryosol	60	Dwarf shrubs	70	70
	Stanwell-Fletcher	Gley. T. Cryosol	30	Sedge meadows	30	100
	Basin	Rego. T. Cryosol	10			
Mid-Arctic	M7	Brun. T. Cryosol	40	Dwarf shrubs	70	30
	Hazard Inlet	Rego. T. Cryosol	40			
	Beaches	Gley. T. Cryosol	20	Sedge meadows	30	100

[1] Rego., R. = Regosolic; Brun. = Brunisolic; Gley. = Gleysolic; Lith. = Lithic; T. = Turbic.

Table 5. Characteristics of Ecological Districts on Prince of Wales Island

Ecoregion	Ecological District	Soil Subgroup[1] (% area)		Vegetation Type (% area)		% Ground Cover
High Arctic	H1	Rego. T. Cryosol	50	Polar desert	70	10
	Cape Hardy Highlands	Brun. T. Cryosol	20	Dwarf shrubs	20	30
		Gley. T. Cryosol	10	Moss-grass	10	75
High Arctic	H2	Rego. T. Cryosol	60	Polar desert	60	10
	North Central	Brun. T. Cryosol	20	Dwarf shrubs	10	30
	Uplands	Gley. T. Cryosol	20	Moss-grass	30	80
High Arctic	H3	Rego. T. Cryosol	80	Polar desert	80	1
	Drake Bay Uplands	Brun. T. Cryosol	10	Dwarf shrubs	10	30
		Gley. T. Cryosol	10	Moss-grass	10	80
High Arctic	H4	Rego. T. Cryosol	60	Polar desert	60	1
	Mount Clarendon	Brun. T. Cryosol	20	Dwarf shrubs	20	30
	Lowlands	Gley. T. Cryosol	20	Sedge meadows	20	100
High Arctic	H5	Gley. T. Cryosol	60	Sedge meadows	60	100
	Back Bay Lowlands	Brun. T. Cryosol	40	Dwarf shrubs	40	30
Mid-Arctic	M1	Brun. T. Cryosol	60	Dwarf shrubs	60	50
	East Prince of Wales	Rego. T. Cryosol	20	Polar desert	20	15
	Highlands	Gley. T. Cryosol	20	Sedge meadows	20	100
Mid-Arctic	M2	Brun. T. Cryosol	70	Dwarf shrubs	80	60
	Cape Henry Kellett	Gley. T. Cryosol	30	Sedge meadows	20	100
	Uplands					
Mid-Arctic	M3	Rego. T. Cryosol	60	Dwarf shrubs	60	5
	Central Prince of	Brun. T. Cryosol	20	Dwarf shrubs	20	30
	Wales Lowlands	Gley. T. Cryosol	20	Moss-grass	20	50
Mid-Arctic	M4	Rego. T. Cryosol	40	Dwarf shrubs	40	15
	Mount Cowie Lowlands	Brun. T. Cryosol	40	Dwarf shrubs	40	30
		Gley. T. Cryosol	20	Sedge meadows	20	100
Mid-Arctic	M5	Brun. T. Cryosol	60	Dwarf shrubs	60	40
	Marine Lowlands	Gley. T. Cryosol	40	Sedge meadows	40	100
Mid-Arctic	M6	Brun. T. Cryosol	40	Dwarf shrubs	40	60
	Prescott Island	Lith. R.T. Cryo.	40	Crustose lichens	40	50
	Uplands	Gley. T. Cryosol	20	Sedge meadows	20	100

[1] Rego., R. = Regosolic; Brun. = Brunisolic; Gley. = Gleysolic; T. = Turbic; Lith. = Lithic.

Table 6. Summary of the characteristics of Soil Associations developed on glacial till[1]

Map[2] Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Parent Material: Textural Class	Parent Material: Origin	Soil Subgroup and Drainage Class[3]	Active Layer Thickness (cm)
El	Elwin River	High Arctic	-	extremely calcareous	clay loam to silt loam	mixture of till and weathered limestone bedrock	50% Brun. T. Cryosol (w-i) 40% Rego. S. Cryosol (w-i) 10% Rego. T. Cryosol (w-i)	40-50 40-50 40-50
Fb1	Fearnall Bay 1	Mid-Arctic	>1.5	extremely calcareous	loam to sandy loam	mixture of marine sediments and till on sedimentary bedrock	80% Brun. T. Cryosol (w-i) 20% Rego. T. Cryosol (w-i)	50-60 60-70
Fb2	Fearnall Bay 2	Mid-Arctic	≤1.5	extremely calcareous	loam to sandy loam	mixture of marine sediments and till on sedimentary bedrock	60% Brun. T. Cryosol (w-i) 40% Rego. T. Cryosol	50-60 60-70
Fo1	Fiona Lake 1	High Arctic	>1.5	moderately to extremely calcareous	clay loam to sandy loam	mixture of till and fines of weathered Precambrian bedrock	70% Brun. T. Cryosol (w-i) 20% Rego. T. Cryosol (w) 10% Gley. T. Cryosol (i-p)	70-90 70-90 60-90
Fo2	Fiona Lake 2	High Arctic	≤1.5	moderately to extremely calcareous	clay loam to sandy loam	mixture of till and fines of weathered Precambrian bedrock	70% Brun. T. Cryosol (w-i) 30% Rego. T. Cryosol (w)	70-90 70-90
Fz1	Fitz Roy 1	Mid-Arctic	>1.5	strongly to very strongly calcareous	loam to sandy loam	till over Precambrian bedrock	80% Brun. T. Cryosol (w-i) 15% Rego. T. Cryosol (w-i) 5% Gley. T. Cryosol (i-p)	60-70 60-70 50-60
Fz2	Fitz Roy 2	Mid-Arctic	≤1.5	strongly to very strongly calcareous	loam to sandy loam	till over Precambrian bedrock	80% Brun. T. Cryosol (w-i) 20% Rego. T. Cryosol (w-i)	60-70 60-70
Hw	Howe Harbour	High Arctic	-	very strongly to extremely calcareous	loam to sandy loam	till and weathered dolostone and shale	70% Brun. T. Cryosol (w-i) 30% Rego. T. Cryosol (w-i)	50-60 50-60
Hn	Hunting	High Arctic	-	extremely calcareous	silty clay loam to loam	colluvium and till on Paleozoic limestone and dolostone bedrock	50% Gley. T. Cryosol (i-p) 50% Brun. T. Cryosol (i)	50-60 60-70
Ly	Lyons Point	High Arctic	-	strongly to very strongly calcareous	loam to clay loam	mixture of till and weathered sandstones and dolostones	60% Brun. T. Cryosol (w-i) 40% Rego. T. Cryosol (w)	50-60 50-60
Mm1	Mt. Matthias 1	High Arctic	>1.5	moderately to very strongly calcareous	loam to sandy loam	mixture of till and weathered Paleozoic sandstone	75% Rego. T. Cryosol (w-i) 10% Brun. T. Cryosol (w-i) 10% Gley. T. Cryosol (i-p) 5% Rego. S. Cryosol (w-i)	60-80 60-80 50-60 60-80
Mm2	Mt. Matthias 2	High Arctic	≤1.5	moderately to very strongly calcareous	loam to sandy loam	mixture of till and weathered Paleozoic sandstone	75% Rego. T. Cryosol (w-i) 10% Brun. T. Cryosol (w-i) 10% Gley. T. Cryosol (i-p) 5% Rego. S. Cryosol (w-i)	60-80 60-80 50-60 60-80
Pg	Prince Regent	Mid-Arctic	-	extremely calcareous	loam to silt loam	mixture of till and marine sediments on sedimentary bedrock	60% Brun. T. Cryosol (w-i) 30% Rego. T. Cryosol (w-i) 10% Rego. S. Cryosol (w-i)	50-60 50-60 50-60
Sb1	Scarp Brook 1	High Arctic	>1.5	extremely calcareous	loam to sandy loam	mixture of till and weathered Paleozoic limestone, dolostone, and sandstone	80% Rego. T. Cryosol (w-i) 10% Brun. T. Cryosol (w-i) 5% Rego. S. Cryosol (w-i) 5% Gley. T. Cryosol (i-p)	60-70 60-70 60-70 30-40
Sb2	Scarp Brook 2	High Arctic	≤1.5	extremely calcareous	loam to sandy loam	mixture of till and weathered Paleozoic limestone, dolostone and sandstone	80% Rego. T. Cryosol (w-i) 10% Brun. T. Cryosol (w-i) 10% Rego. S. Cryosol (w-i)	60-70 60-70 60-70
Sf	Stanwell-Fletcher	Mid-Arctic	1-2	strongly to very strongly calcareous	clay loam to sand	mixture of till and unconsolidated Tertiary sandstone and shale (Eureka Sound Formation)	70% Brun. T. Cryosol (w-i) 30% Rego. T. Cryosol (w-i)	60-70 60-70
Tw	Two Rivers	Mid-Arctic	-	extremely calcareous	sandy loam	mixture of till and weathered sandstone of the Peel Sound Formation	60% Brun. T. Cryosol (w-i) 40% Rego. T. Cryosol (w-i)	50-60 60-70

[1] The term "till" is used to indicate glacially transported materials which may be mixed with frost-shattered bedrock and weathering products. In some cases the glacially transported material is present in very low proportions.

[2] Subscript 1 = material thicker than 1.5 m
Subscript 2 = material less than 1.5 m thick

[3] Drainage classes: w - well drained
i - imperfectly drained
p - poorly drained

Soil Subgroup abbreviations: Rego. = Regosolic; Brun. = Brunisolic; Gley. = Gleysolic; T. = Turbic; S. = Static

Table 7. Summary of the characteristics of Soil Associations developed on residual weathering products

Map[1] Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Parent Material: Textural Class	Parent Material: Origin	Soil Subgroup and Drainage Class[2]	Active Layer Thickness (cm)
Br	Birmingham Bay	High Arctic	1-2	noncalcareous	loam to sandy loam	fines from weathered Precambrian gneissic bedrock	90% Rego. T. Cryosol (i-p) 5% Lithic Rego. T. Cryosol (w-i) 5% Brun. T. Cryosol (i-p)	40-50 50-60 40-50
Gr	Cape Granite	High Arctic	<1.5	noncalcareous	sandy loam to sand	weathered Precambrian granite (grus), may be wave-washed	40% Brun. T. Cryosol (w-i) 20% Lithic Rego. S. Cryosol (w) 20% Rego. T. Cryosol (w) 20% Gley. T. Cryosol (w-i)	60-70 70-80 70-80 60-70
Gf	Gifford Point	High Arctic	<2	moderately to strongly calcareous	silty loam to sand	weathered Tertiary sandstone, lignite and shale (Eureka Sound Formation)	60% Lithic Rego. S. Cryosol (w) 40% Lithic Regosol (w)	80-90 100+

[1] Subscript 1 = material greater than 1.5 m thick
Subscript 2 = material less than 1.5 m thick

[2] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 8. Summary of the characteristics of Soil Associations developed on colluvial materials

Map[1] Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Parent Material: Textural Class	Parent Material: Origin	Soil Subgroup and Drainage Class[2]	Active Layer Thickness (cm)
Lp	Leopold	High Arctic	-	very stongly to extremely calcareous	sand to gravel	clasts of screes and taluses on sedimentary rock	40% Lithic Rego. T. Cryosol (w) 30% Orthic Regosol (w) 30% Lithic Regosol (w)	80-90 100+ 100+
Wa	Wadworth Island	Mid-Arctic	-	noncalcareous	sand to gravel	clasts of screes and taluses on Precambrian bedrock	40% Lithic Rego. S. Cryosol (w) 30% Orthic Regosol (w) 30% Lithic Regosol (w)	80-90 100+ 100+

[1] Subscript 1 = material greater than 1.5 m thick
Subscript 2 = material less than 1.5 m thick

[2] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 9. Summary of the characteristics of Soil Associations developed on bedrock

Map Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Parent Material: Textural Class	Parent Material: Origin	Soil Subgroups and Drainage Class[1]	Active Layer Thickness (cm)
Ch	Cape Hardy	High Arctic & Mid-Arctic	<1	moderately to very strongly calcareous	-	Paleozoic sandstone bedrock	-	-
Mc	Mt. Claredon	High Arctic	<1	very strongly to extremely calcareous	-	Paleozoic bedrock of limestone, dolostone, and sandstone	-	-
Pr	Palmerston Point	High Arctic & Mid-Arctic	<1	noncalcareous	-	Precambrian gneiss, schist and granite	-	-

[1] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 10. Summary of the characteristics of Soil Associations developed on alluvial materials

Map Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Parent Material: Textural Class	Parent Material: Origin	Soil Subgroups and Drainage Class[1]	Active Layer Thickness (cm)
As	Aston Bay	High Arctic	-	extremely calcareous	loam to sand	alluvium on sedimentary bedrock	70% Rego. T. Cryosol (w) 20% Rego. S. Cryosol (w) 10% Gleysolic T. Cryosol (i-p)	50-60 50-60 30-40
Cg	Cape Garry	Mid-Arctic	-	very strongly to extremely calcareous	loam to sand	alluvium on sedimentary bedrock	70% Brun. T. Cryosol (w-i) 20% Gleysolic T. Cryosol (i-p) 10% Rego. T. Cryosol (w-i)	40-50 40-50 50-60
Ot	Otrick Island	Mid-Arctic	-	noncalcareous	loam to sand	alluvium on Precambrian bedrock	90% Rego. T. Cryosol (w-i) 50% Brun. T. Cryosol (w-i)	80-90 80-90

[1] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 11. Summary of the characteristics of Soil Associations developed on marine sediments

Map Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Textural Class	Origin	Soil Subgroups and Drainage Class[1]	Active Layer Thickness (cm)
Ba	Batty Bay	High Arctic	-	extremely calcareous	silty clay loam to loam	marine sediments on Paleozoic sedimentary rock	70% Rego. S. Cryosol (w-i) 20% Rego. T. Cryosol (w-i) 5% Saline Rego. S. Cryosol (w-i) 5% Brun. T. Cryosol (w-i)	40-60 40-60 40-60 40-60
Fu	Fury Beach	Mid-Arctic	-	strongly to extremely calcareous	clay to silt loam	marine sediments on sedimentary bedrock	80% Gley. T. Cryosol (i-p) 20% Brun. T. Cryosol (i)	30-40 40-50
Gb	Garnier Bay	High Arctic	-	extremely calcareous	silty clay loam to silt loam	marine sediments on sedimentary bedrock	60% Brun. T. Cryosol (w-i) 20% Gley. T. Cryosol (i-p) 15% Rego. T. Cryosol (w-i) 5% Saline Rego. T. Cryosol (w-i)	60-70 50-60 60-70 60-70
Tb	Transition Bay	High Arctic	-	moderately to very strongly calcareous	sand to gravel	marine sand deposits on Paleozoic sandstone bedrock	50% Brun. T. Cryosol (w) 50% Brun. S. Cryosol (w-i)	50-60 50-80

[1] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 12. Summary of the characteristics of Soil Associations developed on marine beach materials

Map Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material: Calcareousness	Textural Class	Origin	Soil Subgroups and Drainage Class[1]	Active Layer Thickness (cm)
Bc	Baring Channel	High Arctic	-	moderately to very strongly calcareous	sand to gravel	marine beach deposits on Paleozoic sandstone bedrock	70% Rego. S. Cryosol (w) 30% Rego. T. Cryosol (w)	40-50 40-50
Bh	Birthday Bay	High Arctic	-	extremely calcareous	sand to gravel	marine beach deposits on Paleozoic limestone bedrock	80% Rego. T. Cryosol (w) 10% Lithic Rego. T. Cryosol (w) 10% Brun. T. Cryosol (w-i)	40-50 40-50 40-50
Cr	Creswell	Mid-Arctic	-	moderately to very strongly calcareous	silt loam to sandy loam	marine sand and beach deposits on sedimentary bedrock	70% Brun. T. Cryosol (w-i) 30% Rego. T. Cryosol (w)	40-50 50-70

[1] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 13. Summary of the characteristics of Soil Associations developed on glaciofluvial materials

Map Symbol	Association Name	Ecoregion	Depth to Bedrock (m)	Parent Material			Soil Subgroups and Drainage Class[1]	Active Layer Thickness (cm)
				Calcareousness	Textural Class	Origin		
Fr	Four Rivers	High Arctic	-	weakly to moderately calcareous	loam to sandy loam	glaciofluvial and ice-contact materials on Precambrian bedrock	60% Brun. S. Cryosol (w-i) 20% Rego. S. Cryosol (w) 20% Rego. T. Cryosol (w)	50-60 50-60 50-60
St	Scott Bay	High Arctic	-	extremely calcareous	loam to sand	glaciofluvial and ice-contact deposits on sedimentary rock	80% Rego. S. Cryosol (w) 20% Brun. S. Cryosol (w-i)	60-70 60-70

[1] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Table 14. Soil Associations occurring in Boothia Peninsula (Tarnocai *et al.* 1976) and on Somerset Island

Map Symbol	Association Name	Ecodistrict (Boothia)	Parent Material Descriptions	Subgroup Name and Drainage Class[1]
Am2	Amituryouak 2	M3	Less than 1.5 m of extremely calcareous sandy loam to sandy clay loam glacial till over limestone bedrock	50% Brun. T. Cryosol (w-i) 40% Lithic Brun. T. Cryosol (w) 10% Gley. T. Cryosol (p)
Nd2	Nudlukta 2	M3	Less than 1 m of moderately to strongly calcareous marine sand and gravel	40% Brun. S. Cryosol (w-i) 30% Rego. S. Cryosol (w-i) 30% Lithic Brun. S. Cryosol (w-i)
Pb3	Pasley Bay 3	M5, M6	Less than 1.5 m of very strongly to extremely calcareous sandy clay loam glacial till over limestone bedrock	40% Rego. T. Cryosol (w-i) 40% Lithic Rego. T. Cryosol (w-i) 20% Gley. T. Cryosol (p)
Pb4	Pasley Bay 4	M4, M5, M6	Less than 1.5 m of very strongly to extremely calcareous sandy loam to sandy clay loam glacial till over limestone bedrock	50% Lithic Rego. T. Cryosol (w-i) 30% Brun. T. Cryosol (w-i) 20% Gley. T. Cryosol (p)
S12	Stilwell Bay 2	M4, M6	Less than 1.5 m of strongly to extremely calcareous marine gravel over limestone bedrock	50% Rego. S. Cryosol (w-i) 50% Lithic Rego. T. Cryosol (w-i)

[1] Drainage class and Soil Subgroup abbreviations: see footnote 3, Table 6.

Turbic Cryosol soils have developed in depressions fed by water from melting snow banks. The parent material is stratified sand, gravel, and silt. Internal drainage is generally good and the active layer is 50-60 cm thick. The river terraces in the interior of Somerset Island have 10% vegetation cover or less, but near the coast plant cover may be as high as 30-40%, composed of species such as *Saxifraga oppositifolia*, *Dryas integrifolia*, and *Pedicularis* spp. The sedge-moss meadows on poorly drained locations occupy only small areas and are seldom fully developed. Deltas on the seashore are poorly vegetated and have only scattered individuals of *Poa* spp. and *Papaver lapponicum* ssp. *occidentale*.

5.2.2 Baring Channel Association (Map symbol: Bc)

The Baring Channel Association is comprised of Regosolic Static Cryosol and Regosolic Turbic Cryosol soils developed on gravelly marine beaches. The beach material originated mainly from calcareous sandstone or conglomerate. The material is moderately to highly calcareous, being high in calcite, but low in dolomite. Ice wedge polygons are frequent. Regosolic Turbic Cryosol soils usually occur under and near polygon trenches. The active layer is about 50-60 cm thick in early August. Clear ice with soil inclusions occurs under the polygon trenches, but little visible ice is encountered elsewhere. The vegetation cover is sparse and confined mainly to the polygon trenches where mosses, lichens, and grasses grow in scattered clumps. Gravel and boulders may be covered by crustose lichens.

5.2.3 Batty Bay Association (Map symbol: Ba)

The Batty Bay Association is comprised of soils of Regosolic Static Cryosol, Regosolic Turbic Cryosol, Saline Regosolic Static Cryosol, and Brunisolic Static Cryosol subgroups, developed on marine silts and clays of central and eastern Somerset Island. In contrast to the Garnier Bay Association (p. 42), these soils occur at elevations higher than 150 m asl. The marine sediment is also thicker and more continuous. Internal drainage is imperfect to good. While gravel may form a desert pavement on the surface, the active layer has few stones. Patterned ground development is poor due to the uniform texture of the material. The relief is similar to that of the Garnier Bay Association, namely gently undulating with scattered small lakes. A Regosolic Static Cryosol developing on thick marine deposit is described as follows:

Site: W37 Location: 73° 08'N, 91° 30'W

Cy - 0-49 cm, light brownish gray (10YR 6/2 dry) silty clay, platy, plastic, firm when moist, hard when dry; clear, smooth boundary.

Cz - 49 cm plus, light brownish gray (10YR 6/2) frozen silty clay, well-bonded randomly oriented ice.

The chemical and physical properties of this soil are presented in Table 1 of the Appendix. The active layer is 40-50 cm thick. Vegetation cover is under 10% and includes mainly *Draba* spp., *Papaver lapponicum* ssp. *occidentale*, and *Cerastium alpinum*.

5.2.4 Birmingham Bay Association (May symbol: Br)

The Birmingham Bay Association occurs along the length of the Precambrian Uplands of northern Somerset Island. It includes soils of Regosolic Turbic Cryosol, Lithic Regosolic Turbic Cryosol, and Brunisolic Turbic Cryosol subgroups forming on the weathering product of Precambrian bedrock. The parent material is medium to coarse in texture and non-calcareous. A small fraction of this material must have originated from till because gravel-sized erratics are found on the surface. This 1- to 2-m thick layer generally overlies a weakly calcareous till. The topography is dominated by felsenmeer and bedrock remnants resembling tors; otherwise, the surface is very gently sloping and undulating, and patterned with well-sorted circles and nets. An example of a Regosolic Turbic Cryosol is given below.

Site: W75R Location: 72° 51'N, 92° 33'W

ICy - 0-50 cm, dark brown (10YR 4/3 moist) sandy loam, single-grained, slightly plastic, firm when moist, hard when dry; clear, abrupt boundary.

ICz - 50-75 cm, dark grayish brown (10YR 4/2) sandy loam, well-bonded randomly oriented ice; clear, abrupt boundary.

IIC_1z - 75-105 cm, dark olive gray (5Y 3/2) sandy loam; clear, abrupt boundary.

IIC_2z - 105-118 cm plus, olive gray (5Y 4/2) sandy loam.

Table 2 in the Appendix shows the chemical and physical characteristics of the parent material. The internal drainage of this material is characterized by horizontal movement, and conditions are imperfect to poor. The active layer is 40-50 cm in thickness. Vegetation is scarce except on fine-textured soils between stones where communities of *Polyblastia* spp. and *Blindia* spp. (Fig. 7) form 50-70% cover locally. More often a scattered distribution of *Poa abbreviata* and *Polytrichum strictum* accounts for much of the natural vegetation.

The bedrock surfaces are heavily encrusted with crustose lichens and *Andreaea rupestris*.

5.2.5 Birthday Bay Association (Map symbol: Bh)

The Birthday Bay Association is comprised of Regosolic Static Cryosol and Regosolic Turbic Cryosol soils developing on rubbly, gravelly relict, and active marine beaches. The material originated mainly from dolostone and limestone materials. The soil material is extremely calcareous, being high in dolomite, but relatively low in calcite. Active ice wedge polygons are frequent, with Regosolic Turbic Cryosols developing under and near polygon trenches. The active layer is about 70 cm deep by late summer. The moisture content of the upper part of the permafrost is high, about 50% by volume, and contains disseminated ice crystals. Clear ice with few soil inclusions occurs in ice wedges. The vegetation cover is sparse, with scattered individuals of *Dryas integrifolia* and *Saxifraga oppositifolia*, but in interbeach depressions the cover may reach 10%. Here *Salix*-moss Community Types are encountered.

Table 3 in the Appendix shows the chemical and physical characteristics of the parent material. The active layer at this site was 65 cm in late July. Vegetation was scarce, with less than 1% ground cover.

5.2.6 Cape Garry Association (Map symbol: Cg)

Cape Carry Association is the group of Brunisolic Turbic Cryosol, Gleysolic Turbic Cryosol, and Regosolic Turbic Cryosol soils that develops on the alluvium of the Creswell Basin. Because the river systems here cut through deposits having widely different genetic origins, the properties of the alluvium are quite varied. Nevertheless, the parent material usually consists of stratified sand, silt, and gravel; the particle size distribution depends on whether the original deposit is marine sediment or till. Relief in this association is gently sloping to level. Table 4 in the Appendix shows the physical and chemical properties of the parent material.

The active layer on well-drained or imperfectly drained sites is 50-60 cm thick. On poorly drained gleyed soils it is 30-40 cm thick.

Continuous sedge meadows can be found on the older terraces; however, on the newly deposited sand bars there are only pioneer individuals of *Hierochloe* spp. and *Arctagrostis latifolia*.

5.2.7 Cape Granite Association (Map symbol: Gr)

The Cape Granite Association is derived from severely weathered granite on Somerset Island. The material, known as grus (Dyke 1976), is not calcareous. Brunisolic Turbic Cryosol, Lithic Regosolic Static Cryosol, Regosolic Turbic Cryosol, and Gleysolic Turbic Cryosol soils developed on this parent material. The topography is gently sloping, interrupted only by bedrock outcrops. A Gleysolic Turbic Cryosol soil developing on a marine beach is described as follows:

Site: W77A Location: 73° 40'N, 95° 30'W

Cy - 0-52 cm, olive brown (2.5Y 4/4 moist) sandy loam, single-grained, plastic, friable when moist, hard when dry, many organic smears and intrusions; clear, smooth boundary.

Cgy - 52-64 cm, olive brown (2.5Y 4/2 moist) sandy loam, abundant distinct mottles, single-grained, plastic, friable when moist, hard when dry; clear, smooth boundary.

Cz - 64 cm plus, (2.5Y 4/4) sandy loam, poorly bonded randomly oriented ice.

Table 5 in the Appendix gives the physical and chemical characteristics of the parent material.

Drainage conditions vary from good to imperfect. The active layer is 60-80 cm thick. Vegetation on the Brunisolic and Gleysolic Cryosol soils covers 50-80% of the surface; the community types are usually *Carex* meadows or the *Cetraria-Saxifraga* Community. On Regosolic Cryosol soils vegetation cover is 10-30%; the typical species include *Cassiope tetragona*, *Dryas integrifolia*, and crustose lichens such as *Lecidea Dicksonii*.

5.2.8 Cape Hardy Association (Map symbol: Ch)

This association occurs on frost-shattered calcareous sandstone, conglomerate, or mudstone bedrock materials. The material is generally strongly calcareous and is high in calcite but low in dolomite. Frost action is manifested in poorly developed ice wedge polygons. The vegetation is very sparse, except for crustose lichens growing on boulders; *Rhizocarpon geographicum* and *Lecidea* spp. are common.

5.2.9 Creswell Association (Map symbol: Cr)

The Creswell Association includes Brunisolic Turbic Cryosols and Regosolic Turbic Cryosols developed on coarse- and medium-textured marine sediments in the Mid-Arctic Ecoregion of Somerset Island. This association usually occurs together with the fine-textured marine deposits of the Fury Beach Association (p. 42) in beach ridge systems or in abandoned marine terraces. Generally there is low to moderate change in relief.

The laboratory analyses of the parent material are presented in Table 6 of the Appendix. The soils of this association are imperfectly to well drained, with an active layer ranging from 40-70 cm in thickness, depending on drainage conditions. Vegetation covers 30-50% of the surface. The typical species are *Saxifraga oppositifolia*, *Dryas integrifolia*, and *Polygonum viviparum*.

5.2.10 Elwin River Association (Map symbol: El)

The Elwin River Association is found only on northeastern Somerset Island. The main subgroups in this association are Brunisolic

Turbic Cryosol, Regosolic Static Cryosol, and Regosolic Turbic Cryosol. The parent material of this association is strongly to extremely calcareous material of high silt content, derived mostly from the underlying bedrock with some addition of till. This association can be distinguished from the Howe Harbour Association by its lower dolomite content. Stones, including erratics, are plentiful on the surface. Topography is moderately sloping and gently rolling. Patterned ground development is poor.

The active layer thickness of these soils is between 40 and 50 cm. Drainage conditions vary from imperfect to good. Vegetation cover is between 50 and 70% and consists mostly of *Polyblastia* ssp., *Draba* spp., and grasses. Laboratory analyses of a Brunisolic Turbic Cryosol profile are presented in Table 7 of the Appendix.

5.2.11 Fearnall Bay Association (Map symbol: Fb)

The Fearnall Bay Association includes soils of Brunisolic Turbic Cryosol and Regosolic Turbic Cryosol subgroups in Ecodistrict M1 of Somerset Island. The parent material of this association is an extremely calcareous mixture of marine deposits and till that is loam to sandy loam in texture. Evidence of marine influence lies in the abundance of marine shells and low stone content in the active layer. This deposit forms a fairly continuous layer at an elevation above 150 m asl. The material less than 1.5 m thick was identified on the map with a subscript Fb_2. The topography is gently rolling and undulating. Ice wedge polygons and sorted circles are common. An example of a Brunisolic Turbic Cryosol profile developed in an ice-wedge polygon is given below.

Site: W73 Location: 72° 51'N, 92° 33'W

Bmjy - 0-12 cm, dark brown (10YR 4/3 moist) loam, vesicular, plastic, firm when moist, hard when dry; gradual, smooth boundary.

Cy - 12-55 cm, dark brown (10YR 4/3 moist) loam, massive, plastic, firm when moist, hard when dry; abrupt, smooth boundary.

Cz - 55 cm plus, dark brown (10YR 4/3 moist) loam, well-bonded randomly oriented ice.

The laboratory analyses of the unfrozen layers are presented in Table 8 of the Appendix.

Interal drainage of this association is imperfect to good. Active layer thickness is between 50 and 70 cm. Vegetation on these soils is characterized by the distinctive *Saxifraga-Polyblastia* community. Total ground cover is in the 70-80% range. Dwarf shrub communities of *Salix* spp., particularly along ice wedge polygon trenches, account for much of the remaining vegetation.

5.2.12 Fiona Lake Association (Map symbol: Fo)

The Fiona Lake Association includes Brunisolic Turbic Cryosol and Regosolic Turbic Cryosol soils in the Precambrian areas of the High Arctic Ecoregion on Somerset Island. The parent material of this association is a moderately to strongly calcarous till that in most areas is under 2 m thick. This till layer is quite extensive but may be thinner than 1.5 m when it is identified on the map with a subscript Fo_2. Gleysolic Turbic Cryosol soils develop in areas of poor local drainage, e.g., valley floors or lake edges. The texture of the parent material is very stony sandy loam. The relief is undulating to hilly with frequent outcrops of Precambrian gneiss and schists. Ice wedge polygons and sorted stripes are the main types of patterned ground. A Brunisolic Turbic Cryosol on very thin till is described below.

Site: W60 Location: 73° 32'N, 95° 24'W

Ahy - 0-9 cm, discontinuous, very dark grayish brown (10YR 3/2 moist) loam, single-grained, slightly plastic, friable when moist, loose when dry; clear, wavy boundary.

Bmy - 9-19 cm, discontinuous, dark grayish brown (10YR 4/2 moist) sandy loam, single-grained, plastic, firm when moist, firm when dry; clear, smooth boundary.

ICy - 19-83 cm, dark brown (10YR 3/3 moist) sandy loam, single-grained, plastic, firm when moist, firm when dry; clear, wavy boundary.

IICy - 83-89 cm, olive brown (2.5Y 4/4 moist) sandy loam, plastic, firm when moist, firm when dry; clear, smooth boundary.

IICyz - 89 cm plus, olive brown (2.5Y 4/4) sandy loam, well-bonded ice veinlets and crystals.

Note the change from a calcareous ICy horizon to a non-calcareous IICy horizon (Table 9 in the Appendix).

On well to imperfectly drained Brunisolic and Regosolic Cryosols the active layer ranges from 60 to 90 cm thick depending on local drainage conditions. On heavily vegetated Gleysolic Turbic Cryosol soils the active layer is shallower. In most areas vegetation cover is 30-50%, consisting of *Saxifraga oppositifolia*, *Cetraria* spp., and *Pedicularis* spp. Where there is a better supply of moisture, *Salix arctica*, *Luzula confusa*, *Saxifraga cernua*, and *Alopecurus alpinus* may cover up to 70% of the surface.

5.2.13 Fitz Roy Association (Map symbol: Fz)

The Fitz Roy Association includes Brunisolic Turbic Cryosol, Regosolic Turbic Cryosol, and localized areas of Gleysolic Turbic Cryosol soils in the Mid-Arctic. The parent material of this association is a medium- to coarse-textured, strongly to very strongly calcareous till overlying Precambrian bedrock. This deposit covers most of the Precambrian areas south of Stanwell Fletcher Lake on Somerset Island and varies in thickness from 1 to 5 m. The shallow material (less than 1.5 m) is identified on the map with a subscript Fz_2. The relief is moderately sloping and undulating. Much of the area is covered with very regular ice wedge polygons, many of which are actively wasting due to active layer instability. Rheotropism is also common on many of the slumping slopes. Such a Regosolic Turbic Cryosol is described below.

Site: W117 Location: 72° 38'N, 95° 02'W

Cy - 0-70 cm, light olive brown (2.5Y 5/4 moist) loam, massive, plastic, firm when moist, hard when dry; clear, smooth boundary.

Cz - 70 cm plus, light olive brown (2.5Y 5/4 moist) loam, well-bonded randomly oriented ice.

Laboratory analyses are presented in Table 10 in the Appendix.

The active layer in this association is between 60 and 70 cm thick. Internal moisture conditions range from good to poor drainage, but imperfect drainage occurs most commonly. Vegetation cover ranges from 30 to 70% in most areas. Continuous sedge meadows occur only on poorly drained valley floors and lake borders. However, on the most active solifluction slopes plant cover is only about 5%. The recurring species in typical locations are *Saxifraga oppositifolia*, *Stereocaulon* spp., *Cetraria cucullata*, *Papaver lapponicum* ssp. *occidentale*, *Blindia* spp. and *Polyblastia* spp.

5.2.14 Four Rivers Association (Map symbol: Fr)

The parent material of Four Rivers Association is weakly to moderately calcareous, medium- to coarse-textured glaciofluvial and ice-contact deposits on Precambrian bedrock. The soils found in this association belong to the subgroups Brunisolic Static Cryosol and Regosolic Static and Turbic Cryosol. The topography of these areas is dominated by small steep hills and ridges with intervening ravines. A Brunisolic Turbic Cryosol profile at the foot of an esker is described as follows.

Site: W52A Location: 73° 20'N, 95° 30'W

Ahy - 0-7 cm, very dark brown (10YR 2/2 moist) sandy loam, single-grained, slightly plastic, friable when moist, loose when dry; clear, wavy boundary.

Bmy - 7-34 cm, reddish brown (2.5YR 5/4 moist) sandy loam, vesicular, slightly plastic, firm when moist, firm when dry; gradual, broken boundary.

Cgy - 34-55 cm, reddish brown (2.5YR 5/4 moist) sandy loam, massive, slightly plastic, firm when moist, hard when dry, distinct mottles; clear, smooth boundary.

Cz - 55 cm plus, light olive brown (2.5YR 5/4) sandy loam, well-bonded ice inclusions.

Table 11 in the Appendix gives the physical and chemical properties of this soil.

The active layer thickness of this association is 50 to 60 cm. Drainage is good to imperfect. Vegetation cover ranges from 30 to 70%, consisting of species such as *Dryas integrifolia*, *Cassiope tetragona*, *Luzula confusa*, and *Polygonum viviparum*.

5.2.15 Fury Beach Association (Map symbol: Fu)

The Fury Beach Association refers to the Gleysolic Turbic Cryosol and Brunisolic Turbic Cryosol soils of the Creswell and Stanwell Fletcher Basin. Parent materials of these soils are strongly to extremely calcareous marine silts and clays. Soils of the Fury Beach Association occur with the Stanwell Fletcher till or the Fearnall Bay till in Eco-districts M1 and M6 on Somerset Island. Such occurrences are most common where the marine deposits are thin and discontinuous. The topography is gently sloping and undulating. Drainage is imperfect to poor. The active layer is between 20 and 40 cm thick in Gleysolic Turbic Cryosol soils and between 40 and 50 cm thick in Brunisolic Turbic Cryosol soils. Except on tidal flats, vegetation cover is as high as 70-100%. Sedge meadows and communities of *Salix arctica* and *Dryas integrifolia* are most common.

5.2.16 Garnier Bay Association (Map symbol: Gb)

The Garnier Bay Association includes Gleysolic Turbic Cryosol, Brunisolic Turbic Cryosol, Regosolic Turbic Cryosol, and Saline Rego-solic Turbic Cryosol soils developed on fine-textured marine deposits in the High Arctic Region of Somerset Island. The layer of marine sediment is 1-2 m thick over till and is often mixed with the parent material of the Scarp Brook Association by cryoturbation. The topography in these marine-modified areas is gently sloping and undulating, with a large number of small lakes 5-10 ha in size. This association is seldom found above an elevation of 150 m asl. Earth hummocks are the characteristic patterned ground of this association. A Brunisolic Turbic Cryosol pro-file is described below and illustrated in Figs. 9 and 10.

Site: WZ2 Location: 73° 37'N, 94° 50'W

Bmy - 0-25 cm, discontinuous, olive brown (2.5Y 4/4 moist) silt loam, massive, plastic, firm when moist, firm when dry; clear, smooth boundary.

Bgy - 25-45 cm, discontinuous, olive brown (2.5Y 4/4 moist) silty clay, massive, plastic, firm when moist, hard when dry, distinct mottles; clear, smooth boundary.

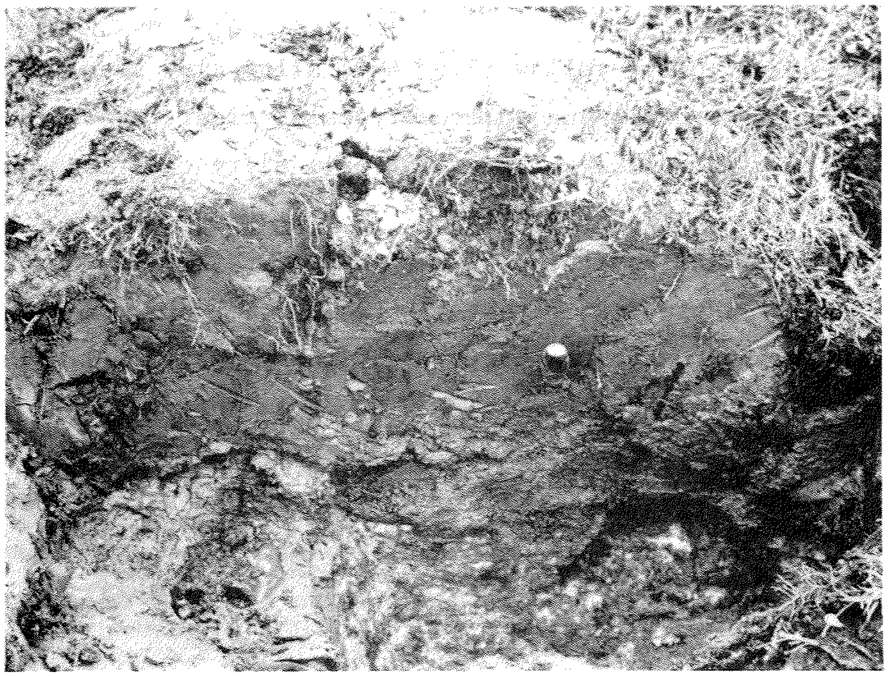


Figure 9. Brunisolic Turbic Cryosol of the Garnier Bay Association on marine silt. The top of the frost table is in the lower left corner.

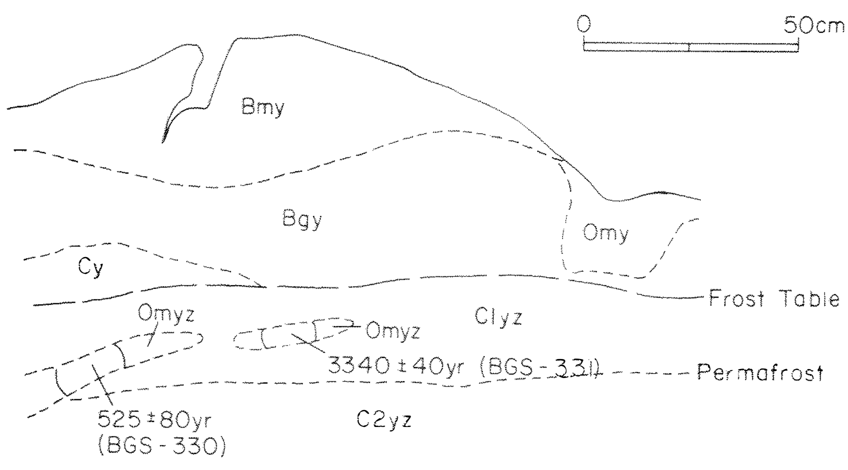


Figure 10. Profile and C^{14} age determinations of the earth hummock shown in Figure 9, Site WZ2.

C_1yz - 45-68 cm, olive yellow (2.5Y 6/4) silty clay loam, some organic intrusions, well-bonded ice crystals; clear, smooth boundary.

C_2yz - 68 cm plus, olive yellow (2.5Y 6/4) silty clay loam, well-bonded ice with soil inclusions.

The physical and chemical analyses of this soil are presented in Table 12 of the Appendix. Tables 14 and 15 in the Appendix give the moisture and temperature characteristics of this site. Drainage in this parent material is imperfect to poor. The permafrost table is 60-70 cm below the surface. Vegetation cover is generally higher than that of the Scarp Brook Association. *Salix arctica*, graminoid, and moss communities are quite common and may cover 50-70% of the surface. However, most areas only have 30-50% cover of *Saxifraga oppositifolia*, *Salix arctica*, and *Dryas integrifolia*.

5.2.17 Gifford Point Association (Map symbol: Gf)

The Gifford Point Association refers to Lithic Regosols and Lithic Regosolic Static Cryosols of a Tertiary formation consisting of sandstone, shale, and lignite at Cunningham Inlet. The outcrop is limited to an area of about 10 ha and is deeply eroded by gullies and ravines. This formation is fossil-rich (Tuke *et al.* 1966) and is extremely poorly consolidated (Veillette 1976); a pit exceeding 1 m in depth can easily be dug into the bedrock. There is virtually no indication of soil development on the unconsolidated material. The only vegetation cover of the gullies consists of very scattered individuals of *Papaver lapponicum* ssp. *occidentale* and *Draba* spp; the total cover does not exceed 1%.

5.2.18 Howe Harbour Association (Map symbol: Hw)

The Howe Harbour Association consists of Brunisolic Turbic Cryosol soils, and to a lesser degree, Regosolic Turbic Cryosol soils of strongly to extremely calcareous loam. This association occurs on Somerset Island and is found along the margins of a band of sedimentary rock sandwiched between the Precambrian ridge to the west and the limestone upland in the east (Read Bay Formation). The parent material originates from a mixture of weathered carbonate bedrock, shale, and sandstone and a small amount of till. The topography is gently rolling, and most of the slopes are heavily colluviated. Mass wasting is very active in these areas.

Table 15 in the Appendix presents the chemical and physical analyses of a Brunisolic Turbic Cryosol soil in this association. These soils are imperfectly to poorly drained, with the permafrost table at 50-60 cm below the surface. *Polyblastia* spp. and *Blindia acuta* are the dominant species, forming surface cover of 50-70%.

5.2.19 Hunting Association (Map symbol: Hn)

The Hunting Association consists of soils of Gleysolic Turbic Cryosol and Brunisolic Turbic Cryosol developed in extremely calcareous medium-textured material originating from a mixture of weathered Paleozoic bedrock and calcareous till. This association is generally less stony than the Scarp Brook Association, but the silt content is higher. The internal drainage of this soil is poor to imperfect, even though it can occur on slopes that may reach 30%. The active layer varies in thickness between 50 and 70 cm. *Salix arctica*, *Saxifraga oppositifolia*, mosses, and graminoids grow on these soils, forming a 70-100% cover.

5.2.20 Leopold Association (Map symbol: Lp)

The Leopold Association includes the erosional products of Paleozoic bedrock. The unconsolidated materials of screes and talus fall into this association, which is quite abundant on the sides of deep canyons in northeastern Somerset. Soil development is negligible or nonexistent on these slopes. The active layer is often over 1 m thick, but may be as thin as 80 cm. The material is generally extremely calcareous and is well drained. The soils found here belong to Lithic Regosolic Turbic Cryosol and Orthic and Lithic Regosol. These steep slopes are barren of vascular vegetation, but crustose lichens such as *Lecidia* sp. grow on stones.

5.2.21 Lyons Point Association (Map symbol: Ly)

The Lyons Point Association comprises Brunisolic Turbic Cryosol soils and Regosolic Turbic Cryosol soils; the latter occupy mainly well-drained areas. The parent material of these soils is a moderately stony, loamy till derived from a mixture of sandstone and dolostone bedrock. The soils are strongly to very strongly calcareous with a moderately high dolomite content, but a low calcite content. Patterned ground types such as sorted and nonsorted nets and circles are common. The active layer thaws to 50-60 cm in August, and internal drainage is good to imperfect. Vegetation cover of 20%, consisting of *Saxifraga oppositifolia*, *Draba corymbosa*, and *Salix* spp., occupies mesic sites. On seepage slopes *Polyblastia-Cephaloziella* communities may cover up to 100% of the area. A Brunisolic Turbic Cryosol is described below, and laboratory analysis results are found in Table 16 of the Appendix.

Site: W90 Location: 74° 01'N, 98°32'W

Bmy - 0-5 cm, dark yellowish brown (10YR 4/2 moist) clay loam, granular, plastic, firm when moist, hard when dry; clear, wavy boundary.

Cy - 5-58 cm, dark yellowish brown (10YR 4/1 moist) clay loam, massive, plastic, firm when dry, hard when dry; clear, smooth boundary.

Cz - 58 cm plus, dark yellowish brown (10YR 4/1 clay loam, well-bonded segregated ice veins and crystals.

5.2.22 Mount Clarendon Association (Map symbol: Mc)

This association comprises frost-shattered calcareous bedrock in which there are no indications of soil development. The material is extremely calcareous and is high in dolomite content. Frost heaving is shown by the frequent occurrence of flat stones standing on edge, and a diffuse polygonal pattern on the boulder fields. The vegetation cover is less than 1%, consisting of *Draba corymbosa*, *Papaver lapponicum* ssp. *occidentale*, and some foliose lichens.

5.2.23 Mount Matthias Association (Map symbol: Mm)

The dominant soils in the Mount Matthias Association are Regosolic Turbic Cryosols on the uplands and Brunisolic Turbic Cryosols at lower elevations on Prince of Wales Island. In wet depressions and seepage slopes fed by perennial snowbanks Gleysolic Turbic Cryosols develop. The parent material, originally derived from calcareous sandstones and conglomerates and deposited as till, is modified by cryoturbation. When the material is less than 1.5 m thick, it is identified on the map with a subscript Mm_2. Colluviation on moderately steep, actively wasting slopes further modifies the parent material. Based on 13 samples, the parent material has a fairly high stone content of 14%. On the average, the calcite content is high (26%), and dolomite content low (9%). Frost-induced microrelief such as sorted and nonsorted circles, nets, and stripes are common. The active layer was 55-80 cm thick in early August. The vegetation cover varies from 10 to 30%, with *Salix arctica*, *Saxifraga oppositifolia*, and *Poa arctica* as the main vascular species. Up to 100% of the ground may be covered with *Polyblastia-Poa* or *Polyblastia-Cephaloziella* communities.

A Regosolic Turbic Cryosol developed on an imperfectly drained 6% N slope, with imperfectly sorted stripes, is described below.

Site: W85 Location: 73° 42'N, 99°12'W

Bmjy - 0-5 cm, grayish brown (2.5Y 5/2 moist) loam, vesicular, plastic, firm when moist, hard when dry; diffuse boundary.

Cy - 5-46 cm, grayish brown (2.5Y 5/2 moist) clay loam, massive, plastic, firm when moist, hard when dry; clear, smooth boundary.

Cz - 46 cm plus, grayish brown (2.5Y 5/2) clay loam, well-bonded with random ice veinlets and crystals.

The chemical and physical characteristics of this soil are presented in Table 17 of the Appendix.

5.2.24 Otrick Island Association (Map symbol: Ot)

The Otrick Island Association includes soils of Regosolic Turbic Cryosol and Brunisolic Turbic Cryosol forming on alluvium derived from Precambrian materials in the Mid-Arctic Region. The parent material consists of noncalcareous stratified acidic sand, silt, and gravel, and the degree of soil development is more advanced than on river terraces of calcareous bedrock areas. These soils are well drained internally and the active layer is 80-90 cm thick. Vegetation cover ranges from 50-70%; it is mostly communities of *Saxifraga oppositifolia*, *Cetraria cucullata*, *C. nivalis*, and *Stereocaulon* spp.

5.2.25 Palmerston Point Association (Map symbol: Pr)

Palmerston Point Association includes the frost-shattered layer of acidic rubble occurring as the unconsolidated material covering Precambrian gneiss, schists, and granite, and is confined to such outcrop areas. Frost shattering accounts for most of the weathering that has taken place. These areas are completely bare, except for crustose lichens growing on rocks.

5.2.26 Prince Regent Association (Map symbol: Pg)

The Prince Regent Association is a group of Brunisolic Turbic Cryosol, Regosolic Turbic Cryosol, and Regosolic Static Cryosol soils of which the parent material is an extremely calcareous, medium- to coarse-textured mixture of weathered bedrock and till. While the bulk of this material lies along the tributaries of the Central and East Creswell Rivers, it may extend above the late Pleistocene marine limit of 150 m asl. It can be distinguished from the Fearnall Bay Association by its higher clay and silt content and light color. The physiography is characterized by low hills and ridges dissected by small rivers.

The active layer in these areas is 50-60 cm thick. Drainage ranges from good to imperfect. The extreme calcareousness is in part responsible for the scanty vegetation cover (below 5%). The recurring species are *Papaver lapponicum* ssp. *occidentale*, *Draba corymbosa*, and *Cerastium arcticum*. Physical and chemical characteristics of a Brunisolic Turbic Cryosol are presented in Table 18 of the Appendix.

5.2.27 Scarp Brook Association (Map symbol: Sb)

The dominant soils of the Scarp Brook Association are Regosolic Turbic Cryosols, but some weakly developed Brunisolic Turbic Cryosols are also found. The poorly drained members are Gleysolic Turbic Cryosols. The soils of this association developed on an exceedingly stony (33% stones by weight) carbonate-rich medium- to coarse-textured parent material. The calcite and dolomite contents are high. The parent material is a till enriched by bedrock materials due to frost heaving. Although the material is usually thick, thin (less than 1.5 m) till was encountered and identified on the map with a subscript Sb_2. Permafrost-related microrelief such as sorted circles, nets, and stripes are common. The active layer was 60-70 cm deep in early August. Vegetation cover is characteristically less than 10%, often less than 1% on the well- and imperfectly drained members, but may be as high as 30% on poorly drained members. *Salix arctica*, *Draba corymbosa*, and *Dryas integrifolia* are characteristic plants.

A Regosolic Turbic Cryosol developed on a well-drained 5% SW slope with poorly sorted nets is described below.

Site: W100 Location: 73° 35'N, 100° 05'W

Bmjy - 0-6 cm, pale brown (10YR 6/3 moist) loam, vesicular, plastic, firm when moist, hard when dry; gradual, wavy boundary.

Cy - 6-71 cm, grayish brown (10YR 5/2 moist) loam, single-grained, plastic, firm when moist, hard when dry; clear, smooth boundary.

Cz - 71 cm plus, grayish brown (10YR 5/2 moist) loam, stony with well-bonded randomly oriented ice crystals and veinlets.

The chemical and physical characteristics of this soil are presented in Table 19 of the Appendix. The vegetation cover is about 5%, occurring mainly in the cracks of sorted nets. Dominant species are *Thamnolia vermicularis*, *Arenaria sajanensis*, *A. rubella*, *Papaver lapponicum* ssp. *occidentale*, and *Saxifraga oppositifolia*.

5.2.28 Scott Bay Association (Map symbol: St)

The Scott Bay Association comprises soils of Regosolic Static Cryosols and Brunisolic Static Cryosols that develop in glaciofluvial and ice-contact deposits on sedimentary bedrock in the High Arctic Regions. The parent material is an extremely calcareous sandy loam to coarse sand. It occurs mostly on Prince of Wales Island; on Somerset Island this association is represented only by an esker south of Aston Bay. These sites are generally well drained with a very sparse (under 5%) vegetation cover that consists mostly of *Papaver lapponicum* ssp. *occidentale* and *Draba* spp. The thickness of the active layer in August was 60-70 cm.

5.2.29 Stanwell Fletcher Association (Map symbol: Sf)

The Stanwell Fletcher Association consists of Brunisolic Turbic Cryosols and Regosolic Turbic Cryosols derived from very strongly calcareous till over poorly consolidated Tertiary sandstone and shale of the Eureka Sound Formation. A layer of till about 1.5 m in thickness covers this bedrock, and both Precambrian and Paleozoic erratics are present on the gently sloping and undulating surface. Patterned ground development is poor. The active layer of these soils is about 60-70 cm thick and internal drainage is good. Vegetation such as *Cassiope tetragona*, *Salix arctica*, *Cladonia* spp., and *Alectoria* spp. covers 30-50% of the surface. Chemical and physical properties of a Brunisolic Turbic Cryosol soil are listed in Table 20 of the Appendix. Tables 21 and 22 of the Appendix provide information on the moisture and temperature characteristics of the profile.

5.2.30 Transition Bay Association (Map symbol: Tb)

The Transition Bay Association is comprised of Brunisolic Turbic Cryosol and Brunisolic Static Cryosol soils developed on marine sands and sandy loams. The drainage is imperfect to good, but poorly drained sands are also found. The parent material is usually stone-free to slightly stony. The material is moderately to very strongly calcareous and contains both calcite and dolomite. Ice wedge polygons are common, often with nonsorted circles in the central part of the polygons. The active layer was 50-60 cm thick in early August. Vegetation cover varies from about 20% in *Salix-Dryas* communities on well-drained sites to 70-100% cover in *Cetraria-Saxifraga* communities on well-drained sites.

A Brunisolic Turbic Cryosol developed on a level plain with no patterned ground development is described below.

Site: W91 Location: 73° 45'N, 97° 36'W

Bmy - 0-45 cm, dark grayish brown (10YR 4/2 moist) sandy loam, many organic intrusions, single-grained, nonplastic, friable when moist, loose when dry; clear, smooth boundary.

Cz - 45 cm plus, very dark brown (10YR 2/2 moist) sandy loam, well-bonded, ice not visible.

The chemical and physical characteristics of this soil are presented in Table 23 of the Appendix. Vegetation cover is almost continuous, with *Stereocaulon paschale*, *Polyblastia* sp., *Luzula nivalis*, *Saxifraga oppositifolia*, and *Thamnolia vermicularis* being the common species.

5.2.31 Two Rivers Association (Map symbol: Tw)

The Two Rivers Association includes soils of Brunisolic Turbic Cryosol and Regosolic Turbic Cryosol developed in extremely calcareous coarse-textured till and weathered bedrock of the Peel Sound Formation on Somerset Island. The parent material is characterized by a high dolomite but low calcite content. The topography is severely dissected by drainage systems, resulting in ridges and hills with fairly steep slopes. The depth of the permafrost table is between 50 and 70 cm. Internal drainage ranges from good to imperfect. Vegetation cover ranges from 30 to 80% and consists of communities of *Saxifraga oppositifolia*, *Dryas integrifolia*, and *Salix arctica* in areas of dense cover. Table 24 of the Appendix gives the chemical and physical properties of the parent material.

5.2.32 Wadworth Island Association (Map symbol: Wa)

This is an association of Orthic and Lithic Regosols and Lithic Regosolic Static Cryosols developed in unconsolidated material of Precambrian talus and screes. There are no indications of soil development. The active layer is 80 cm to over 100 cm in this noncalcareous material. The surfaces are generally devoid of vascular vegetation.

5.2.33 Organic Cryosols

Organic soils occur on Somerset and Prince of Wales Islands in isolated pockets of 1- to 5-ha in size, areas too small to map. Organic soils, in the form of high-center polygons, are mainly associated with alluvial river terraces, marine deposits, and fine-textured colluvium. The maximum depth of peat reached 1.5 m. However, these high-center polygons all show signs of wind or stream erosion (Fig. 11), and in certain areas the ice wedge in the polygon trough has completely thawed. The active layer on the raised portions is less than 30 cm, but may reach 50 cm in the polygon troughs. The vegetation cover on the raised peat is generally less than 20% and is composed of *Papaver lapponicum* ssp. *occidentale*, *Oxyria digyna*, and *Salix arctica*. In the wet peatlands graminoid plants and mosses such as *Hylocomium splendens* are found.

The profile description of a Mesic Organic Cryosol on a fine marine sand is given below.

Site: WZ10 Location: 74° 01'N, 93°27'W

Oh - 0-5 cm, dark yellowish brown (10YR 3/4, moist) decomposed peat; loose; clear, smooth boundary.

Om - 5-25 cm, very dark brown (10YR 2/2, moist) moderately decomposed moss peat; clear, smooth boundary.

Omz - 25-55 cm, very dark brown (10YR 2/2) moss peat, vein ice; clear, wavy boundary.

Wz - 55-100 cm, ice with soil inclusions; discontinuous; clear, wavy boundary.

Cz - 100 cm plus, grayish brown (10YR 5/2) sand; well-bonded ice not visible.

The result of laboratory analyses of the peat are presented in Table 25 of the Appendix. Moisture and temperature data are shown in Tables 26 and 27 of the Appendix.

5.3 VEGETATION AND COMMUNITY TYPES OF SOMERSET AND PRINCE OF WALES ISLANDS

A detailed description of Vegetation Types and their Community Types follows. These are briefly summarized in Table 15.

Table 15. Summary of vegetation Community Types in the study area

Ecological Region	Vegetation Type	Map Symbol	Community Type	Typical Species	Typical % Cover	Soil Carbonate Content	Drainage	Soil Texture
High Arctic	Polar Desert	1.1	*Papaver-Draba*	*Papaver lapponicum* ssp. *occidentale*, *Draba* spp., *Cerastium* spp., *Saxifraga oppositifolia*	0-5%	extremely calcareous	well to imperfectly drained	medium to coarse
High Arctic	Polar Desert	1.2	*Rhizocarpon-Umbilicaria*	*Rhizocarpon geographicum*, *Lecidea* spp., *Umbilicaria* spp., *Andreaea rupestris*	0-5% (excluding crustose lichens)	noncalcareous to weakly calcareous	well to imperfectly drained	medium to coarse
High Arctic	Moss-grass	1.3	*Polyblastia-Poa*	*Polyblastia* spp., *Poa abbreviata*, *Blindia acuta*, *Cephaloziella* spp., *Papaver lapponicum* ssp. *occidentale*	30-50% (including *Polyblastia* spp.)	noncalcareous to moderately calcareous	well to imperfectly drained	medium to coarse
High Arctic	Moss-grass	1.4	*Polyblastia-Cephaloziella*	*Polyblastia* spp., *Poa abbreviata*, *Blindia acuta*, *Cephaloziella* spp., *Polytrichum triste*	30-50% (including *Polyblastia* ssp.)	noncalcareous to weakly calcareous	imperfect to poor	medium
High & Mid-Arctic	Moss-grass	1.5	*Hierochloe-Pleuropogon*	*Hierochloe* spp., *Pleuropogon sabinei*, *Arctagrostis latifolia*	0-5%	noncalcareous to moderately calcareous	imperfect to poor	medium coarse
High Arctic	Arctic dwarf shrub	2.1	*Saxifraga-Draba*	*Saxifraga oppositifolia*, *Draba* spp., *Polyblastia* spp., *Alopecurus alpinus*, *Papaver lapponicum* ssp. *occidentale*	5-10%	strongly to extremely calcareous	well to imperfectly drained	medium to coarse
High Arctic	Arctic dwarf shrub	2.2	*Saxifraga-Papaver*	*Saxifraga oppositifolia*, *Papaver lapponicum* ssp. *occidentale*, *Cetraria* spp., *Polyblastia* sp.	5-10%	moderately to strongly calcareous	well to imperfectly drained	medium to coarse
High & Mid-Arctic	Arctic dwarf shrub	2.3	*Saxifraga-Dryas*	*Saxifraga oppositifolia*, *Dryas integrifolia*, *Alopecurus alpinus*, *Papaver lapponicum* spp. *occidentale*	10-30%	strongly to extremely calcareous	well to imperfectly drained	medium to coarse
High & Mid-Arctic	Arctic dwarf shrub	2.4	*Saxifraga-Salix*	*Saxifraga oppositifolia*, *S. caespitosa*, *Papaver lapponicum* ssp. *occidentale*, *Cetraria* spp.	10-30%	moderately to strongly calcareous	well to imperfectly drained	medium to coarse

Table 15. Continued

Ecological Region	Vegetation Type	Map Symbol	Community Type	Typical Species	Typical % Cover	Soil Carbonate Content	Drainage	Soil Texture
High & Mid-Arctic	Arctic dwarf shrub	2.5	*Salix-Dryas*	*Salix* spp., *Dryas integrifolia*, *Polyblastia* ssp., *Polygonum viviparum*, *Distichium capillaceum*	30-70%	moderately to strongly calcareous	imperfect to poor	medium to fine
Mid-Arctic	Arctic dwarf shrub	2.6	*Salix-Alopecurus*	*Salix* spp., *Dryas integrifolia*, *Alopecurus alpinus*, *Cetraria* spp., *Cladonia* spp.	30-70%	weakly to moderately calcareous	imperfect to poor	medium to fine
Mid-Arctic	Arctic dwarf shrub	2.7	*Saxifraga-Cetraria*	*Saxifraga oppositifolia*, *Dryas integrifolia*, *Cetraria* spp., *Alectoria* spp., *Rhacomitrium lanuginosum*	30-70%	weakly to moderately calcareous	imperfect to well drained	medium to fine
Mid-Arctic	Arctic dwarf shrub	2.8	*Cassiope-Cetraria*	*Cassiope tetragona*, *Cetraria cucullata*, *Cladonia* spp., *Dryas integrifolia*	70-100%	weakly to noncalcareous	well drained	medium to coarse
High & Mid-Arctic	Arctic dwarf shrub	2.9	*Salix-Dicranum*	*Salix* spp., *Dicranum* spp., *Drepanocladus* spp., *Arctagrostis latifolia*, *Carex* spp.	70-100%	moderately to extremely calcareous	imperfect to poor	medium to fine
Mid-Arctic	Arctic dwarf shrub	2.10	*Saxifraga-Polyblastia*	*Saxifraga oppositifolia*, *Polyblastia* spp., *Cetraria* spp., *Alectoria* ssp., *Cladonia* spp.	70-100%	moderately to strongly calcareous	imperfect	fine to medium
High & Mid-Arctic	Arctic sedge meadow	3.1	*Carex-Hierochloe*	*Carex* spp., *Arctagrostis latifolia*, *Salix* spp., *Dicranum* spp., *Drepanocladus* spp., *Luzula* spp.	70-100%	moderately to extremely calcareous	imperfect to poor	fine to medium
High & Mid-Arctic	Arctic sedge meadow	3.2	*Carex-Drepanocladus*	*Carex* spp., *Arctagrostis latifolia*, *Hierochloe* spp., *Drepanocladus revolvens*, *Distichium capillaceum*, *Luzula* spp., *Eriophorum* spp.	70-100%	moderately to extremely calcareous	imperfect to poor	fine to medium

5.3.1 Polar Desert Type

Papaver-Draba Community (Map symbol 1.1)

This community type is extensive on Somerset Island and covers a significant portion of Prince of Wales Island. The total vegetative cover is usually under 1%, consisting of scattered individuals of *Papaver lapponicum* ssp. *occidentale*, *Draba* spp., *Cerastium arcticum*, and *Saxifraga oppositifolia*. The exceptions are sites enriched by wastes of owls, lemmings, and other animals; these locations have 80-100% cover of *Festuca baffinensis*, *Poa arctica*, *Poa glauca*, and *Papaver lapponicum* ssp. *occidentale*. The barrenness of the limestone desert is seemingly due to cold temperatures, aridity, and the lack of soil nutrients.

Rhizocarpon-Umbilicaria Community (Map symbol 1.2)

This community type inhabits the felsenmeer and bedrock outcrops of the Precambrian uplands. Crustose lichens such as *Umbilicaria* spp., *Lecidea* spp., *Rhizocarpon geographicum*, *R. disporum*, and mosses such as *Andreaea rupestris* and *Polytrichum triste* are the main species. The cover of crustose lichen on rock surfaces may be as high as 30%; otherwise, the surface is barren except for occasional mosses, fruticose lichens, and *Cassiope tetragona* growing in crevices.

5.3.2 Moss-Grass Vegetation Type

Polyblastia-Poa Community (Map symbol 1.3)

Vegetative cover of the moss-grass type, if the *Polyblastia* crust is excluded, is as low as the polar desert type, but the scarcity is not due to aridity. The *Polyblastia-Poa* Community Type is limited in distribution. It is mostly found on the fines of noncalcareous to moderately calcareous substrates. Species of *Polyblastia* in conjunction with mosses such as *Blindia acuta* form black crusts on the surface. The grasses *Poa abbreviata* and *Phippsia algida* and the liverworts *Cephaloziella* spp. are the other common species (Fig. 12). While the black crusts may cover 30-50% of these imperfectly drained areas, there is a lack of vascular, especially dicotyledonous, species; for this reason, the appearance of this vegetation type resembles the polar desert rather than the arctic dwarf shrub.

Polyblastia-Cephaloziella Community (Map symbol 1.4)

This is a community that closely resembles the *Polyblastia-Poa* Community. The main difference is that there are more bryophyte species such as *Bryum cryophilum* and *Philonotis fontana* due to active surface drainage. Crusts of *Polyblastia* are also better developed. It is localized in distribution, with a 30-50% cover developed on noncalcareous to weakly calcareous substrate.

Hierochloe-Pleuropogon Community (Map symbol 1.5)

This community type is found in limited areas, most often in deltaic flats along the coasts. The main species are *Hierochloe alpina*, *Pleuropogon sabinei*, and *Arctagrostis latifolia*. They occur scattered along the banks of streams that cut through the deltas. The vegetation cover is usually under 1%, developed on a noncalcareous to moderately calcareous substrate.

5.3.3 Arctic Dwarf Shrub[4] Vegetation Type

The Arctic Dwarf Shrub vegetation has a higher percentage ground cover than the Polar Desert and Moss-Grass types. The basic pattern is the co-occurrence of vascular and nonvascular plant species with dwarf shrub components such as *Salix* spp. (dominantly *S. arctica*, but rarely *S. reticulata*), *Saxifraga oppositifolia*, *Dryas integrifolia*, and *Cassiope tetragona*.

Saxifraga-Draba Community (Map symbol 2.1)

In the *Saxifraga-Draba* Community Type, the vegetation cover is 5-10%, consisting of *Saxifraga oppositifolia*, *Draba* spp., *Papaver lapponicum* var. *occidentale*, *Cerastium* spp., and *Poa glauca*. This community inhabits the extremely calcareous xeric portions of the Paleozoic uplands in the study area.

Saxifraga-Papaver Community (Map symbol 2.2)

This community type is dominated by *Saxifraga oppositifolia*, *S. caespitosa*, *Papaver lapponicum* ssp. *occidentale*, *Stereocaulon* spp.,

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[4] The term "shrub" is used loosely here to include plants having lignified root stocks, runners, or branches.

Cetraria cucullata, *C. nivalis*, and *Polyblastia* spp. It forms a 5-10% cover, but unlike the *Saxifraga-Draba* Community, is not found on excessively calcareous areas. The substrate favored by this community is moderately to very strongly calcareous. Moderately to well-drained sandstone till is the usual habitat.

Saxifraga-Dryas Community (Map symbol 2.3)

This community usually covers 10-30% of the surface and is dominated by *Saxifraga oppositifolia*, *Dryas integrifolia*, *Alopecurus alpinus*, *Papaver lapponicum* ssp. *occidentale*, and *Pedicularis* spp. This community is best developed on extremely calcareous mesic sites.

Saxifraga-Salix Community (Map symbol 2.4)

This community is dominated by *Saxifraga oppositifolia* and other common species listed for the *Saxifraga-Papaver* Community (2.2). However, the better moisture content in the substrate promotes the growth of *Salix arctica*, mosses, and hepatics. The overall vegetation cover is 10-30%. The sites are well to imperfectly drained. Table 28 in the Appendix lists an example of this type of community and indicates the species coverage class.

Salix-Dryas Community (Map symbol 2.5)

The vegetation cover on this community type is 30-70%. The common species are *Salix arctica*, *Dryas integrifolia*, *Polygonum viviparum*, *Pedicularis* spp., *Distichium capillaceum*, and *Polyblastia* spp. Moderately to strongly calcareous sites which are moderately to imperfectly drained are the best habitats for this community.

Salix-Alopecurus Community (Map symbol 2.6)

This community is similar to the *Salix-Dryas* Community (2.5) in percentage cover and species composition. However, a low carbonate content in the substrate allows the growth of lichens such as *Cetraria cucullata*, *C. nivalis*, *C. delisei*, and *Cladonia* spp. Grasses, such as

Alopecurus alpinus and *Poa* spp., and sedges are also favored by these imperfect drainage conditions.

Saxifraga-Cetraria Community (Map symbol 2.7)

This is an extensive and distinctive community that inhabits weakly to moderately calcareous areas of the Mid-Arctic Ecoregion. The average vegetation cover is 30-70%, consisting largely of *Saxifraga oppositifolia*, *Dryas integrifolia*, *Cetraria* spp., *Alectoria* spp., *Stereocaulon* spp., *Cladonia* spp., *Luzula* spp., *Rhacomitrium lanugionosum*, and *Tortula ruralis*. This community occupies mesic sites.

Cassiope-Cetraria Community (Map symbol 2.8)

This type of vegetation is limited in distribution but distinctive. It is dominated by *Cassiope tetragona*, *Dryas integrifolia*, *Cetraria* spp., *Stereocaulon* spp., *Cladonia* spp., and *Luzula confusa*. As a rule this community can only be found in areas underlain by Precambrian bedrock, forming cover ranging from 70 to 100%. Locations where snowbanks linger late into the growing season are most favored, indicating that moist but well-drained conditions are preferred. Table 29 in the Appendix lists an example of this community, with species coverage classes.

Salix-Dicranum Community (Map symbol 2.9)

Dominating this community are *Salix arctica*, *Carex* spp., *Drepanocladus revolvens*, *D. brevifolius*, *Pedicularis sudetica*, and *Arctagrostis latifolia*. This community occurs close to the coast and below an elevation of 150 m. It forms a cover of 70-100% on imperfectly to poorly drained soils that range from moderate to extreme in carbonate content.

Saxifraga-Polyblastia Community (Map symbol 2.10)

This community grows on imperfectly drained, moderately calcareous soils. It is similar to the *Saxifraga-Cetraria* Community (2.7), but there is a marked domination by *Polyblastia* spp. and the associated mosses (Fig. 13). Typical other species are *Saxifraga oppositifolia*, *Papaver lapponicum* spp. *occidentale*, *S. caespitosa*, *Cetraria cucullata*, *Thamnolia* spp., and *Stereocaulon* spp. An example of this community with species coverage classes is given in Table 30 of the Appendix.

5.3.4 Sedge Meadow Vegetation Type

The characteristics of sedge meadows are the continuous vegetation cover and the poor drainage.

Carex-Hierochloe Community (Map symbol 3.1)

Carex-Hierochloe Communities are dominated by species of *Carex*, *Hierochloe alpina*, *Salix arctica*, *Dicranum elongatum*, *Drepanocladus revolvens*, *D. brevifolius*, *Luzula nivalis*, *L. confusa*, and *Arctagrostis latifolia*. The vegetative cover is seldom less than 80% and the drainage conditions are invariably poor. This community is widely distributed. An example of its relative species abundance is given in Table 31 of the Appendix.

Carex-Drepanocladus Community (Map symbol 3.2)

This community is similar to the *Carex-Hierochloe* Community (3.1) in site conditions and vegetative cover. However, there is more domination by mosses such as *Drepanocladus revolvens*, *Distichium capillaceum*, *Calliergon giganteum*, *Eriophorum triste*, and *Juncus biglumis*. Drainage conditions are too poor for the growth of *Salix arctica*. Water bodies are often found among this community. Table 32 in the Appendix gives an example of the relative species abundance in this community.

5.4 THE FLORA OF SOMERSET AND PRINCE OF WALES ISLANDS

A total of 81 vascular species was collected during this study. Ten of these are first reports for Somerset Island and six are first reports for Prince of Wales Island. Field work on Prince of Wales Island was far more restricted than on Somerset Island, but general observation and limited plant collecting suggest that the flora of the

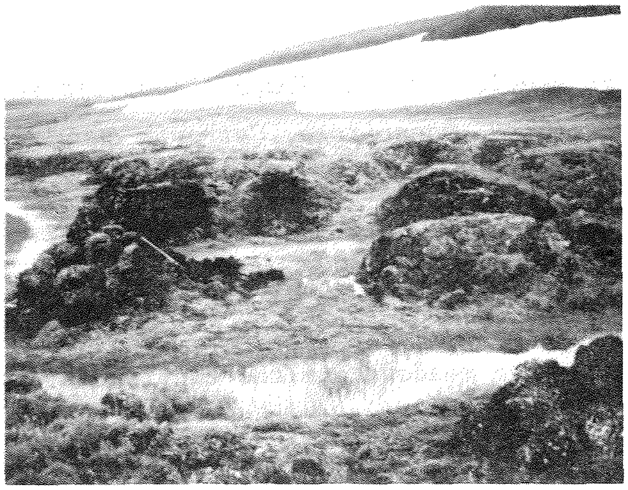

Figure 11.

Peat polygons eroded by the stream running among them. The snowbank in the background persists throughout the summer.

Figure 12.

The *Polyblastia-Poa* Community Type growing on the surface of gneissic fines. *Polyblastia* spp., *Phippsia algida*, *Polytrichum triste*, and *Blindia acuta* are the species present.

Figure 13.

The *Saxifraga-Polyblastia* Community Type growing on moderately calcareous till on Precambrian gneiss. Lichen species such as *Cetraria cucullata* and *Thamnolia* along with *Polyblastia* cover much of the surface.

two islands are probably similar. The list of species is given in the Appendix. Table 33 lists the 81 vascular species collected on Somerset Island for this study and Table 34 lists the 22 vascular plants collected from Prince of Wales Island. Table 35 gives the 29 species reported by Savile (1959) from Somerset Island, but not encountered during this field study. The collected samples were deposited in the herbaria of the Northern Forest Research Centre (CAFB) and at the Canada Department of Agriculture, Ottawa (DAO).

In addition to the vascular plants, 40 species of mosses (Table 36, Appendix), 4 liverworts (Table 37, Appendix), and 24 lichens (Table 38, Appendix) were collected on Somerset Island. These samples were deposited at the Northern Forest Research Centre Herbarium (CAFB). The bryophytes and lichens were identified by Dr. D.H. Vitt (University of Alberta), who remarked that the occurrence of the mosses *Lyella aspera* and *Psilopilum cavifolium* represents a significant extension of their range.

6. *ADDITIONAL RESULTS AND DISCUSSION*

6.1 SOIL DEVELOPMENT AND POSTGLACIAL CHRONOLOGY

The postglacial history and hence the age of the land surfaces in various parts of the study area are still under review (Netterville *et al.* 1976; Dyke 1976). As outlined in Section 3.4, the northern part of Somerset Island has a weathered surface characteristic of mature landscapes, but the southern portion shows the effects of recent glaciation. Although the current pedological studies were not designed to elucidate this problem, information from one detailed site is relevant in this connection.

The site occurs in a field of tors developed on Precambrian bedrock. The site (W75R) and its soil were described in detail as an example of the Birmingham Bay Association in this report. Dyke (1976) discussed tor development at this location. The pit was dug on the fines of nonsorted stone nets about 10 m from the center of a group of tors. The location is at the top of a 1% slope that extends 3-4 km to the northwest. Igneous and sedimentary erratics, generally of coarse gravel size, are found on the soil surface as well as among felsenmeer boulders. At 75 cm below the surface, a layer is encountered in which the material changes from noncalcareous to calcareous; the clay content decreases while the silt content increases; the color changes from yellowish brown to dark olive; and the stone content decreases with depth.

The finding of a weakly to moderately calcareous layer beneath a noncalcareous layer is of considerable importance. One plausible explanation is that the underlying layer is a calcareous till buried under the noncalcareous fines derived from the gneiss of the tors through prolonged weathering. Thus, the age of the buried till is relevant to the conclusions of Netterville *et al.* (1976); it should predate mid- or late Wisconsin times. If this view is correct, then the tor fields can best be explained as having developed in an ice-free area within ice fields, e.g. as nunataks. This interpretation was applied to shale tors in eastern Greenland by Washburn (1969). The surface erratics could be frost-heaved from the buried till, or they could postdate the underlying layer.

An alternative explanation is that the entire profile represents a well-developed soil on a very old till. The noncalcareous upper 75 cm could be considered a thick Bm horizon from which all the carbonates have been leached. The calcareous layer then would indicate a concentration of carbonates, or residual carbonates at greater depth. Thus the profile could be considered that of a mature soil developed on an old calcareous till. This explanation supports the postulates of Dyke (1976) based on the weathering of bedrock. Of the two hypotheses the first one is more likely to be correct, as great differences in chemical properties between surface and bottom samples can best be explained by two different parent materials.

6.2 ACTIVE LAYER PROCESSES

The engineering properties of the soil were studied in some detail by the Terrain Sciences Division, Geological Survey of Canada

(Veillette 1976). Accordingly, only those features that can be related to vegetation or soil-forming processes will be reported here.

6.2.1 Cryoturbation

Cryoturbation, the mixing of materials in the active layer by frost action, is pronounced on most sites. It is manifested in sorting of stones (e.g. moving them upwards and to the side of patterned ground), orienting flat stones parallel to the perimeter of the pattern, and mixing streaks of organic matter into soil (Fig. 14). The general scarcity of organic matter in the study area makes cryoturbated organic matter a rare phenomenon restricted to certain types of soils. The best cryoturbated organic materials were found under earth hummocks, a form of nonsorted circles, developed on marine clays (Garnier Bay Association). Radiocarbon dates were obtained from such cryoturbated material from earth hummocks at two locations to determine whether the burying action is a recent or relict phenomenon. At site WZ2 (Figs. 9 and 10) two dates were obtained: 3,340 ± 40 years before present (B.P.) and 525 ± 80 years. At the second site (WZ21), another earth hummock yielded dates of 3,000 ± 40 years B.P. and 2,710 ± 110 years B.P. (Fig. 15). These dates show that cryoturbation is an ongoing process, active in the past as well as in the present.

6.2.2 Patterned Terrain

Patterned terrain is a surface expression of cryoturbation, since sorting of materials, heaving of stones, and upward displacement of soil materials are caused by frost action. Patterned ground is very well developed in the study area as sorted, nonsorted, and polygonal features (Washburn 1956). Areas that show the least pattern are the beach, marine sand, and glaciofluvial sand and gravel deposits (Tables 11, 12, and 13), although ice wedge polygons are common in these materials. Ice wedge polygons can be found even on some talus slopes (Table 8).

Sorted patterns are common in till materials (Table 6), and especially on shallow till over Paleozoic bedrock (Scarp Brook 2 Soil

Figure 14. Cryoturbation buries the Ahy horizon formed at the boundary of two small unsorted circles. The dense vegetation cover along the boundary results from the better moisture supply in the depression.

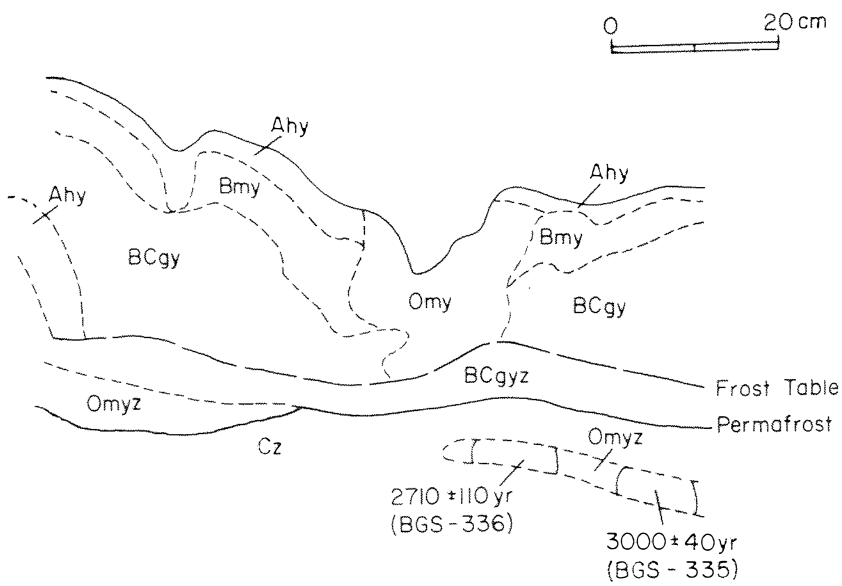

Figure 15. Profile and C^{14} age determinations of an earth hummock, Site WZ21.

Association). The pattern is usually circular on flat to gently sloping areas, but becomes elongated downslope on slopes greater than 5%, thereby forming sorted stripes.

Nonsorted patterns occur in stone-free or sparsely stony areas. Nonsorted circles and nets are common in loamy marine sediments (Table 11). On gentle slopes (about 3-5%) the pattern becomes elongated into long nonsorted stripes running downhill. On some level areas of fine sand materials small polygonal cracks that resemble desiccation polygons are formed.

6.2.3 Rheotropic Soils

Rheotropy is a phenomenon among plastic soils; its occurrence is quite widespread. It may be defined as a weakening of the bearing strength of a soil from high (solid) to lower yield values (liquid) upon disturbance (Yong and Warkentin 1975). Such soils were described from the Soviet tundra (Liverovskaya-Kosheleva 1965) and were attributed to both physical and chemical soil properties. In Arctic Canada soils were found which have very low liquid limits and plasticity indices (Shilts 1974). Such soils become readily liquefied by a very slight increase in moisture content or an increase in pore-water pressure.

On Somerset and Prince of Wales islands, soils with rheotropic properties are very common, covering nearly half the area. They usually occur in materials that are high in silt and are not excessively stony. Disturbances such as shaking, excavation, or wetting cause the apparently solid soils to liquefy and flow. Recovery of strength, or "rest-hardening", may occur, depending on the properties of clay minerals, the original fabric structure, and the degree of disturbance (Yong and Warkentin 1975).

In the study area, rheotropic properties are often associated with a vesicular (bubbly) structure in the soil. This structure makes the soil appear to be perforated by small holes (Fig. 16). The vesicular structure is probably related to the repetitive wetting and drying of surface layers of the soil which occurs in spring and fall in the active layer during freezing and thawing. Vesicular structure indicates lesser strength of the soil due to unstable particle arrangement. This type of structure is most often observed in Regosolic Turbic Cryosol and Regosolic Static Cryosol soils with a high silt but low clay content.

Rheotropic conditions are very common on the Fitz Roy Association (Fig. 17) and widespread on the Fiona Lake, Fearnall Bay, Lyons Point, Mt. Matthias, and Two Rivers Associations, provided that the materials are not excessively stony. The imperfectly drained members of Scarp Brook Association are also rheotropic.

6.2.4 Mass Wasting

Three forms of mass wasting phenomena were encountered on the study area. Gelifluction was noted only at one site near the head of Aston Bay, where a well-vegetated, steep (20%) slope slid downslope, producing a pronounced gelifluction lobe. This lobe partially overwhelmed an Inuit whaling site containing modern artifacts, dating the gelifluction within the 20th century.

A second, very common mass wasting process can be termed active layer flow. This consists of slow, viscous flow of the active layer, manifested by the development of sorted or unsorted stripes. When viewed from the air, such active layer flows tend to follow depressions down the hillsides and curve around bedrock outcrops. On moist slopes fed by snowbanks, such flows can occur on gentle slopes of 3%, but generally the slopes are steeper than 5%. Excessively stony materials, such as sand and gravel areas, seldom display such flows, but all other materials are subject to active layer flows. The rate of movement is not known, but studies of similar phenomena on Banks Island (French 1974; 1976) showed a rate of 2 cm per year on relatively coarse-textured material on dry sites. This implies a volumetric downslope movement of 30 cm^3/cm/yr. Actual rates of movement depend on the nature of soil materials and the active layer moisture regime during the summer; the rate of movement is higher on wet to moist fine-textured materials. The active layer flow appears to be enhanced by rheotropic soil characteristics.

The third form of mass wasting relates to thermal erosion of subsurface massive ice bodies. Such ice bodies are common in the western Arctic where they formed as segregated ice in an aggrading permafrost environment (Mackay 1971). The massive ice bodies encountered appeared to be similar to those in the west and probably originated as segregated ice. On Somerset and Prince of Wales islands natural exposures were found where about 1 m of active layer or low-ice-content permafrost covered the massive ice (Fig. 18). The thickness of the exposed ice in all cases was about 1 m in a face ranging from 20 to 200 m long.

All massive ice bodies were associated with fine-textured marine sediments or till that was modified by marine inundation. On Somerset Island three active and six inactive massive ice bodies were found in marine clays south of Creswell Bay. On Prince of Wales Island one active massive ice body was seen between Emily Bay and Arabella Bay, but air photos show numerous slump scars. Another massive ice body was found east of Arabella Bay and inland from Browne Bay at 73°13'N Lat. and 98°38'W Long. All these massive icy beds were in marine clays (Garnier Bay Association), except for the Arabella Bay location, which was in a marine-modified till.

6.3 VEGETATION-SOIL RELATIONSHIPS

6.3.1 Vegetation Distribution and Mineralogy

The vegetation cover on many areas can be related to the soil associations. The best vegetated areas occur invariably on marine silts and clays of Fury Beach and Garnier Bay Associations. In these associations the low relief and fine-textured soils combine to provide more moisture for vegetation.

Differential vegetation distribution was observed on the till materials within the study area, although their textural range is similar. It was found that the vegetation abundance can be related to $CaCO_3$ equivalent, and especially to the calcite and dolomite contents (Table 16).

A striking example of this phenomenon was investigated at a site on soils derived from Paleozoic sandstone, surrounded by soils

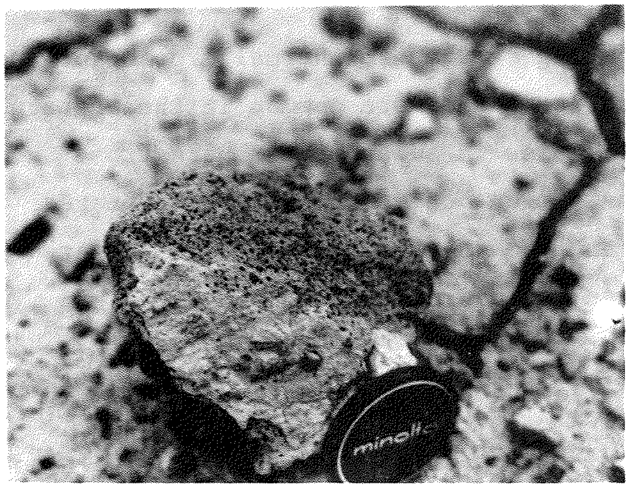

Figure 16.

The vesicular structure in the surface 20 cm of many silty soils is probably caused by the formation of ice crystals. Note the surface shrinkage cracks caused by freezing and/or desiccation.

Figure 17.

The rectangular high-center ice wedge polygons of south Somerset Island are associated with the Fitz Roy Association. Nonsorted nets have developed inside the polygons. The nets are elongated downslope due to rheotropism in the soil.

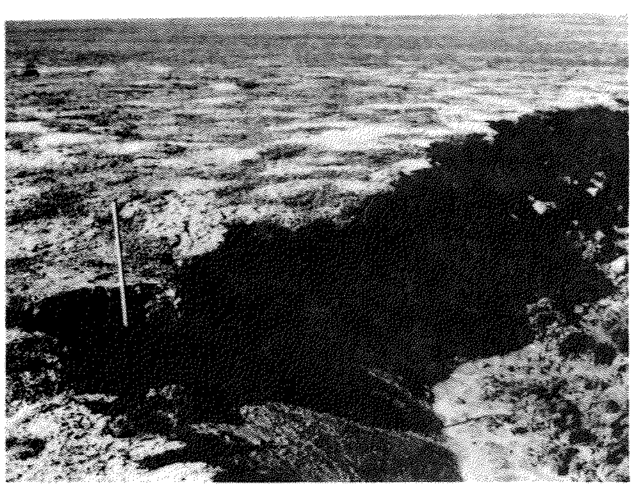

Figure 18.

Tabular ground ice exposed in a retrogressive thaw flow-slide in marine sediments, Somerset Island (73°37'N, 94°08'W).

Table 16. Carbonate rock content means and standard deviations in some Soil Associations developed on till, and relationships to average vegetation cover

Parent Materials	Range of Vegetation Cover (%)	% $CaCO_3$ Equivalent	% Calcite	% Dolomite	No. of Samples
Howe Harbour	50-100	27 ± 13	1 ± 1	24 ± 12	7
Fearnall Bay	50-100	42 ± 9	14 ± 6	25 ± 5	11
Fiona Lake	30- 70	35 ± 16	12 ± 3	20 ± 13	4
Fitz Roy	30- 70	35 ± 5	13 ± 1	20 ± 7	5
Mount Matthias	30- 70	29 ± 11	15 ± 11	13 ± 9	15
Lyons Point	30- 50	36 ± 7	10 ± 7	27 ± 6	4
Scarp Brook	0- 20	59 ± 15	26 ± 18	36 ± 18	39

derived from limestone (Fig. 19). This contrast is seen in the analyses of soil parent materials and reflected in the vegetation cover and species composition (Table 17).

6.3.2 Vegetation and Soil Nutrients

The vegetation cover of the polar deserts occurring on highly calcareous soils is scant, usually less than 1%, and consists of widely scattered individual plants. It is common to find small (1-2 m^2) patches where vegetation cover is 100%. Closer scrutiny reveals that such spots occur at lemming burrows, rocks serving as bird perches (Fig. 20) or fox stations, skeletal remains of animals, or old Inuit habitations. These sites are all enriched by extraneous organic materials. The plant species present may be unique to such enriched sites, but are usually species occurring in the vicinity of the site. On the enriched site, however, they are taller and generally more luxuriant than elsewhere.

The species commonly occurring on well to moderately well drained enriched sites are: *Festuca baffiniensis*, *Poa abbreviata*, *P. glauca*, *Dryas integrifolia*, *Draba corymbosa*, *D. subcapitata*, *Saxifraga caespitosa*, *S. cernua*, *Stellaria crassipes*, *S. laeta*, *Cerastium Beeringianum*, *Potentilla pulchella*, and *Papaver lapponicum* ssp. *occidentale*.

Such well-vegetated spots often occur on excessively drained ridge tops that are exposed to wind. This eliminates sheltering and added soil moisture as the main reasons for their occurrence. To test the soil nutrient conditions, a fox stop was investigated by analyzing the top 10 cm of the soil outside and at the center of the enriched area (Table 18). The results show that all soluble salts, available phosphorus, and nitrate nitrogen are substantially higher at the center of the enriched area than outside. These results lend credence to the possibility that plants on extremely calcareous polar deserts are suffering from low nutrient levels in addition to climatic stresses.

6.4 MUSKOX AND CARIBOU HABITATS

The range requirements of caribou and muskoxen on Somerset Island are under investigation at the present (Russell and Edmonds 1976). The

Table 17. Comparison between vegetation growing on Prince Regent Association (limestone-derived till) and Lyons Point Association (sandstone-derived till) at 73°10'N Long. and 92°12'W Lat. (Sites W39A and W39B)

Bedrock type	limestone	sandstone
Soil parent material textural class	loam	loam
Soil Association	Prince Regent	Lyons Point
% $CaCO_3$ equivalent	54.24	52.32
% calcite	47.68	22.38
% dolomite	6.04	27.58
% plant cover (est.)	1	50
Species list	*Papaver lapponicum* ssp. *occidentale* *Draba* spp. *Cerastium alpinum* *Thamnolia vermicularis*	*Saxifraga caespitosa* *Thamnolia vermicularis* *Saxifraga oppositifolia* *Papaver lapponicum* ssp. *occidentale* *Polyblastia* spp. *Poa arctica* *Cetraria cucullata* *Stereocaulon* spp.

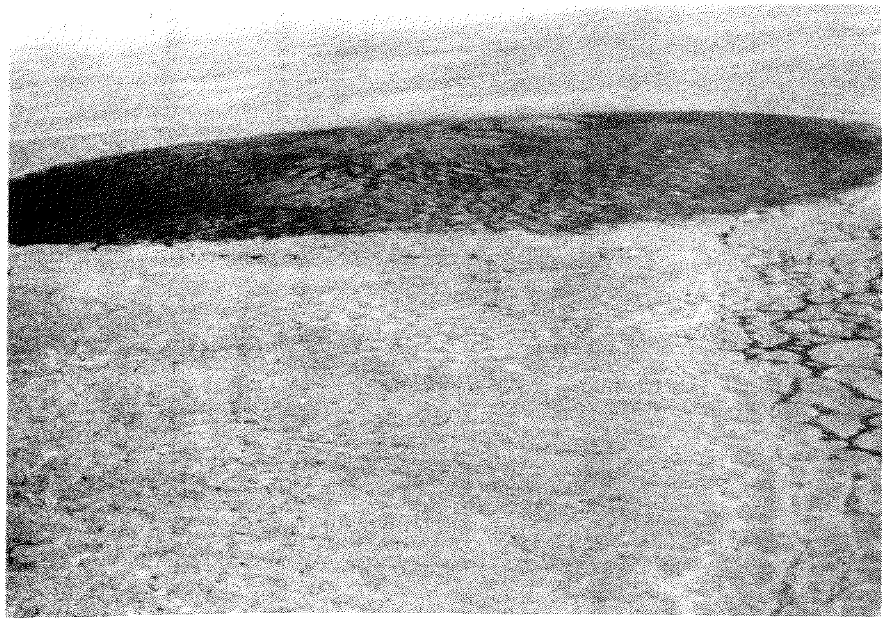

Figure 19. The vegetation cover on the darker Palaeozoic sandstone surface is about 50%, whereas the limestone surface has less than 1% cover.

Figure 20. Continuous vegetation cover in an enriched area in the polar desert. Dominant species are *Festuca baffiniensis* and *Dryas integrifolia*, with *Xanthoria elegans* on a rock.

Table 18. Chemical analysis of topsoil from outside and in the center of an enriched site

Site	Texture	pH	% $CaCO_3$ Equiv.	Soluble Salts ppm in Saturated Extract: Ca	Mg	Na	K	SO_4	Avail. P ppm	NO_3-N ppm	% Org. C	% Total N	C/N Ratio
Outside	Loam	7.9	66.5	77.8	37.3	16.8	4.8	27.8	2.5	0.9	1.9	0.3	14.0
Center	Sandy Loam	8.0	76.3	168.8	98.1	83.8	28.5	515.0	108.8	7.8	3.4	0.5	17.0

prime muskox habitats are the sedge meadows (Community Types *Carex-Hierochloe* (3.1) and *Carex-Drepanocladus* (3.2)) found primarily on Fury Beach and Garnier Bay Associations in the Stanwell-Fletcher Basin (Ecological District M6) and smaller pockets in the Creswell Lowland (Ecological District M5) and Cunningham Inlet area (Ecological District H3). On the basis of available habitat, Somerset Island could support over 100 muskoxen. At present, however, only one small herd of 12 animals is known to inhabit the island. Historical records and old skulls indicate that muskoxen were more numerous in the past but were eradicated by the whalers in the late 19th century (Russell and Edmonds 1976).

On Prince of Wales Island sedge meadows are better distributed, occurring in the marine lowlands that cross the island (Mount Clarendon Ecological District H3, and Fisher Lake Lowlands M3). A number of muskox herds were sighted in these and neighboring areas, but it is doubtful whether the estimated number of 2,300 muskoxen (Manning and Macpherson 1961) now exist on the island.

Habitat studies (Russell and Edmonds 1976) indicate that the Precambrian bedrock areas are important habitat for caribou. The presence of foliose and fruitcose lichens is important, especially in combination with uneven topography that influences snow drifting, making the forage more available to caribou. Other habitat types utilized by caribou either as summer or winter range are the arctic dwarf shrub Vegetation Types (*Salix-Alopecurus*, *Saxifraga-Cetraria*, *Cassiope-Cetraria*, *Salix-Dicranum*, and *Saxifraga-Polyblastia* Community Types). The community types are common on all but the Northwest Plateau (Ecological District H1) on Somerset Island and throughout Prince of Wales Island. Precambrian bedrock areas, however, are limited on Prince of Wales Island, restricting the availability of prime winter foraging areas.

7. *RECOMMENDATIONS*

7.1 Sensitive Environments

Sensitive environments can be defined as those where a disturbance would induce an environmental reaction whose magnitude is out of proportion to the initial disturbance. In a highly sensitive environment a relatively minor disturbance could cause a severe reaction, but in a less sensitive environment the same disturbance would cause only a mild reaction. The sensitivity of the terrestrial environment examined in this report may be due to the characteristics of the terrain, the vegetation covering the terrain, or a combination of these. Reactions primarily attributable to the characteristics of the terrain are referred to as terrain sensitivity (Van Eyk and Zoltai 1975). Terrain sensitivity is dependent on characteristics inherent in the ecosystem; for example, ice content either near the surface or at depth, slope angle, the properties of surficial material, and vegetative insulating cover are all relevant factors. Other sensitive environments may be unique habitats for vegetation and wildlife, or habitats that are keys to the perpetuation of these populations.

During this study, certain processes were noted that may contribute to the sensitivity of the environment to disturbance. These are listed below with actions recommended to minimize their impact.

7.1.1 Massive Ground Ice

Massive ground ice was found in certain areas on both islands in association with retrogressive thaw flow-slides (Sec. 6.2.4). The exposed ice was melting at a fairly fast rate, releasing large quantities of water. Much of this sediment-rich water reached nearby streams, causing a great deal of sedimentation. The observed exposures were initiated by natural causes (sheet erosion, stream erosion), but excavations by machinery could also expose the massive ice bodies, initiating thermal erosion.

> Recommendation 1:
> Disturbance of the surface over tabular ice bodies should be avoided to prevent the development of retrogressive thaw flow-slides and attendant sedimentation of water bodies.

7.1.2 Vegetation Cover

Moss vegetation cover, however thin, serves as an insulation of the frost table. If the vegetation cover or the active layer is disturbed by stripping, compaction, churning by wheels, or other means, its insulating qualities will be reduced, and deeper thawing will result (Figs. 21 and 22). This will lead to the melting of near-surface permafrost, causing subsidence or thermokarst development. If the shape of the impact is linear (e.g. vehicle tracks, seismic lines, and winter roads) the channel created by newly depressed permafrost table will carry subsurface drainage water, and the subsided ground surface will channel the surface runoff. Depending on the nature of surficial materials and the slope angle, gullying can become the end result. This can be a serious problem on ice-rich and erosion-prone materials such as fine-textured marine sediments or till that is low in stone content.

Recommendation 2:
Disturbance of the surface vegetation and active layer should be avoided as much as possible on fine-textured soil parent materials.

7.1.3 Frost Heaving

Uplifting of rocks by frost heaving was noted on crystalline bedrock areas. In one instance a 1 m x 2 m x 2 m bedrock block was lifted 1 m above the glacially smoothed bare bedrock surface. Examination showed that cracks had developed in the bedrock along natural jointing, and water seeping into the cracks froze and eventually lifted the bedrock boulder. Should blasting create or enlarge cracks in solid bedrock, the process described above could be artificially induced, causing disruptive action on roads, pipelines, or buildings. The possibility of rock heaving after blasting should be tested under field conditions.

Figure 21. Winter road constructed in the spring of 1975, Russell Island. Note soil exposed by scalping on the left, vegetation debris in the middle, and undisturbed surface on the right.

Figure 22. Nonsorted circles exposed by scalping on the winter road (Fig. 21) to the left of the knife. Active layer was 10% deeper under the scalped area by early August 1975.

Recommendation 3:
Blasting of solid crystalline bedrock may induce frost heaving. This effect should be investigated, and construction design should accommodate the findings of these studies.

7.1.4 Mass Wasting

Mass wasting of the active layer is very common even on gentle slopes. It is possible that linear structures running parallel to the contour will interfere with the downslope movement of mass wasting. Structures built on roadbeds or foundations (berms, roads, etc.) may be moved differentially by the downslope flow. Structures built on piles or stilts may be subjected to increasing pressures. The permafrost table raised artificially (e.g. under roadbeds, over chilled pipelines) may impede the mass wasting of the active layer, and the pressures which build up against structures may lead to their eventual destruction; moreover, the ensuing repair operations can cause further terrain damage.

Recommendation 4:
Natural mass movements occurring as active layer downslope flow may be impeded by artificial structures, and the resultant pressures are potentially disruptive. The effects of mass movements on structures should be studied, and construction methods should be based on the results of such studies.

7.1.5 Rheotropic Soils

Many soils with high silt and moisture contents show rheotropic characteristics. Mechanical vibrations such as those which may be produced by vehicle traffic and compressor stations, and the vibration of the pipeline may be sufficient to cause the active layer to become fluid. This will lead to damage to structures, and the permafrost may also thaw out because of the change in thermal regime. Moreover, some of the soil materials under plastic flow may reach water bodies, thereby causing sedimentation and damaging the aquatic environment.

Recommendation 5:
Rheotropic soils may become fluid as a result of mechanical vibrations. The rheotropic phenomenon, common on the two islands investigated, should be studied from the soil mechanics point of view. Construction methods to overcome this phenomenon should be developed based on field tests.

7.1.6 Wildlife Habitats

Extensive well-vegetated areas suitable to sustain muskox populations are limited. Such areas are in Ecological Districts H3, M6, and M5 on Somerset Island, and Districts H5 and M5 on Prince of Wales Island. These are generally areas of marine sediments or areas underlain by Tertiary bedrock. Other unique habitats which have been identified by wildlife biologists are Prince Leopold Island (seabird habitat) and the rugged Precambrian areas of Somerset Island (barren-ground caribou habitat). Disturbance to these areas may lead to the displacement of these animals that may threaten their survival.

Recommendation 6:
Interference with unique areas that are vital for the survival of wildlife should be avoided.

8. *CONCLUSIONS*

A reconnaissance of Somerset and Prince of Wales islands has revealed aspects of the environment that make them vulnerable to disturbances and that need detailed studies to suggest ways of minimizing the harmful impact. Vegetation capable of sustaining muskox and caribou herds is confined to specific areas both in the High and Mid-Arctic Regions. Protection of such key areas is essential to the preservation of the natural resources of the islands. Several factors and processes that affect terrain sensitivity have been identified in this study as relevant to pipeline construction. The function of vegetation as insulation for the permafrost must not be interfered with to any great extent. Natural processes of frost heaving, rheotropism, thermal erosion, and mass wasting are also critical factors. Their effect on pipeline construction and maintenance is largely unknown; extreme caution must be exercised in construction methodology and timing where these processes are known to be active.

From a scientific viewpoint, Somerset Island is unique in that it poses a number of pedological and geological problems. Geologically, the glacial history remains unclear. At the same time, certain areas of the island have soils that are extremely old, a rare phenomenon in Canada. These two questions may be resolved by some common key: if it can be shown that soil development has not been interrupted by glaciation for a relatively long period, the old soils would represent fully mature soils developed in a High Arctic environment. It is hoped that further studies in geology and pedology will enrich the knowledge of both disciplines.

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A P P E N D I X

Table 1. Chemical and physical analyses, Batty Bay Association

Site: W-37
Location: 73°05'N & 91°30'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Cy	0-49	8.2	0.37	56.63	42.0	13.5	0.3	0.02	15.0	4.7	22.8	2.8	0.5	0.1	2.2	0.5
Cz	49+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Cy	0-49	37.8	17.5	12.7	6.1	4.6	23.3	0.0	0.2	0.1	0.1	0.2	0.4	1.0	58.9	40.1	SiClay
Cz																	

Table 2. Chemical and physical analyses, Birmingham Bay Association

Site: W-75R
Location: 72°51'N & 92°33'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Cy	0-50	6.7	0.3	--	--	--										
ICz	50-75	7.2	1.1	Tr.	--	--										
IICz	75-105	7.8	2.0	5.5	2.3	2.9										
IIC_2z	105-118	7.6	2.4	3.0	2.5	0.5										

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Cy	0-50							10	19.1	13.6	14.4	14.4	10.3	71.8	14.6	13.6	SLoam
ICz	50-75							29	13.4	15.1	15.6	15.3	11.5	70.9	19.0	10.1	SLoam
IICz	75-105							5	5.9	5.1	10.9	21.7	18.8	62.4	29.3	8.3	SLoam
IIC_2z	105-118							7	8.5	7.1	10.2	16.4	18.4	60.6	30.6	8.8	SLoam

Table 3. Chemical and physical analyses, Birthday Bay Association

Site: WZ-11
Location: 73°37'N & 94°50'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Cy	0-38															
Cyz	38-65	8.4	0.37	48.3	6.3	37.4	0.4	0.1	4.0	3.2	4.7	3.0	0.05	0.04	2.5	0.0
Wz	65+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Cy	0-38																
Czy	38-65	38.3	22.9	14.6	3.2	39.1	9.8	65.5	17.0	18.4	12.0	17.6	10.8	75.8	12.1	12.1	SaLoam
Wz	65+																

Table 4. Chemical and physical analyses, Cape Garry Association

Site: W-119B
Location: 72°54'N & 93°29'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}		
C_1y	0-15															
C_2y	15-51	8.2	0.69	58.36	14.5	40.4	0.3	0.04	7.5	3.6	23.9	1.6	0.1	0.1	1.1	6.0
Cz	51+															

Chemical Characteristics — Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
C_1y	0-15																
C_2y	15-51	86.8	22.4	18.4	4.8	91.1	25.5	0.0	0.0	0.2	1.7	16.7	18.8	37.4	49.8	12.8	Loam
Cz	51+																

Table 5. Chemical and physical analyses, Cape Granite Association

Site: W-77a
Location: 73°40'N & 95°30'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Cy	0-52	6.7	0.11	--	--	--	0.6	0.06	10.0	10.0	7.2	4.6	0.1	0.04	3.4	0.5
Cgy	52-64															
Cz	64+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Cy	0-52	7.8	5.4	5.3	0.9	3.2	7.0	17.7	7.1	14.3	13.4	18.0	12.5	65.3	15.3	19.4	SLoam
Cgy	52-64																
Cz	64+																

Table 6. Chemical and physical analyses, Creswell Association

Site: W-23
Location: 72°47'N & 92°58'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}		
Ahy	0-15															
Bmy	0-35															
Omy	10-25															
Cy	0-35	8.0	0.31	48.99	17.8	28.7	1.3	0.09	14.4	6.0	21.5	1.7	0.1	0.01	1.0	0.0
Cz	35+															

Chemical Characteristics — Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Ahy	0-15																
Bmy	0-35																
Omy	10-25																
Cy	0-35	59.5	10.6	5.1	0.7	4.6	14.0	0.0	0.1	0.2	0.6	4.7	25.3	30.9	52.0	17.1	SiLoam
Cz	35+																

Table 7. Chemical and physical analyses, Elwin River Association

Site: W-32
Location: 73°23'N & 92°55'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Bmj	0-22	7.8	0.48	24.27	5.5	17.3	1.5	0.1	15.0	11.7	19.9	3.2	0.3	0.02	2.0	8.0
Cy	22-37	7.0	0.34	27.82	6.6	19.5	1.3	0.1	13.0	11.2	23.3	3.0	0.3	0.02	2.5	0.3
Cz	37+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Bmj	0-22	82.5	13.9	3.0	2.8	3.6	10.6	8.5	2.7	3.4	4.5	9.5	16.3	36.4	40.4	23.2	Loam
Cy	22-37	57.5	11.3	3.1	4.0	3.6	9.9	4.2	1.4	2.3	3.5	9.3	19.0	35.5	42.5	22.0	Loam
Cz	37+																

Table 8. Chemical and physical analyses, Fearnall Bay Association

Site: W-73
Location: 72°51'N & 92°33'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g Ca^{2+}	Mg^{2+}	K^+	Na^+	Avail. P ppm	NO_3-N ppm
Bmj	0-12	7.9	1.3	45.59	12.2	30.7	0.9	0.09	10.0	5.7	21.6	1.7	0.1	0.04	1.2	8.5
Cy	12-55	8.1	0.6	47.63	17.9	27.4	0.7	0.06	12.0	5.4	22.5	1.8	0.1	0.03	1.3	1.0
Cz	55+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract Ca	Mg	Na	K	Cl	SO_4-S	% Stone	Sand Fraction % V.C.S.	C.S.	M.S.	F.S.	V.F.S.	% Total Sand	% Silt	% Clay	Textural Class
Bmj	0-12	448.8	37.1	11.5	2.1	270.5	120.0	3.4	2.2	1.9	3.9	15.0	19.3	42.3	38.1	19.6	Loam
Cy	12-55	89.8	19.3	7.6	2.6	86.9	33.0	1.5	1.0	2.1	4.1	15.0	21.1	43.3	37.61	19.1	Loam
Cz	55+																

Table 9. Chemical and physical analyses, Fiona Lake Association

Site: W-60
Location: 73°32'N & 95°24'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Ahy	0-9															
Bmy	9-19															
ICy	19-83	8.0	0.29	17.29	10.3	6.4	0.9	0.03	30.0	11.9	27.9	2.5	0.2	0.03	1.1	0.5
IICy	83-89	7.6	0.14	0.00	0.0	0.0	0.3	0.02	15.0	6.9	5.7	2.5	0.2	0.03	1.6	0.5
IICyz	89+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Ahy	0-9																
Bmy	9-19																
ICy	19-83	50.8	7.7	3.9	2.6	5.0	12.3	67.4	15.6	10.9	6.6	12.5	11.1	56.7	27.5	15.8	SLoam
IICy	83-89	13.3	6.0	6.0	2.3	3.6	12.0	59.8	10.9	11.4	9.6	15.7	12.8	60.4	23.3	16.3	SLoam
IICyz	89+																

Table 10. Chemical and physical analyses, Fitz Roy Association

Site: W-117
Location: 72°38'N & 95°00'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Cy	0-70	8.4	0.28	29.34	13.4	14.7	0.3	0.03	10.0	4.5	23.1	2.3	0.2	0.03	1.0	0.8
Cz	70+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Cy	0-70	38.5	12.8	3.4	3.5	3.2	15.6	17.5	3.9	5.6	5.5	19.1	12.6	46.7	31.0	22.3	Loam
Cz	70+																

Table 11. Chemical and physical analyses, Four Rivers Association

Site: W-52A
Location: 73°20'N & 95°30'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Ahy	0-7															
Bmy	7-34	7.9	0.23	0.57	0.4	0.2	0.3	0.02	15.0	5.3	4.2	2.3	0.1	0.1	0.5	0.3
Cgy	34-55	8.5	0.28	0.97	0.3	0.6	0.2	0.02	10.0	5.2	4.3	2.4	0.1	0.1	4.1	0.5
Cz	55+															

Chemical Characteristics — Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Ahy	0-7																
Bmy	7-34	17.5	9.2	21.4	3.3	5.3	14.7	0.8	0.5	0.7	3.3	20.2	30.6	55.3	33.2	11.5	SLoam
Cgy	34-55	13.5	6.0	51.5	4.3	9.9	14.4	0.1	1.2	2.1	1.9	13.2	40.1	58.5	31.5	10.0	SLoam
Cz	55+																

Table 12. Chemical and physical analyses, Garnier Bay Association

Site: WZ-2
Location: 73°37'N & 94°50'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}		
Om	0-9	8.0	0.91	22.3	0.0	20.5	24.0	1.5	16.0	56.0	33.9	26.0	1.02	.28	35.5	8.8
Bmy	0-25	8.0	0.28	47.1	3.4	40.3	0.4	0.1	4.0	10.4	8.3	4.1	0.09	0.02	2.1	0.0
Bgy	25-45	8.0	0.28	44.8	5.8	36.0	2.7	0.3	9.0	18.6	16.4	10.5	0.24	0.06	0.5	0.0
C_1yz	45-68	8.0	0.51	42.2	3.2	36.0	2.9	0.3	9.7	19.1	16.8	4.8	0.35	0.06	3.9	0.0
C_2yz	68+	8.4	0.30	86.7	13.7	67.0	0.2	0.02	10.0	9.0	13.8	1.7	0.01	0.03	0.2	0.0

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Om	0-9	123.8	80.6	11.3	2.8	17.0	243.0	N.D.									Organic
Bmy	0-25	39.3	14.7	5.7	2.1	53.3	21.6	35.6	4.0	5.6	8.0	17.0	8.2	43.4	41.2	15.4	Loam
Bgy	25-45	32.5	15.4	8.8	3.9	88.8	5.3	N.D.	0.0	0.1	0.4	0.8	2.6	3.9	54.8	41.3	SiClay
C_1yz	45-68	64.3	24.1	9.8	2.0	30.8	23.5	N.D.	0.6	0.2	0.4	1.1	3.3	5.6	56.9	37.5	SiLoam
C_2yz	68+	23.8	11.8	28.6	3.9	44.4	14.4	58.6	9.4	10.9	5.5	8.4	17.3	51.5	34.2	14.3	Loam

Table 13. Moisture characteristics, Garnier Bay Association

Site: WZ-2
Location: 73°37'N & 94°50'W

Horizon	Depth cm	Moist. % by Vol.	Moist. % by Weight	Bulk Density g/cm^3
Om	5	75.6	341.3	0.98
Bg	20	40.0	24.0	2.09
Bm	35	30.4	20.7	1.78
Bm	40	34.3	19.3	2.12
Cz	60	94.4	115.4	1.61
Cz	65	92.1	99.8	1.69

Table 14. Temperature profile of a hummock, Garnier Bay Association

Site: WZ-2
Location: 73°37'N & 94°50'W
Date: July 3, 1975

Section at top of hummock

Horizon	Depth cm	Temperature °C
Bm	5	8
Bm	10	6
Bg	20	5
Bg	25	4
Bg	30	3
Bg	38	0

Section in trough between hummocks

Horizon	Depth cm	Temperature °C
Om	5	6
Om	10	4
Om	15	1

Table 15. Chemical and physical analyses, Howe Harbour Association

Site: W-31
Location: 73°30'N &94°00'

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Ahy	0-25															
Bmy	0-54	8.0	0.37	33.67	0.0	31.0	1.0	0.1	10.0	9.1	10.8	4.4	.13	.03	0.66	2.25
Cy	10-54	8.0	0.32	30.34	0.9	27.1	1.1	0.1	11.0	10.0	13.9	4.5	.14	.03	0.66	0.75
Cz	54+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Ahy	0-25																
Bmy	0-54	53.3	16.8	3.7	0.9	3.6	9.7	23.2	4.9	8.3	8.7	13.3	15.0	50.2	34.0	15.8	Loam
Cy	10-54	46.0	14.4	3.0	1.6	4.3	9.1	26.1	5.6	9.6	9.4	13.4	13.5	51.5	31.5	17.0	Loam
Cz	54+																

Table 16. Chemical and physical analyses, Lyons Point Association

Site: W-90
Location: 74°01'N & 98°32'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Bm	0-5															
Cy	5-58	8.0	0.39	27.31	6.7	27.3	0.9	0.08	11.3	6.3	12.7	4.6	0.3	0.1	2.3	0.5
Cz	58+															

Chemical Characteristics — Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Bm	0-5																
Cy	5-58	37.3	16.2	21.3	8.2	19.1	24.3	29.1	4.6	4.4	3.4	7.3	14.5	34.2	36.6	29.2	CLoam
Cz	58+																

Table 17. Chemical and physical analyses, Mount Matthias Association

Site: W-85
Location: 73°42'N & 99°12'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Bmj	0-5	8.1	0.47	29.43	20.0	8.7	0.6	0.06	10.0	6.5	23.5	1.9	0.2	.03	1.1	4.8
Cy	5-46	8.1	0.29	29.80	20.9	8.2	0.7	0.06	11.7	6.3	26.4	2.2	0.2	.03	0.8	0.0
Cz	46+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Bmj	0-5	73.5	15.0	5.1	3.3	7.1	24.8	8.8	3.4	3.7	3.2	4.9	13.8	29.0	45.1	25.9	Loam
Cy	5-46	44.3	10.5	2.6	3.0	5.3	15.6	10.2	2.7	3.6	3.9	5.2	14.4	29.8	42.3	27.9	CLoam
Cz	46+																

Table 18. Chemical and physical analyses, Prince Regent Association

Site: W-72
Location: 73°04'N & 92°22'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g Ca^{2+}	Mg^{2+}	K^+	Na^+	Avail. P ppm	NO_3-N ppm
Bmj	0-10	8.1	0.52	66.8	37.3	27.1	0.4	0.05	8.0	4.2	21.0	1.7	0.1	0.02	0.5	6.5
Cy	10-56	8.1	0.32	57.2	29.0	25.9	1.1	0.10	11.0	7.2	23.5	2.3	0.2	0.02	1.6	0.0
Cz	56+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract Ca	Mg	Na	K	Cl	SO_4-S	% Stone	Sand Fraction % V.C.S.	C.S.	M.S.	F.S.	V.F.S.	% Total Sand	% Silt	% Clay	Textural Class
Bmj	0-10	74.5	17.7	6.5	2.0	8.0	17.5	30.3	4.0	4.3	2.9	6.5	15.4	33.1	48.2	18.7	Loam
Cy	10-56	53.8	12.6	2.3	1.8	4.6	9.1	11.2	3.0	4.0	3.1	6.6	11.7	28.4	54.0	17.6	Loam
Cz	56+																

Table 19. Chemical and physical analyses, Scarp Brook Association

Site: W-100
Location: 73°35'N & 100°05'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g Ca^{2+}	Mg^{2+}	K^+	Na^+	Avail. P ppm	NO_3-N ppm
Bmj	0-6	8.0	0.67	71.52	25.3	42.5	0.5	0.05	10.0	2.9	23.3	1.3	0.1	0.02	1.3	14.3
Cy	6-71	8.4	0.30	72.47	30.5	38.6	0.6	0.04	15.0	7.6	23.5	1.7	0.1	0.03	1.2	0.0
Cz	71+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract Ca	Mg	Na	K	Cl	SO_4-S	% Stone	Sand Fraction % V.C.S.	C.S.	M.S.	F.S.	V.F.S.	% Total Sand	% Silt	% Clay	Textural Class
Bmj	0-6	100.5	20.8	3.9	2.7	7.4	10.8	30.8	7.0	8.5	6.2	8.2	10.1	40.0	42.9	17.1	Loam
Cy	6-71	38.0	14.0	7.3	2.5	8.5	19.3		5.7	7.4	5.3	6.7	8.0	33.0	50.8	16.2	Loam
Cz	71+																

Table 20. Chemical and physical analyses, Stanwell Fletcher Association

Site: WZ-19
Location: 72°58'N & 94°59'W

Chemical Characteristics

Hor.	Depth cm	pH	Conduc-tivity mmhos/cm	% $CaCO_3$ equiv.	% Cal-cite	% Dolo-mite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Bm	0-6	6.2	0.18	--	--	--	1.1	0.1	11.0	11.6	6.4	4.3	0.5	0.04	1.1	0.0
Cy	6-55	6.8	0.09	--	--	--	0.2	0.02	10.0	6.2	3.3	2.9	0.3	0.02	4.3	0.5
ICz	55-60	7.0	0.08	--	--	--	0.1	0.02	5.0	5.4	2.4	2.3	0.3	0.02	4.0	0.5
IICz	60+	7.0	0.40	--	--	--	0.1	0.02	5.0	2.0	0.9	1.1	0.2	0.01	0.8	0.8

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Bm	0-6	2.2	8.4	11.0	6.6	4.6	17.0	0.0	0.4	0.8	1.7	28.2	13.6	44.7	2.3	53.0	Clay
Cy	6-55	1.1	3.3	3.5	5.4	3.6	19.0	0.0	0.1	0.4	1.0	25.3	27.7	54.5	18.0	27.5	SCLoam
ICz	55-60	1.2	3.2	2.4	5.2	3.2	6.0	0.0	0.2	0.6	1.0	38.0	20.9	60.7	16.8	22.5	SCLoam
IICz	60+	28.8	21.4	3.9	44.8	5.0	52.0	0.0	0.0	0.1	0.8	44.8	29.6	75.3	10.6	14.1	SLoam

Table 21. Moisture characteristics, Stanwell Fletcher Association

Site: WZ-19
Location: 72°58'N & 94°57'W

Horizon	Depth cm	Moist. % by Vol.	Moist. % by Weight	Bulk Density g/cm^3
Bm	10	21.1	13.8	1.74
Cy	30	22.6	12.2	2.07
Cy	50	23.5	12.3	2.14
ICz	54	38.5	24.6	1.78
IICz	68	64.8	34.3	2.52

Table 22. Temperature profile, Stanwell Fletcher Association

Site: WZ-19
Location: 72°58'N & 94°57'W
Date: July 26, 1975

Horizon	Depth cm	Temperature °C
Bm	5	3.5
Cy	10	3.5
Cy	20	3.0
Cy	30	2.5
Cy	40	2.0
Cy	50	1.0
Cy	55	0.0

Table 23. Chemical and physical analyses, Transition Bay Association

Site: W-91
Location: 73°45'N & 97°36'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^+	Na^+		
Bmy	0-45	7.9	0.27	12.70	1.5	10.3	2.9	0.2	14.5	13.2	12.9	6.5	0.2	0.1	1.2	0.3
Cz	45+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Bmy	0-45	26.0	15.9	9.0	2.1	14.5	23.3	3.1	0.7	3.3	7.8	28.0	17.2	57.0	23.5	19.5	SLoam
Cz	45+																

Table 24. Chemical and physical analyses, Two Rivers Association

Site: W-21
Location: 73°07'N & 93°36'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g				Avail. P ppm	NO_3-N ppm
											Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}		
Ahy	0-10															
Bmy	0-20															
Cy	20-57	8.2	0.26	53.4	9.4	40.5	0.1	0.01	10.0	3.4	15.3	1.5	0.1	0.01	0.2	0.3
Cz	57+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract						% Stone	Sand Fraction %					% Total Sand	% Silt	% Clay	Textural Class
		Ca	Mg	Na	K	Cl	SO_4-S		V.C.S.	C.S.	M.S.	F.S.	V.F.S.				
Ahy	0-10																
Bmy	0-20																
Cy	20-57	37.0	13.2	6.4	2.6	3.9	10.8	14.8	5.8	9.1	7.0	19.8	23.5	65.2	25.3	9.5	SLoam
Cz	57+																

Table 25. Chemical and physical analyses of a Mesic Organic Cryosol

Site: WZ-10
Location: 74°01'N & 93°27'W

Chemical Characteristics

Hor.	Depth cm	pH	Conductivity mmhos/cm	% $CaCO_3$ equiv.	% Calcite	% Dolomite	% Org. C	% Total N	C/N ratio	C.E.C. m.e./100 g	Exchangeable Cations m.e./100 g Ca^{2+}	Mg^{2+}	K^+	Na^+	Avail. P ppm	NO_3-N ppm
Oh	0-5	7.1	1.26	5.4	3.8	1.5	24.8	2.5	9.2	122.5	111.8	12.5	0.20	0.84	15.5	232.5
Om	5-25	6.1	0.46	3.2	0.9	2.2	35.6	2.9	12.3	111.0	81.8	8.4	0.10	0.20	7.5	78.8
Omz	25-55	6.5	1.35	2.6	0.7	1.7	43.6	3.7	11.8	90.1	66.8	5.8	0.05	0.12	6.3	0.0
Wz	55-100+															

Chemical Characteristics / Particle Size Characteristics

Hor.	Depth cm	Soluble Salts ppm in saturation extract Ca	Mg	Na	K	Cl	SO_4-S	% Stone	Sand Fraction % V.C.S.	C.S.	M.S.	F.S.	V.F.S.	% Total Sand	% Silt	% Clay	Textural Class
Oh	0-5	212.5	34.4	30.7	2.0	117.2	55.8	0.0									Organic
Om	5-25	84.3	11.4	4.7	1.1	19.2	24.0	0.0									Organic
Omz	25-55	28.3	3.4	3.0	0.6	7.1	15.6	0.0									Organic
Wz	55-100+																

Table 26. Moisture characteristics, Mesic Organic Cryosol

Site: WZ-10
Location: 74°01'N & 93°27'W

Horizon	Depth cm	Moist. % by Vol.	Moist. % by Weight	Bulk Density g/cm^3
Oh	5	28.9	86.6	0.62
Om	18	31.3	102.0	0.62
Omz	23	58.1	215.6	0.78
Omz	30	91.7	255.9	1.17
Omz	50	91.8	274.1	1.14
Omz	77	92.2	204.8	1.26
Wz	96	98.7	3740.7	0.95

Table 27. Temperature profile, Mesic Organic Cryosol

Site: WZ-10
Location: 74°01'N & 93°27'W
Date: July 14, 1975

Horizon	Depth cm	Temperature °C
Oh	5	3.0
Om	10	3.0
Om	20	2.0
Om	25	0.0

Table 28. An example of the *Saxifraga-Salix* Community Type (Map symbol 2.4)

Site: VW6 Location: 72°58'N & 94°57'W

Site Descriptions: 3% E slope, moderately calcareous, moderately well drained sand

Vegetation Cover: 25%

Species	Domin Class
Carex rupestris	4
Dryas integrifolia	4
Stereocaulon spp.	4
Salix arctica	2
Saxifraga oppositifolia	2
Poa arctica	2
Rhacomitrium lanugionosum	2
Thamnolia spp.	2
Alectoria spp.	2
Umbilicaria spp.	2
Rhizocarpon geographicum	2
Polyblastia spp.	2

Table 29. An example of the *Cassiope-Cetraria* Community Type (Map symbol 2.8)

Site: VW5 Location: 72°58'N & 94°57'W

Site Descriptions: 6% E slope, moderately calcareous, moderately well drained sand

Vegetation Cover: 100%

Species	Domin Class
Rhacomitrium lanugionosum	8
Cassiope tetragona	7
Polyblastia spp.	5
Stereocaulon spp.	5
Cladonia spp.	5
Salix arctica	4
Thamnolia spp.	4
Carex rupestris	3
Pedicularis arctica	3
Cetraria deliesi	3
Alectoria spp.	3

Table 30. An example of the *Saxifraga-Polyblastia* Community Type (Map symbol 2.10)

Site: VW11 Location: 73°03'N & 94°05'W

Site Descriptions: 6% W slope, imperfectly drained, moderately calcareous sand

Vegetation Cover: 80%

Species	Domin Class
Dryas integrifolia	7
Stereocaulon paschale	7
Thamnolia vermicularis	3
Cetraria cucullata	3
Polyblastia spp.	3
Salix arctica	2
Saxifraga oppositifolia	2
Pedicularis arctica	2
Alectoria spp.	2
Cetraria delisei	2

Table 31. An example of the *Carex-Hierochloe* Community Type (Map symbol 3.1)

Site: VW3 Location: 72°58'N & 94°57'W

Site Descriptions: 6% S slope, imperfectly drained, weakly calcareous sand

Vegetation Cover: 90%

Species	Domin Class
Carex spp.	5
Salix arctica	5
Rhacomitrium lanuginosum	5
Dicranum spp.	4
Cladonia spp.	4
Thamnolia spp.	4
Stereocaulon spp.	4
Alectoria spp.	4
Polyblastia spp.	4
Dryas integrifolia	2
Hierochloe alpina	2
Arctagrostis latifolia	2
Alopecurus alpina	2
Polygonum viviparum	2
Cassiope tetragona	2
Tortula spp.	2

Table 32. An example of the *Carex-Drepanocladus* Community Type (Map symbol 3.2)

Site: VW4 Location: 72°58'N & 94°57'W

Site Descriptions: level, poorly drained moderately calcareous silt

Vegetation Cover: 100%

Species	Domin Class
Drepanocladus revolvens	9
Carex spp.	7
Distichium capillaceum	7
Calliergon giganteum	7
Dicranum spp.	6
Hierochloe alpina	2
Polygonum viviparum	2
Saxifraga hirculus	2
Pedicularis arctica	2
Cetraria spp.	2
Thamnolia spp.	2
Polyblastia sp.	2

Table 33. List of vascular plants collected on Somerset Island (Identified by W.S. Cody, Canada Department of Agriculture)

1. *Alopecurus alpinus* J.E. Smith
* 2. *Arctophila fulva* (Trin.) Anders.
3. *Arenaria rubella* (Wahlenb.) Sm.
* 4. *Arenaria sajanensis* Willd. (Mill.) Willd.
5. *Arctagrostis latifolia* (R.Br.) Griseb.
* 6. *Armeria maritima* ssp. *labradorica* (Wallr.) Hult.
7. *Braya purpurascens* (R.Br.) Bunge
8. *Cardamine bellidifolia* L. Wahlenb.
9. *Carex aquatilis* Wahlenb. var. *stans* (Dej.) Bott.
10. *Carex membranacea* Hook.
11. *Carex misandra* R. Br.
12. *Carex rupestris* All.
13. *Carex ursina* Dew.
14. *Cassiope tetragona* (L.) D. Don
15. *Cerastium alpinum* L.
16. *Cerastium beeringianum* Cham. & Schlecht
17. *Cerastium regelii* Ostf.
18. *Chrysosplenium tetradrum* (Lund) Fries
19. *Chrysanthemum integrifolium* Richards.
20. *Cochlearia officinalis* L. var. *groenlandica* (L.) Porsild
21. *Deschampsia brevifolia* R. Br.
*22. *Draba cinerea* Adams
23. *Draba corymbosa* R. Br. ex DC.
24. *Draba lactea* Adams
25. *Draba subcapitata* Simm.
26. *Dryas integrifolia* M. Vahl
27. *Dupontia Fisheri* R. Br.
28. *Epilobium latifolium* L.
*29. *Equisetum arvense* L.
30. *Equisetum variegatum* Schleich.

Table 33. Continued

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*31. *Eriophorum callitrix* Cham.
32. *Eriophorum Scheuchzeri* Hoppe
33. *Eriophorum triste* (Th. Fr.) Hadac & Love
34. *Eutrema Edwardsii* R. Br.
35. *Festuca baffinensis* Polunin
36. *Hierochloe alpina* (Sw.) R. & S.
37. *Hierochloe pauciflora* R. Br.
38. *Juncus biglumis* L.
39. *Luzula confusa* Lindeb.
40. *Luzula nivalis* (Laest.) Beurl.
41. *Lycopodium selago* L.
42. *Melandrium apetalum* (L.) Fenzl. var. *arctica* (Fr.) Hult.
43. *Oxyria digyna* (L.) Hill
44. *Papaver lapponicum* (Tolm.) Nordh. ssp. *occidentale* (Lundstr.)
45. *Parrya arctica* R. Br.
46. *Pedicularis arctica* R. Br.
47. *Pedicularis capitata* Adams
48. *Pedicularis hirsuta* L.
49. *Pedicularis lanata* Cham. & Schlecht.
50. *Pedicularis sudetica* Willd.
51. *Phippsia algida* (Sol.) R. Br.
52. *Pleuropogon sabinei* R. Br.
53. *Poa abbreviata* R. Br.
*54. *Poa alpigena* (Fr.) Lindm. var. *colpodea* (Fr.) Sol.
*55. *Poa alpina* L.
56. *Poa arctica* R. Br.
*57. *Poa glauca* Vahl
58. *Polygonum viviparum* L.
59. *Potentilla hyparctica* Malte
60. *Potentilla pulchella* R. Br.
61. *Potentilla rubricaulis* Lehm.

Table 33. Continued

62. *Ranunculus hyperboreus* Rottb.
63. *Ranunculus sulphureus* Sol.
64. *Salix arctica* Pall.
65. *Salix reticulata* L.
66. *Saxifraga caespitosa* L.
67. *Saxifraga cernua* L.
68. *Saxifraga flagellaris* Willd. ssp. *platysepala* (Trautv.) Pors.
69. *Saxifraga hieracifolia* Waldst. & Kit.
70. *Saxifraga hirculus* L.
71. *Saxifraga nivalis* L.
72. *Saxifraga oppositifolia* L.
73. *Saxifraga rivularis* L.

*74. *Saxifraga tenuis* Sm.

75. *Saxifraga tricuspidata* Rottb.
76. *Silene acaulis* L. var. *exscapa* (All.) DC.
77. *Stellaria humifusa* Rottb.
78. *Stellaria crassipes* Hult.
79. *Stellaria laeta* Richards.
80. *Taraxacum phymatocarpum* J. Vahl
81. *Woodsia glabella* R. Br.

* Indicates species not previously reported (Savile 1959).

Table 34. List of vascular plants collected on Prince of Wales Island (Identified by W.S. Cody, Canada Department of Agriculture)

1. *Arctagrostis latifolia* (R.Br.) Griseb.
* 2. *Carex aquatilis* Wahlenb. var. *stans* (Dej.) Bott.
3. *Carex membranacea* Hook.
* 4. *Carex misandra* R. Br.
5. *Cochlearia officinalis* L. var. *groenlandica* (L.) Porsild
6. *Dryas integrifolia* M. Vahl
* 7. *Dupontia Fisheri* R. Br.
8. *Equisetum variegatum* Schleich.
9. *Eriophorum Scheuchzeri* Hoppe
10. *Eriophorum triste* (Th. Fr.) Hadac & Love
11. *Festuca baffinensis* Polunin
12. *Papaver lapponicum* (Tolm.) Nordh. ssp. *occidentale* (Lundstr.)
*13. *Poa alpigena* (Fr.) Lindm. var. *colpodea* (Fr.) Sol.
*14. *Poa arctica* R. Br.
15. *Polygonum viviparum* L.
16. *Ranunculus suphureus* Sol.
17. *Salix arctica* Pall.
18. *Saxifraga caespitosa* L.
19. *Saxifraga flagellaris* Willd. ssp. *platysepala* (Trautv.) Pors.
20. *Saxifraga nivalis* L.
*21. *Saxifraga oppositifolia* L.
22. *Taraxacum phymatocarpum* J. Vahl

* Indicates species not previously reported (Porsild 1964).

Table 35. List of vascular plants collected on Somerset Island by Savile (1959), but not encountered in present study

1. *Arnica alpina* L. Olin ssp. *angustifolia* (Vahl) Maguire
2. *Arenaria Rossii* R. Br.
3. *Campanula uniflora* L.
4. *Cardamine pratensis* L. var. *angustifolia* Hook.
5. *Carex amblyorhyncha* Krecz.
6. *Chrysosplenium iowense* auctt.
7. *Cystopteris fragilis* (L.) Bernh.
8. *Draba Bellii* Holm.
9. *Draba nivalis* Liljebl.
10. *Draba oblongata* R. Br.
11. *Draba groenlandica* Fl. Ekman.
12. *Empetrum nigrum* L.
13. *Eriophorum angustifolium* Honck.
14. *Festuca brachyphylla* Schultes
15. *Kobresia myosuroides* (Vill.) Fiori & Paol.
16. *Melandrium triflorum* (R.Br.) J. Vahl.
17. *Poa arctica* R. Br. var. *vivipara*
18. *Potentilla nivea* L.
19. *Potentilla Vahliana* Lehm.
20. *Puccinellia angustata* (R.Br.) Rand & Redf.
21. *Puccinellia Bruggemannii* Th. Spr.
22. *Puccinellia phryganodes* (Trin.) Scribn. & Merr.
23. *Ranunculus nivalis* L.
24. *Ranunculus pygmaeus* Wahlenb.
25. *Salix Richardsonii* Hook.
26. *Saxifraga foliolosa* R. Br.
27. *Taraxacum hyparcticum* Dahlst.
28. *Taraxacum pumilum* Dahlst.
29. *Trisetum spicatum* R. Br.

Table 36. List of mosses collected on Somerset Island (Identifications were made by Dr. D.H. Vitt, University of Alberta.)

1. *Andreaea rupestris* Hedw.
2. *Aulacomnium turgidum* (Wahlenb.) Schwaegr.
3. *Blindia acuta* (Hedw.) B.S.G.
4. *Bryum cryophilum* Mart.
5. *Bryum pseudotriquetrum* (Hedw.) Schwaegr.
6. *Calliergon giganteum* (Schimp.) Kindb.
7. *Calliergon sarmentosum* (Wahlenb.) Kindb.
8. *Campylium arcticum* (Williams) Broth.
9. *Catoscopium nigritum* (Hedw.) Brid.
10. *Cinclidium arcticum* (B.S.G.) Schimp.
11. *Cirriphyllum cirrosum* (Schwaegr. ex Schulres) Grout
12. *Cratoneuron filicinum* (Hedw.) Spruce
13. *Dicranoweisia crispula* (Hedw.) Milde.
14. *Dicranum elongatum* Schwaegr.
15. *Didimodom asperifolius* (Mitt.) Crum, Steere & Anderson
16. *Distichium* cf. *capillaceum* (Hedw.) B.S.G.
17. *Ditrichum flexicaule* Schwaegr.
18. *Drepanocladus brevifolius* (Lindb.) Moenk
19. *Drepanocladus revolvens* (Sw.) Warnst.
20. *Encalypta rhaptocarpa* Schwaegr.
21. *Encalypta alpina* Sm.
22. *Gymnostomum recurvirostrum* Hedw.
23. *Hylocomium splendens* (Hedw.) B.S.G.
24. *Hygrohypnum polare* (Lindb.) Loeske
25. *Hypnum bambergeri* Schimp.
26. *Hypnum vaucheri* Lesq.
27. *Lyella aspera* (Hag. & C. Jens.) Frye
28. *Myurella julacea* (Schwaegr.) B.S.G.
29. *Orthothecium chryseum* (Schultes) B.S.G.
30. *Philonotis fontana* var. *pumila* (Turn.) Brid.

Table 36. Continued

31. *Pogonatum alpinum* (Hedw.) Roehl.
32. *Pseudoleskeela nervosa* (*Leskeela nervosa*) (Brid.) Loeske
33. *Psilopilum cavifolium* (Wils.) Hag.
34. *Rhacomitrium lanuginosum* (Hedw.) Brid.
35. *Rhacomitrium sudeticum* (Funck) Bauer
36. *Scorpidium turgescens* (T. Jens.) Loeske
37. *Tomenthypnum nitens* (Hedw.) Loeske
38. *Tortella arctica* (Arnell) Grundw. & Nyh.
39. *Tortula mucronifolia* Schwaegr.
40. *Tortula ruralis* (Hedw.) Gaertn., Myer & Scherb.

Table 37. List of liverworts collected on Somerset Island (Identifications were made by Dr. D.H. Vitt, University of Alberta.)

1. *Anastrophyllum minutum* (Schrab. ex Cranz) Schust.
2. *Blepharostoma trichophyllum* (L.) Dum.
3. *Gymnomitrion corallioides* Leberm.
4. *Scapania simmonsii* Bryhn & Kaal.

Table 38. List of lichens collected on Somerset Island (Identifications were made by Dr. D.H. Vitt, University of Alberta.)

1. *Alectoria ochroleuca* (Hoffm.) Mass.
2. *Alectoria pubescens* (L.) R.H. Howe
3. *Cetraria cucullata* (Bell) Ach.
4. *Cetraria delisei* (Bory ex Schaer.) Th. Fr.
5. *Cetraria nivalis* (L.) Ach.
6. *Cetraria tilesii* Ach.
7. *Cladina mitis* (Sandst.) Hale & W. Culb.
8. *Cladonia pyxidata* (L.) Hoffm.
9. *Dactylina arctica* (Hook.) Nyl.
10. *Lecanora epibryon* (Ach.) Ach.
11. *Lecanora verrucosa* Ach.
12. *Lecidea decipiens* (Hedw.) Ach.
13. *Lecidea dicksonii* (Gmel.) Ach.
14. *Lecidea melinodes* (Korb.) Magn.
15. *Parmelia centrifuga* (L.) Ach.
16. *Peltigera aphthosa* (L.) Willd.
17. *Peltigera canina* (L.) Willd.
18. *Polyblastia* spp.
19. *Rhizocarpon disporum* (Naeg. ex Hepp.) Mull. Arg.
20. *Rhizocarpon geographicum* (L.) DC.
21. *Sarcogyne simplex* (Dav.) Nyl.
22. *Solorina crocea* (L.) Ach.
23. *Stereocaulon paschale* (L.) Hoffm.
24. *Thamnolia vermicularis* (Sw.) Ach. ex Schaer.