Canada

Soils of the Avalon Peninsula, Newfoundland

Report No. 3 | Newfoundland Soil Survey | 1981

Agriculture Canada

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P.K. Heringa
Research Station,
St. John's West, Newfoundland

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RESEARCH BRANCH,
AGRICULTURE CANADA
1981

Land Resource Research Institute,
Publication 113

SOIL REPORT No. 3. Available from Research Station, Research Branch, Agriculture Canada, P.O. Box 7098, St. John's West, Newfoundland, A1E 3Y3

Cat. No. A57–112/1981E   ISBN: 0-662-11542-2
Printed 1981   3.5M–9:81

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ACKNOWLEDGMENTS

The soil survey for the Avalon Peninsula was conducted as part of the activities of the Research Station, Agriculture Canada, St. John's West, under the direction of H. W. R. Chancey.

Contributions from the following persons are gratefully acknowledged: Dr. D. B. Cann and J. L. Nowland for soil correlation and guidance in compiling and editing the report; Mrs. A. P. Fagan for laboratory analyses; Mrs. G. Greenlee for drafting the soil maps; C. H. Butler for compilation of area measurements; J. A. Ivany, B. J. Sullivan, W. L. Morris, and R. A. Wishart for their assistance in the field; and the staff of the Research Station for advice and technical assistance.

Special thanks to Dr. F. C. Pollett, A. F. Rayment, and B. B. Delaney for writing the sections on peatlands flora, agricultural potential of peatland soils, and forest capability.

The soil maps were prepared by the Cartography Section, Land Resource Research Institute, Agriculture Canada, Ottawa.

SUMMARY

The Avalon Peninsula occupies the southeastern part of the island of Newfoundland and is joined to it by an isthmus. The Peninsula has a land area of about 9835 km^2, or 972 400 ha.

The Peninsula was well known to fishermen from Europe before the fifteenth century, but no settlements were established until 1610. The early economic history of the province was closely related to the varying success of the cod fishery, and therefore the Peninsula experienced a series of booms and depressions. Since Newfoundland became a province of Canada in 1949 attention has been directed toward industrial development and improvement in farming and fishing on the Peninsula.

About 40% of the population of the province lives on the Avalon Peninsula, with the majority around St. John's, the capital of the province and one of the main shipping ports. The Peninsula is well supplied with transportation facilities by road, rail, sea, and air.

The climate of the Peninsula is strongly influenced by the ocean. The Labrador current keeps the air cool in spring and summer and the presence of sea ice along the coast until late spring or early summer delays the planting season. Summers are short but pleasant. July temperatures are 13–16°C. Coastal fog is common throughout the year. Winters are usually mild, with temperatures of −4°C to 2°C from December to February. Precipitation is 100–165 cm and is evenly distributed throughout the year. The growing season is about 150–160 days.

The Peninsula is a highland area surrounding a large central lowland. The highland surface is rough and rugged, whereas that of the lowland is ridged and hummocky. Much of the coastline rises abruptly from the sea and is indented with numerous bays and inlets, some of which make good harbors. Many rivers drain the highlands and there are several lakes. About 9% of the area is covered by water.

Nearly 40% of the Peninsula is forested. The main trees are balsam fir, black spruce, white spruce, and tamarack, along with some white and yellow birch and alder.

The soils of the Peninsula have developed from materials derived from the underlying slate, siltstone, sandstone, shale, limestone, conglomerate, and granitic and volcanic rocks. The whole area was glaciated and the materials were deposited in the form of ground moraine, outwash, and other glaciofluvial deposits. Some of the present streams have deposited alluvial sediments along their courses.

Most of the mineral soils are coarse to moderately coarse textured, stony, acid to extremely acid, and low in natural fertility. They belong mainly to the Humo-Ferric and Ferro-Humic Podzol great groups and some are Humic Podzols. Some of the soils have a thin iron or manganese pan in the profile. Where the parent materials are fine to moderately fine textured, the soils are less leached and have a profile typical of the Dystric Brunisol great group. Gleysolic soils with dull-colored, mottled profiles and organic soils are found in poorly drained positions.

About 28% of the mineral soils are unsuitable for agriculture because of excessive stoniness, unfavorable topography, or wetness. Of the remainder, the soils in Classes 3–5 occupy only 0.1% and those in Classes 4–6, about 1.2% of the area. No Class 1 or 2 soils occur on the Peninsula. Most of the farming is done on the Cochrane soils, which range in capability from Classes 4 to 7, and occupy 19% of the area. A number of small areas are suitable for growing crops, and in some places, large areas are suitable for grazing when they are properly managed.

Organic soils occupy nearly 13% of the area. Some of these soils can be developed for agriculture, and experiments have shown that they are capable of producing good crops of vegetables when proper management practices are followed.

The best forest stands are found in the central part of the Peninsula. The main limiting factors to forest growth are exposure to wind, stoniness, depth to bedrock, and wetness. In some soils, frost heaving makes it difficult or impracticable to grow trees.

Many areas of the Peninsula have considerable potential for recreation. Some of these areas have been developed as provincial parks.

INTRODUCTION

The soil survey of the Avalon Peninsula was started in the fall of 1963 to determine the nature of the soils, their extent and location in the area, and their capability for agriculture. The survey required examination, description, and mapping of the soils in the field; a vegetation survey; and observations of bedrock, climate, streams, and ponds.

The first part of the report gives a brief description of the area—its location, transportation, and communication facilities—and it is followed by a discussion of the environmental factors that produced the soils and influence their suitability for use. A brief explanation of how the soils were mapped and classified is also included.

The main part of the report describes the characteristics and classification of the soil map units and their suitability for use. A section on land use discusses the suitability of the soils for agriculture and forestry.

Detailed descriptions of profiles representative of each soil map unit, analytical data, a discussion of soil formation processes on the Peninsula, and a list of the main plants found in the area are given in the Appendix.

Soil maps on a scale of 1:100 000 accompany this report. The maps were prepared before the report was written. The report therefore incorporates recent changes in classification and new data acquired after the maps were prepared.

HOW TO USE THE SOIL MAPS AND REPORT

The soil maps accompanying this report show the location and area of various kinds of soil. Each delineation, which is an area enclosed by a line, represents an area that is characterized by a symbol on the map. The symbol designates the name of the dominant soil series, or combination of soil series, as well as the topography and stoniness of the area. The map legend gives the soil name designated by each of these symbols and describes the material from which the soil was formed, the drainage, and the classification of the soil, as well as other information pertinent to its use. It also explains how to interpret the map symbol shown on each area.

To use the map, first locate the area in which you are interested. Features such as roads, rivers, lakes, or population centers are helpful in locating the area. Note the symbol, or symbols, shown on the area and refer to these in the legend to obtain the name of the soil. Further information on the soil can be obtained by reading the description of the soil in the soil survey report and the sections covering the uses of the soil.

Each soil has a range of properties, and the boundaries between soils are not necessarily sharp. Soils tend to grade from one kind to another on the landscape, so that within any delineated area all profiles are not exactly alike. The boundaries between soils are drawn so that the soils in one area have as many properties as possible in common and differ from the soils in adjacent areas. Within some soil areas, other soils may occur whose areas are too small or so intermingled with the dominant soil that they cannot be shown separately at the scale of the map. In such cases, the area is mapped as a complex.

Additional information concerning the organization, climate, physiography, and vegetation of the area may be found in the section of the report entitled "General description of the area."

PART I GENERAL DESCRIPTION OF THE AREA

Location and extent

The Avalon Peninsula, including the isthmus, occupies the southeast part of the island of Newfoundland. It is located between 46° 30′ and 48° 10′ north latitude, and between 52° 40′ and 54° 10′ west longitude. The Peninsula is bordered by Trinity Bay and Conception Bay on the north, the Atlantic Ocean on the east, St. Mary's Bay and Trepassey Bay on the south, and Placentia Bay on the west. The Avalon Peninsula has an area of 9835 km^2.

History and population

The Avalon Peninsula was well known to fishermen from Europe before John Cabot landed there in 1497. These fishermen dried their catches along the coast during the summer and returned to Europe in the winter. For many years settlement was discouraged, but between 1610 and 1630, English settlements were established at Cupids on Conception Bay and at Ferryland on the east coast. French settlers established a colony at Placentia in 1662.

During the next 50 years, England and France vied for possession of the island until the Treaty of Utrecht, in 1713, gave the English sovereignty over Newfoundland. From 1729 to 1817 Newfoundland was governed by personnel from the Royal Navy on a seasonal basis. The province was not recognized as a colony until 1824.

The history of the province and the Peninsula is directly related to the success of the cod fishery. There were prosperous periods followed by depressions. The War of 1812 brought prosperity to St. John's and surrounding areas. Settlement restrictions were relaxed and, in 1814, more than 11 000 immigrants from Ireland landed in St. John's.

A collapse of fish prices after the war resulted in economic depression. A permanent civil governor was appointed, who promoted the building of roads and public buildings and encouraged the development of farming and education. Responsible government was granted in 1853.

Another prosperous period occurred between 1870 and 1875. In 1881, a railway was begun between St. John's and St. George's Bay. It was extended to Port aux Basques in 1897. In 1892, a large part of St. John's was destroyed by fire. Two years later, the two leading banks failed and the currency became valueless. Union with Canada was proposed at this time and again during World War I, but the change was resisted.

After the economic depression in 1929, responsible government was abandoned and in 1934 Newfoundland reverted to colonial status under a Commission of Government appointed by Britain. During World War II the province and the Peninsula experienced another period of prosperity.

About 40% of the population of Newfoundland lives on the Avalon Peninsula. St. John's is the capital and largest city in the province. Smaller centers of population on the Peninsula include Carbonear, Harbour Grace, Wabana, Avondale, Portugal Cove, Pouch Cove, St. Bride's, Long Harbour, and Petty Harbour.

Transportation and services

The Avalon Peninsula is well supplied with roads. St. John's is connected by a paved highway to Port aux Basques on the west coast of the province. This highway generally follows the route of the railway and passes through many towns in central and western Newfoundland. From Port aux Basques, a ferry crosses to Nova Scotia. Other roads, some paved, link St. John's with the settlements along the coast and inland. Branch rail lines connect Carbonear, Argentia, and Placentia Junction with the main line at Brigus Junction. Bus service is provided between St. John's and the west coast of Newfoundland.

Because the Peninsula is nearer to Europe than any other part of North America, St. John's is a busy shipping port. St. John's services foreign fishing fleets and has freighter connections with Montreal, Toronto, and Halifax. Coastal steamers operating from St. John's service many of the small ports along the coast. Also, a ferry operates from Argentia to the mainland of Newfoundland. Several good harbors are located along the coast.

Air services by Air Canada and Eastern Provincial Airways from the airport at Torbay connect the Peninsula with the major cities of Canada and abroad as well as with smaller centers in the province and the north.

Since 1949 the Avalon Peninsula has benefited from improved highways, communication systems, and industrial development; the expansion of educational and recreational facilities; and the application of new technology to farming and fishing. The good educational facilities on the Peninsula include the Memorial University of Newfoundland, located in St. John's on a new campus that was opened in 1961.

Butter Pot Park on the Peninsula is the largest provincial park in Newfoundland.

Climate

The climate of Newfoundland is dominated by the ocean and, to a much lesser extent, by the North American continent. The Labrador current, which consists partly of arctic water, encircles the Avalon Peninsula with cold water in spring and summer, but with fairly warm and saline water in winter.

In spring, sea ice along the coast often keeps water temperatures close to freezing and delays the growing season until late May. The pack ice is at its peak in March. The warm air masses approaching the island are chilled by the ice, and the sun is not strong enough to dispell the chill entirely. The sea ice begins to break up in April, but disintegrating parts of the pack ice may lie off the northeast coast until June or even July. These ice conditions vary, but mild winters with no sea ice are not uncommon.

The summers are short, but pleasant, with much cooler temperatures prevailing along the coast than farther inland on the Peninsula. The average air temperature in July is 13–16°C for most of the area, with an average of slightly above 16°C in the central part of the Peninsula and 13°C in the south near Trepassey. The area around Trepassey is affected by fog and moisture carried inland by onshore winds, which blow off the cold Labrador current during the summer.

The average dates of frost and the number of frost-free days for three locations on the Peninsula are given in Table 1. The growing season (mean air temperature above 6°C) begins in the Trepassey area about 30 May and lasts about 150 days. In the central part of the Peninsula this season begins about 15 May and lasts nearly 160 days. In the autumn the temperatures decline rapidly, but except for occasional frosty nights remain above freezing.

The winters are mild, and the average monthly temperatures from December to February are between −4°C and 2°C. Extremely cold periods seldom occur and temperatures near −20°C are an exception.

Table 2 shows the average monthly total precipitation, snowfall, and temperatures at Argentia, Colinet, and St. John's airport. The total mean annual precipitation is 165 cm at Cape Race in the southwest corner of the Peninsula, 155 cm at St. John's, 140 cm at Colinet, and 102 cm at Argentia. The precipitation is fairly evenly distributed throughout the year, but is usually heaviest in winter, with a decline during the late winter and early spring. Summer is the driest period. Summer rains are usually heavier, of shorter duration, and less frequent than during the rest of the year. The precipitation increases in the autumn and in the early winter.

Table 1. Average dates of frost and number of frost-free days at three locations on the Avalon Peninsula

Location	Elevation, m	Average dates		Frost-free period, days			No. of years recorded
		Last spring frost	First fall frost	Average	Longest	Shortest	
Argentia	17	11 May	11 Nov.	184	216	162	10
Colinet	20	6 June	16 Sept.	102	136	76	18
St. John's airport	141	2 June	10 Oct.	130	156	86	27

Table 2. Average monthly temperature, total precipitation, and snowfall at three locations in the Avalon Peninsula

	Argentia			Colinet			St. John's		
	Temperature, °C	Precipitation		Temperature, °C	Precipitation		Temperature, °C	Precipitation	
		Total, cm	Snow, cm		Total, cm	Snow, cm		Total, cm	Snow, cm
January	−1.7	10.2	51.6	−3.3	14.0	51.3	−4.2	15.3	76.5
February	−2.6	9.7	49.5	−3.5	12.4	53.3	−4.6	16.3	92.7
March	−1.0	7.9	40.1	−1.3	10.9	43.2	−3.9	13.5	72.6
April	2.3	6.9	11.2	1.8	9.1	17.8	1.1	12.1	34.1
May	5.5	6.4	4.1	5.7	10.4	3.8	5.6	9.9	9.1
June	9.1	6.4		9.8	9.4		10.3	9.4	1.0
July	14.0	8.1		14.5	10.9		15.3	8.9	
August	15.5	7.6		9.8	9.7		15.4	10.2	
September	12.6	7.6		11.7	9.9		12.0	12.0	
October	8.7	9.1	1.5	7.7	12.7	1.0	6.6	13.8	2.0
November	5.0	11.4	4.6	4.0	15.5	5.1	2.9	16.3	18.5
December	0.7	11.2	32.3	−0.2	14.5	30.2	−1.6	17.4	73.2
Total	5.7	102.4	194.8	5.2	139.4	205.7	4.7	154.9	380.0
No. of years recorded	18	18	10	18	18	10	29	29	29

Snowfall is heavy in the latter part of December and lasts until early April. Traces of snow have been recorded in May, October, and November.

The wind has an important cooling effect that contributes to evaporation. Prevailing southwesterly and westerly winds are important to the climate and growing conditions of many crops and trees in the Avalon Peninsula. The mean annual windspeed at Torbay airport from 1942 to 1968 was 25 km/h. Table 3 gives the average monthly windspeed and the prevailing monthly wind direction at Torbay.

Cloud cover reduces the amount of direct sunshine, and the amount of cloud cover and fog is high on the Peninsula. Table 4 shows that there is little variation in cloudiness throughout the year, but the months of May to September are sunnier than the rest of the year. The figures for bright sunshine indicate a maximum of 224 h sunshine in July, decreasing to a low of 57 h in December.

Table 3. Prevailing wind direction and average windspeed at Torbay (1942–68)

	Windspeed, km/h	Prevailing direction
January	29.9	W
February	27.4	W
March	26.9	W
April	25.1	SW
May	23.4	SW
June	22.5	SW
July	21.6	SW
August	23.6	SW
September	22.8	SW
October	25.4	W
November	25.9	SW
December	27.4	W
Annual average	24.8	SW

Table 4. Cloud cover and hours of sunshine

	Cloudiness, in tenths*	Bright sunshine, h†
January	7.1	69.3
February	7.1	78.1
March	6.6	92.2
April	7.0	114.2
May	6.7	165.9
June	6.1	195.9
July	6.1	223.9
August	5.7	190.6
September	5.9	155.4
October	6.6	110.6
November	7.4	64.7
December	7.2	56.5
Annual average	6.6	Total 1517.3

* Cloudiness observations were made two or three times a day at St. John's airport (Torbay), 1931–60.
† Hours of bright sunshine were recorded at the Research Station, St. John's West, 1951–70.

Topography

The Avalon Peninsula is part of the Atlantic uplands of Newfoundland and is the lower part of an ancient peneplain that slopes in a southeasterly direction. The surface is preglacial. It has been only slightly modified by glaciation except in places where glacial deposits have filled old basins and smoothed the topography or slightly increased the relief.

The Peninsula may be regarded as a highland area surrounding a central lowland. In general, the arms of the Peninsula form the highlands. A large central lowland and smaller lowlands on the east side of Trinity Bay and the southeast coast of Conception Bay extend between St. Mary's Bay and Conception Bay. In a few places the uplands are rocky and rugged, but generally they are a rolling plain of low relief.

A barren, irregular, and knobby topography predominates on the isthmus and the adjacent part of the Peninsula. Rock outcrops are common and many small to large organic deposits occur. In the eastern part of the isthmus, the ridges are rounded, except for prominent ridges near Chapel Arm. The elevations are 60–120 m above sea level, with a few small areas between 198 and 213 m. The coastline rises abruptly from the sea and is indented with many inlets.

In the southwestern part of the Peninsula, between Placentia Bay and St. Mary's Bay, the coastline is generally steep and rugged with cliffs 30–60 m high, except at the northern end of St. Mary's Bay. Here the topography slopes more gently. In the interior, hills 300 m high are found between Placentia and Markland. Extensive areas of organic soils occur in the south and southwestern parts of this area, and along the western shore of St. Mary's Bay.

The northwestern arm of the Peninsula between Trinity Bay and Conception Bay has a rough topography with elevations of 61–240 m and large areas of exposed bedrock. Much of the shoreline of Conception Bay is formed by cliffs a few metres high to more than 60 m. The southwestern shore of Conception Bay is broken by many inlets and bays. Some of these inlets extend inland to form prominent valleys in a rolling, rugged plateau, which is 240 m high, west of Spaniard's Bay. The eastern and central part of this arm is largely barren, with dry, rocky, and stony uplands interspersed with lakes and organic deposits. The western side of the arm, except for a ridge west of New Harbour, consists of low, rolling hills with a few bedrock ridges. It slopes gently westward to the shore of Trinity Bay.

The central part of the Peninsula, between Conception Bay and St. Mary's Bay, is a lowland composed of a series of rounded hills less than 15 m high, interspersed with numerous lakes and organic deposits that are sometimes 9 m but usually less than 3 m deep. From

Conception Bay the surface rises gradually southwestward to a barren, knobby upland 152–315 m above sea level. The area southwest of Conception Bay has many lakes and low, rolling morainic ridges (recessional moraine) that trend southwestward and separate many of the lakes.

In the eastern part of the Peninsula, the precipitous east coastline of Conception Bay and the Atlantic coast are in marked contrast with the relatively smooth coastal plain that slopes toward the southeastern shore of Conception Bay. On the Atlantic coast there is an almost continuous exposure of bedrock from Pouch Cove to as far south as Renews. A rough plateau with organic soils, lakes, and streams extends south and southwest of Renews. Isolated rock outcrops and some hills with an elevation of 300 m rise above the generally rolling, stony, and barren surface.

More gently sloping barren hills and gently rolling heath barrens, with some large and small organic soil deposits, extend around Trepassey and the east coast of St. Mary's Bay. The shoreline in this area is not as rugged as elsewhere on the Peninsula.

Drainage

An abundance of precipitation and cool temperatures are responsible for the large amounts of moisture available for vegetation. Large amounts of water are carried away to the sea. A few large and many small streams drain the area. The majority of the rivers have their source in the uplands of the eastern part of the Peninsula, whereas others flow from the central part of the area. Many small streams drain the highlands in the southwestern and northeastern areas of the Peninsula. The larger streams include the Salmonier, Crossing Place, Northeast, Southeast, Peter's, Manuels, and Rocky rivers and Northwest Brook (Fig. 1).

The streams are clear, small, and swift and have various gradients. Rock ledges with rapids and small falls are common. The Rocky River and the lower reaches of the Salmonier River and Peter's River do not have as steep gradients as other streams and have wide estuaries with sand and gravel deposits near the sea.

There are numerous lakes, especially southwest of Conception Bay. A total of 91 988 ha or 9% of the surface of the Peninsula is covered with water. Some of this water is utilized in a dozen small generating plants, which produce 50 megawatts of electrical power.

The many slopes throughout the area are not uniform, but contain various small depressions or basins. The drainage in these depressions depends on the porosity of the soil, the steepness of the slope, the porosity and stoniness of the subsoil, and the presence or absence of bedrock. The surface soils are generally porous; even heavy rainfalls are rapidly drained away. The subsurface movement of moisture through most soils is extensive and results in excessive moisture at or near the feet of hills or in basins or depressions where water accumulates from higher areas. In some areas, where the subsoil is impermeable or bedrock is close to the surface, the moisture may accumulate in small depressions on the slope causing poorly drained soils. Thus drainage conditions in the soil may vary markedly over small areas (Fig. 2).

The origin and nature of the soil-forming materials

The Avalon Peninsula is underlain mainly by Precambrian rocks. Cambrian rocks can be found near the south shore of Conception Bay, the eastern and southern shores of Trinity Bay, south of Trinity Bay, in the southwestern part of the Peninsula near the shore of Placentia Bay, and near the shore of St. Mary's Bay (Fig. 3).

The oldest formaton, the Harbour Main group of Hadrynian age, comprises intermediate to acidic volcanic rocks with interbedded flinty siltstone, slate, greywacke, coarse conglomerate, and metamorphic equivalents. The Harbour Main group is unconformably overlain by a thick sequence of Precambrian sedimentary rocks of the Conception, Hodgewater, and Musgravetown groups.

The Conception group is composed of green to greenish gray fine-grained argillaceous rocks, with some sandstone, siltstone, and some red slate and siltstone near the top of the formation. Chlorite is common in most of this material.

The Hodgewater and Musgravetown groups consist of gray to black slate, gray to green or red siltstone and sandstone, and red and green conglomerate. The rocks are coarser, less well sorted, and more arkosic than those of the underlying Conception beds. The Hodgewater group is probably late Proerozoic in age.

The area north, east, and south of St. John's is characterized by mainly red sandstone, red conglomerate, and greenish gray sandstone of the Cabot group.

Bodies of the Holyrood batholith intrude into the Harbour Main and Conception groups. They consist mainly of granodiorite, quartz monzonite, granite, quartz diorite, diorite gabbro, and monzonite.

The Random formation overlies the Hodgewater and Musgravetown beds. It is composed largely of white quartzite, quartz pebble conglomerate, and some red and green arkose.

The Cambrian rocks are black, gray, and green shale and slate, with some limestone nodules and manganiferous beds. They overlie red and pale green slate with some limestone and conglomerate. Small beds of diabasic gabbro are located in the western part of the Peninsula.

Bell Island is composed of Lower Ordovician sandstone, shale, beds of colite, hematite, pyrite, and phosphatic pebbles.

The Avalon Peninsula was glaciated throughout the Wisconsin period of the Pleistocene age. Glaciation took place at least once and probably several times during this period. There is abundant evidence that the ice completely glaciated the Peninsula. Remnants of an older till on the east side of the Waterford River, south of St. John's, and in the area northwest of Long Pond, northeast of Ship Cove, and elsewhere indicate a glaciation earlier than that which laid down the present till, which is found throughout the Peninsula. No indication of weathering of the earlier till is evident, and no organic or weathered material has been observed between the tills. The two tills may be evidence of only two phases of the last Wisconsin glacial stage.

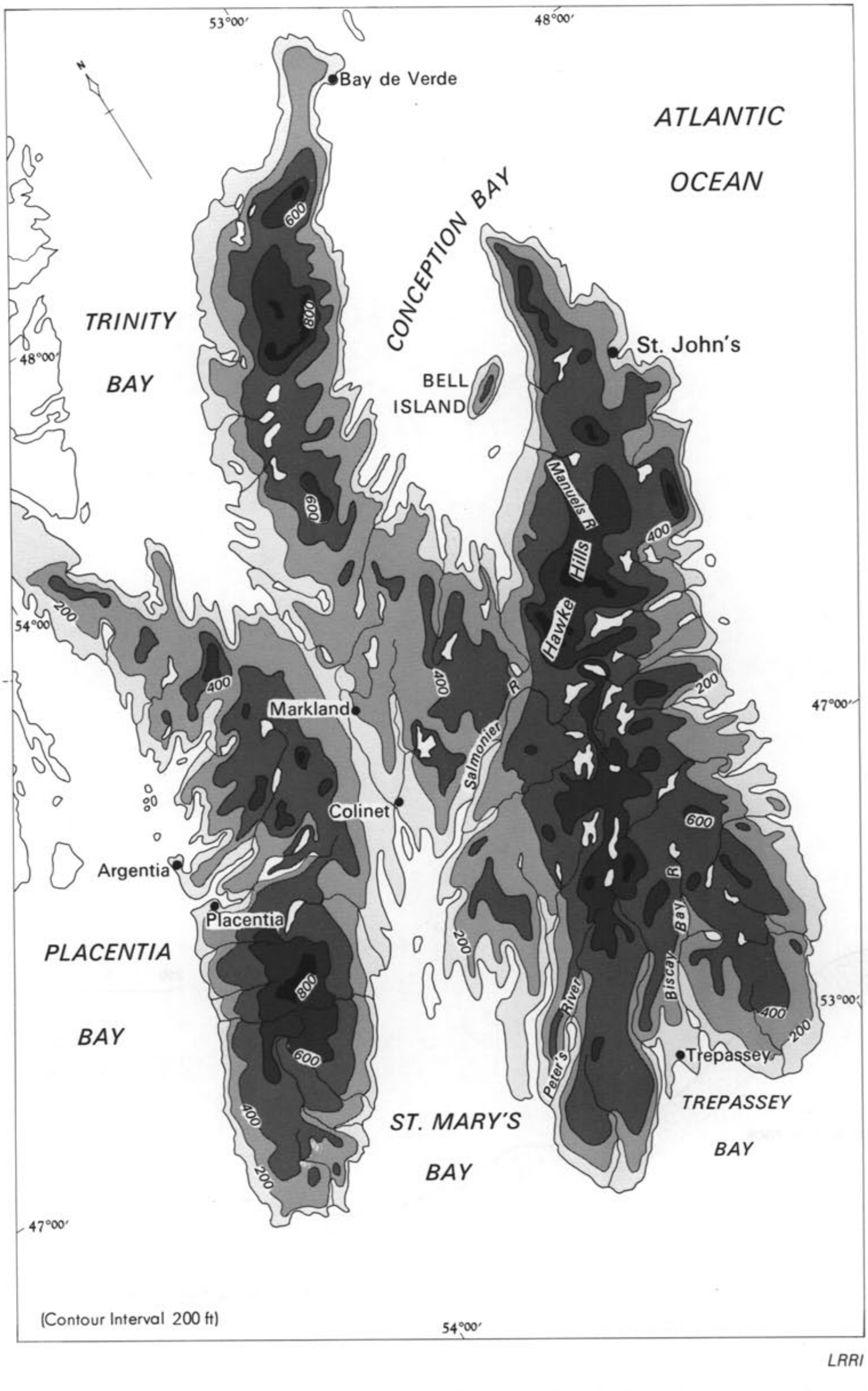

Fig. 1. Topography and drainage of the Avalon Peninsula.

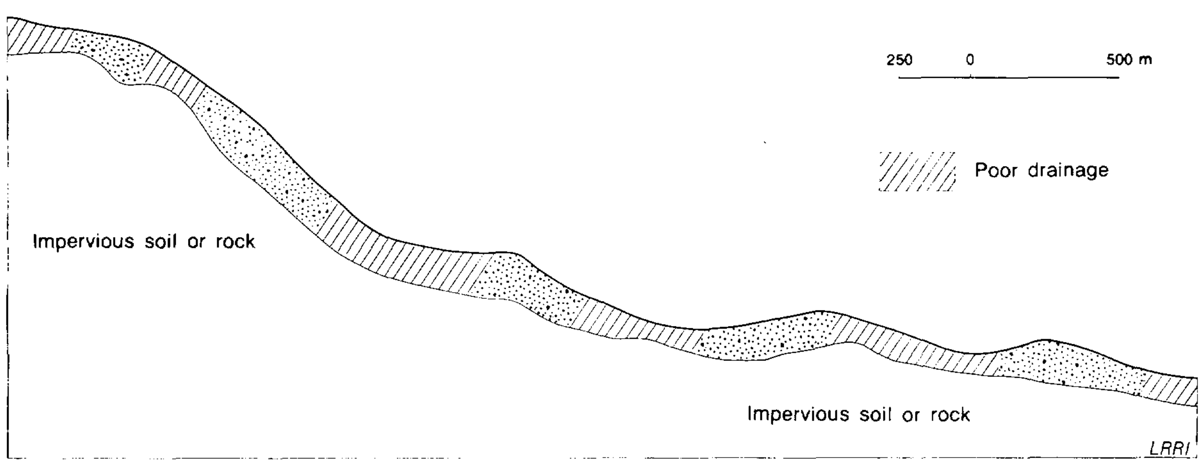

Fig. 2. Typical occurrence of poorly drained soil on sloping terrain.

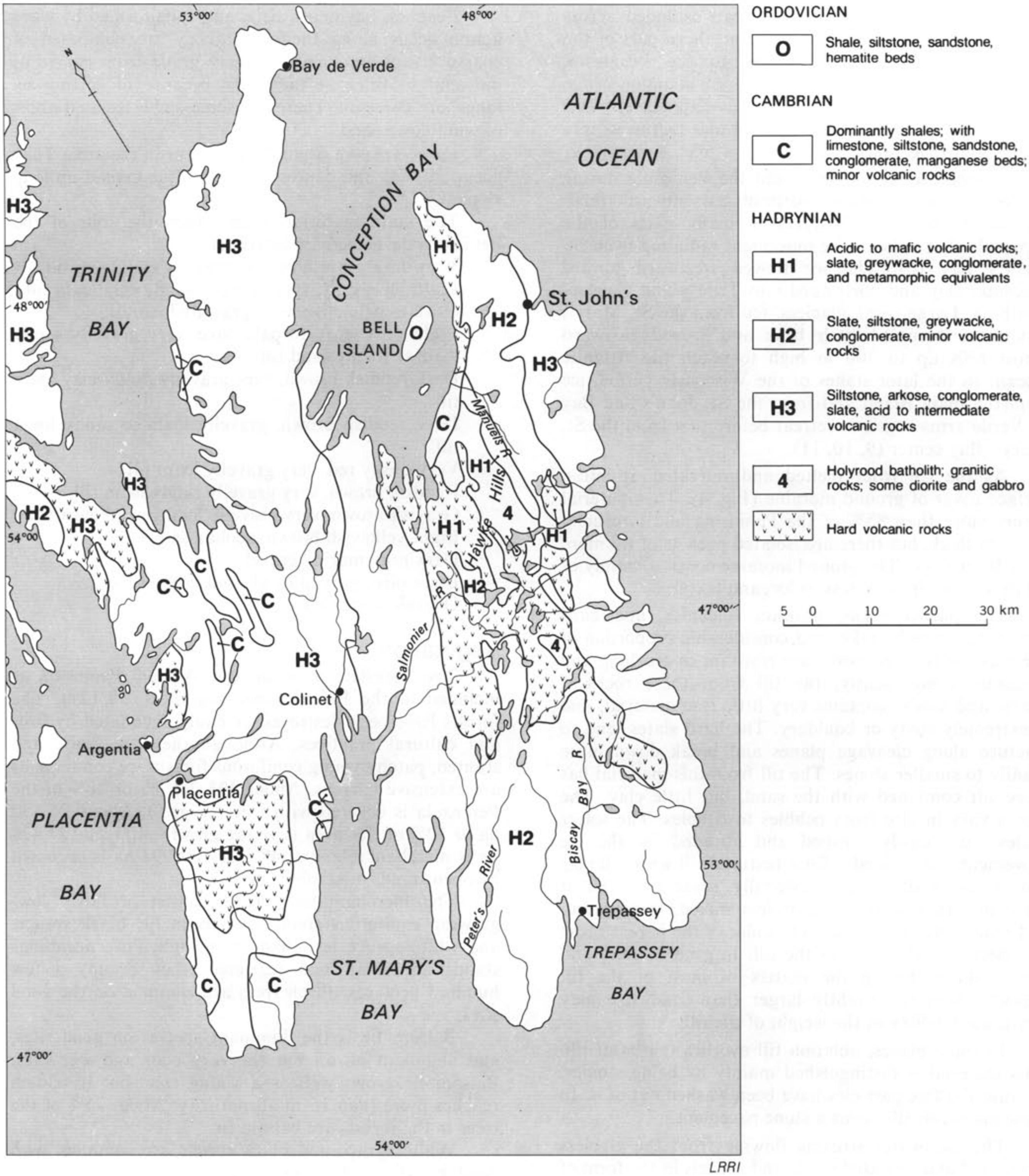

Fig. 3. Geological formations of the Avalon Peninsula.

The main Newfoundland ice cap extended across the head of Placentia Bay and the northern part of the isthmus joining the main island to the Peninsula. Granite stones from the main island are common in the till of the isthmus as far southward as Fair Haven. This ice cap was diverted to the northeast and southwest into Trinity and Placentia bays.

A separate ice cap occupied the Peninsula during the Wisconsin glaciation and produced outward trending striae and other features in many parts of the Peninsula that indicate ice movement radiating from St. Mary's Bay (6). The ice flowed westward toward Placentia Bay and northward into Trinity and Conception bays. Large trunk glaciers, fed from the St. Mary's Bay area, occupied both bays and spread eastward across hills up to 300 m high to reach the Atlantic Ocean. In the later stages of the Wisconsin period, ice from the main island and from the St. John's and Bay de Verde arms began to retreat before that from the St. Mary's Bay center (9, 10, 11).

As the ice front melted and retreated, it left a surface cover of ground moraine (Fig. 4). This material covers more than 85% of the Peninsula and is usually 1.5–6 m thick, but there are isolated pockets of till more than 30 m thick. The ground moraine consists mainly of till that varies in stoniness, color, and texture.

The harder rocks, granite, volcanics, and hard sandstones, which make up a considerable proportion of the rocks of the Peninsula, are resistant to crushing and abrasion. Consequently, the till from these rocks is coarse and sandy, contains very little fine material, and is extremely stony or bouldery. The hard slates tend to fracture along cleavage planes and break down more readily to smaller stones. The till from this material has more silt combined with the sand, but little clay. The stones vary in size from pebbles to cobbles. The softer shales were easily crushed and abraded by the ice movement and yielded a finer textured till with a larger proportion of silt and, occasionally, some clay. All of these materials were more or less mixed, transported, and redeposited by the ice. The color of the parent rocks is reflected in the color of the till. In general, sand and coarse silt make up the matrix of most of the till deposits. Material slightly larger than sand size may constitute 60–90% of the weight of the till.

In some places, ablation till overlies the basal till. This material is distinguished mainly by being stonier, because the fine particles have been washed out of it. In some areas this till forms a stone pavement.

The meltwater streams flowing from the glaciers left sorted and unsorted sands and gravels in the form of outwash plains, ice contact materials, deltas, valley trains, kames, and eskers. These materials comprise only a very small part of the Peninsula. No large-scale damming appears to have taken place, but a layer of silt 30–45 cm thick covers the moraine over a fairly large area south of Whitbourne, where water was trapped between retreating ice fields.

In a few places there are deposits of recent alluvium derived from the erosion of glacial deposits by postglacial streams.

Beaches, baymouth bars, and spits formed by wave action occur along the coast. They are composed of coarse gravel and sand and may grade from coarse at one end to finer at the other because of sorting by longshore currents. There are some small isolated areas of windblown sand.

Large areas of organic soils occur in the area. They occupy basins and depressions and often extend up long slopes.

The main materials from which the soils of the Peninsula developed are listed below.

Very dark grayish brown, gravelly clay loam till
Light olive gray, very gravelly sandy clay loam till
Olive to pale olive, very gravelly loam till
Light olive gray to pale olive, very gravelly sandy loam to loamy sand till
Dark reddish brown, very gravelly sandy clay loam till
Dark reddish brown, gravelly loam to sandy loam till
Very dusky red, very gravelly loam till
Reddish brown, very gravelly sandy loam till
Grayish brown, very gravelly loamy sand outwash
Light yellowish brown, aeolian sand
Dark gray marine gravel
Light olive gray alluvial sands and gravels
Organic materials

Vegetation

The forested area of the Avalon Peninsula is included in the Boreal forest region B. 30 (21). The forests have been destroyed or badly decimated by fires and cultural practices. Although they are dense and stunted, patchy young coniferous forests are common, as are extensive barrens. About 393 368 ha or 40% of the Peninsula is covered with trees (Fig. 5). About 54 350 ha or 12% of this area is young growth, 40% or 157 428 ha is merchantable, and 48% or 189 994 ha is occupied by open stands or scrub growth.

The merchantable forests consist of fairly low-growing coniferous stands of balsam fir, black spruce, and white spruce less than 15 m high. Pure deciduous stands are small and scattered; they occupy a few hundred hectares. Birch trees are common on the good sites.

Balsam fir is the dominant species on good sites, and abundant on all but the very poor and wet sites. Balsam fir grows well as a young tree, but it seldom reaches more than 15 m at maturity. About 75% of the trees in the forests are balsam fir.

White spruce and black spruce are common, with good growth on the moderately well drained soils and organic soils. The softwood stands are used for pulpwood and only a few stands yield small sawlog timber. White birch and some yellow birch are the only important hardwoods. They can usually be found in stands with balsam fir; they are less than 15 m high and small in diameter. Yellow birch, trembling aspen, and very small red maple occur, but they are of no economic value. Eastern white pine was formerly of considerable importance, but cutting and disease have eliminated it from the Peninsula.

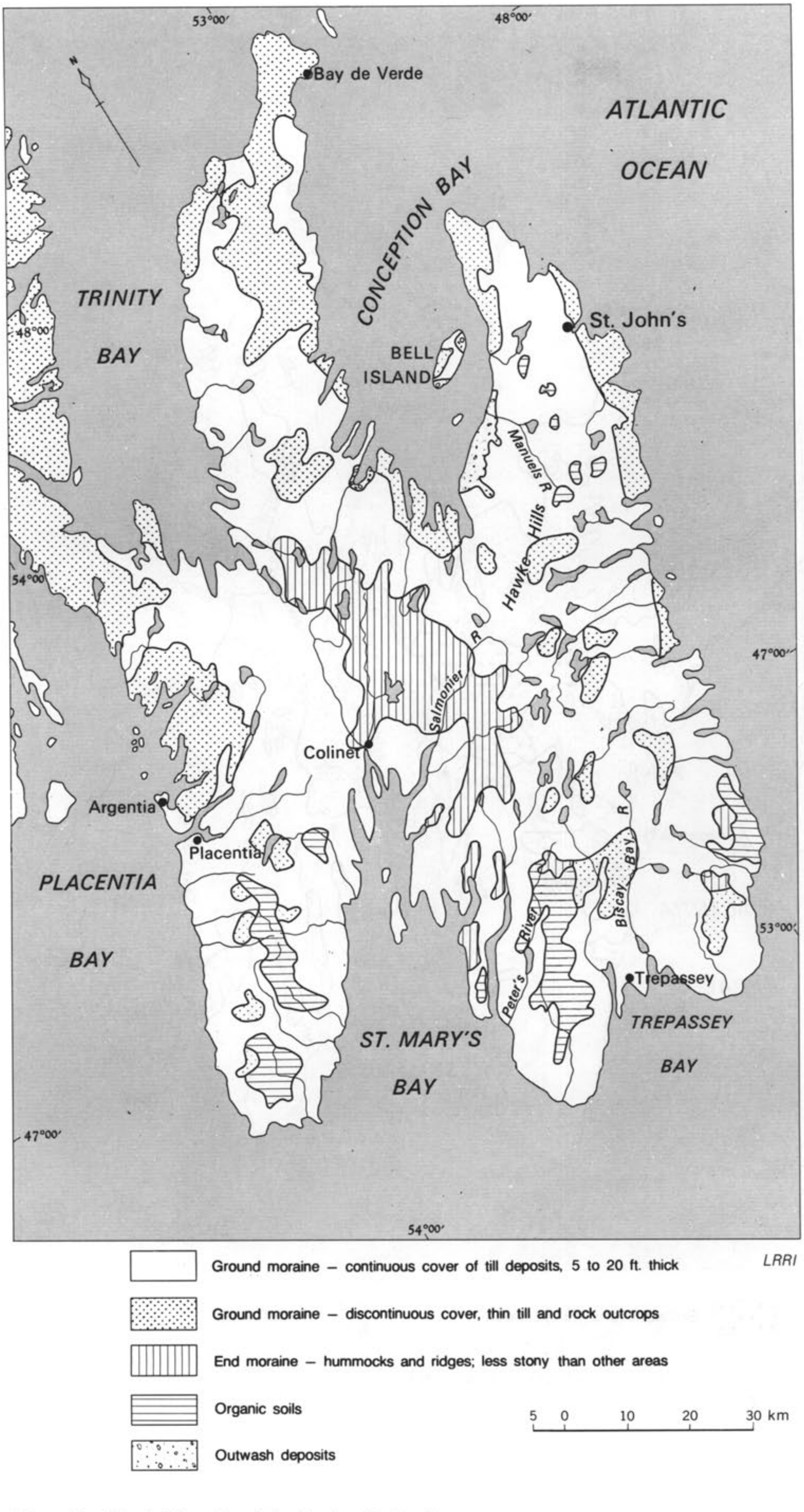

Fig. 4. Glacial deposits of the Avalon Peninsula.

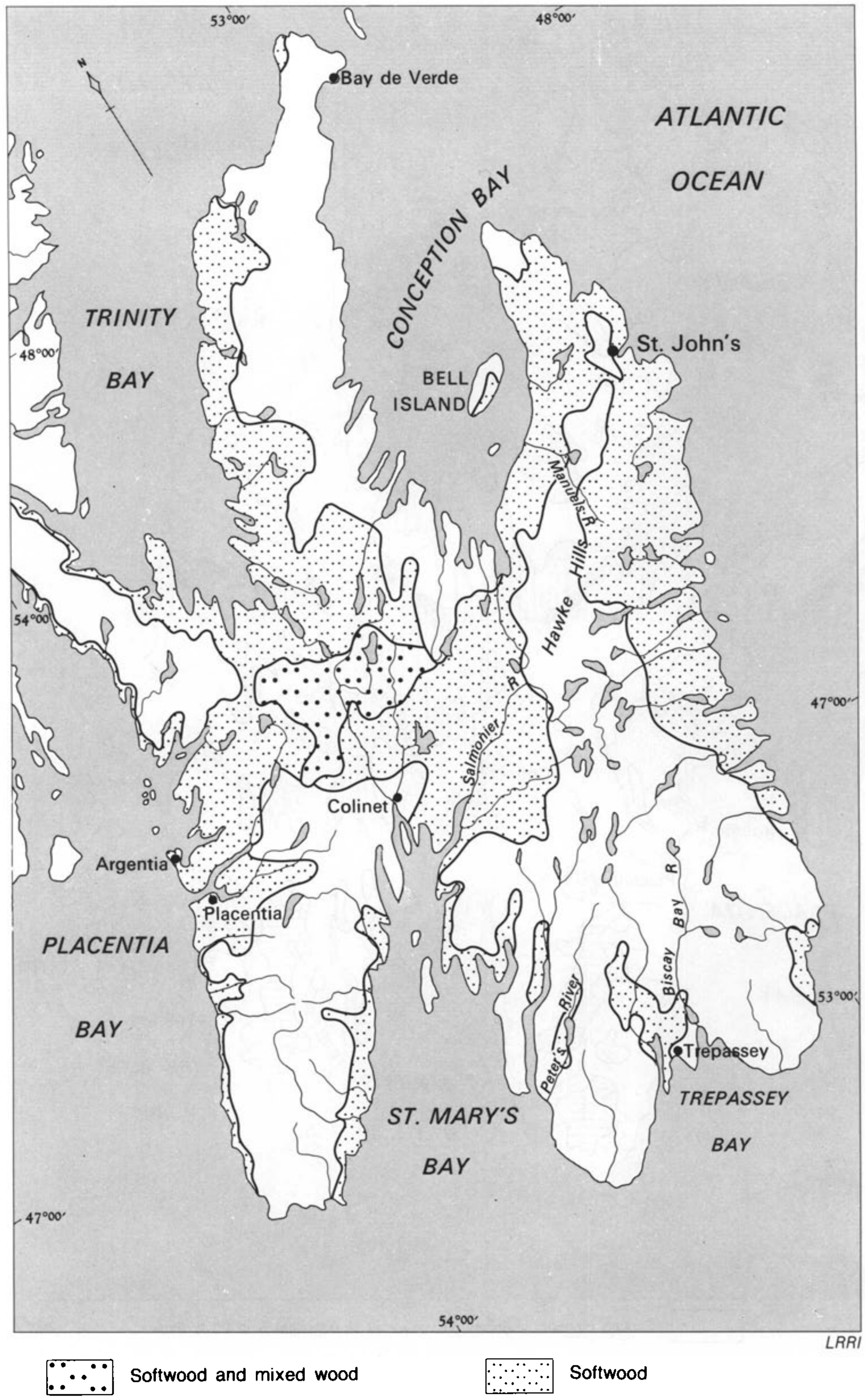

Fig. 5. The main forest areas of the Avalon Peninsula.

The best forest stands occur in the center of the Peninsula on the Markland soils and in sheltered locations along the coast. The main tree species here are balsam fir, white spruce, some black spruce, and white birch. Ground cover is mainly bunchberry, bristly club-moss, raspberry, gooseberry, northern twinflower, blueberry, sheep-laurel, dogberry, goldenrod, pin cherry, and serviceberry. A general characteristic of the soil in good forest stands is the occurrence of mottling in the lower B and C horizons.

Less productive forests of black spruce and balsam fir with occasional white birch and a ground cover of sheep-laurel, blueberry, bunchberry, foxberry or cowberry, Labrador-tea, bristly club-moss, and reindeer moss, occur on well-drained soils and often on shallow soils over bedrock.

The poorer forests consist mainly of black spruce with some balsam fir and tamarack and little or no birch. The ground vegetation is sheep-laurel, blueberry, bunchberry, Labrador-tea, serviceberry, ground-fir, black crowberry, fireweed, and mosses.

Poorly drained sites support open to dense stands of black spruce and stunted balsam fir. Abundant sheep-laurel, bunchberry, Labrador-tea, blueberry, sphagnum mosses, sweet gale, and other shrubs form the ground cover.

The noncommercial forests consist of burned-over stands with low regeneration on poor or exposed sites. Scrub-type forests are common at elevations over 150 m above sea level and along the south and west coasts.

Balsam fir is the most important tree species. Balsam fir, black spruce, and tamarack are common on poorly drained soils. Black spruce predominates in the north, and balsam fir in the southern part of the Peninsula.

Heath and barrens occupy about 34% of the Peninsula. The common plants found on the barrens include sheep-laurel, blueberry, fireweed, partridgeberry, goldenrod, black crowberry, bunchberry, Labrador-tea, small cranberry, burnet, ground-fir, common club-moss, meadowsweet, and creeping snowberry. An organic mantle 10–40 cm thick is common on these imperfectly drained soils. These barrens are thought to be the result of repeated fires, which cause a loss of fertility and seed sources, and also exposure to wind and low ground temperatures.

Organic soils occupy about 12% of the Peninsula. The vegetation on these soils largely reflects the nutrients in the upper horizon.

Low nutrient organic soils are characterized by a cover of sphagnum mosses, lichens (reindeer moss), and an abundance of sheep-laurel, bog-laurel, black crowberry, Labrador-tea, and cloudberry. Black spruce and tamarack may also be abundant. The higher nutrient organic soils, which occur extensively in the east, southeast, south, and western part of the Peninsula, are the sedge blanket bogs. They grow an abundance of sedges, bulrushes, aster, some sweet gale, and swamp birch. As the nutrient content increases, the vegetation is composed more of sedges, burnet, goldenrod, aster, cinquefoil, rose, sweet gale, and brown mosses.

The sedge-tree or open-wooded organic soils have a vegetation of sedges and black spruce, tamarack, stunted balsam fir, some grass, aster, goldenrod, rose, meadowsweet, sweet gale, burnet, and cassandra. The nutrient-rich or herb-rich spruce bog has sphagnum mosses, feather mosses, sedges, bunchberry, false Solomon's-seal, Labrador-tea, sheep-laurel, creeping snowberry, tall meadow rue, and aster.

The peatlands are described in more detail by Dr. F. C. Pollett in the following section. A list of the plants found on the Peninsula is given at the end of this report.

PEATLANDS OF THE AVALON PENINSULA

F. C. Pollett
Newfoundland Forestry Research Centre,
Canadian Forestry Service, Environment Canada,
St. John's, Newfoundland

INTRODUCTION

Newfoundland has about 2 million hectares of peatland, with the greatest concentrations on the high level plateaus and the coastal lowlands. These peatlands include bog and fen types, with their locations and area dependent on edaphic conditions acting in combination with climate and hydrotopography of particular ecoregions. To evaluate the potential of our peatlands for wildlife, agriculture, and forestry, the vegetation and the characteristics of the major peat types must be considered. Furthermore, to facilitate mapping and management of specific vegetation units, a workable peatland classification is required. Such studies are now in progress. This report, based on preliminary data from these studies, describes the main peatland formations of the Avalon Peninsula and provides a list of indicator plants, which may be used in site evaluation.

PEATLANDS

The evolution of peatlands on the Avalon Peninsula has been mainly influenced by the wet maritime climate. Localized differences depend mainly on soil conditions, degree of site exposure, and cultural practices. Morphologically, the Avalon peatland formation is mainly a blanket peat with the absence of true raised bogs. Also, the lack of nutrient-rich soils on the Peninsula has resulted in a scarcity of rich fens.

Bogs

The blanket bogs of the Avalon Peninsula can be subdivided into two main types, the dry dwarf shrub-sphagnum bog and the wet sedge-sphagnum bog.

Dwarf shrub-sphagnum bog. This dwarf shrub-sphagnum bog (Fig. 6) occurs primarily in the forested parts of the Peninsula and reaches its optimal development in the Whitbourne-Colinet interior region. The ground cover is dominated by heath shrubs such as sheep-laurel, Labrador-tea, cassandra with sedge and bulrush tussocks scattered throughout. Sometimes these tussocks appear to have a regular pattern. Lichens, particularly reindeer moss, are common, also hummocks of *Sphagnum fuscum* and *S. imbricatum*. *Rhacomitrium lanuginosum* is common on the bog hummocks. The bog hollows have abundant bulrushes, *Rhynchospora alba,* and a moss layer comprised of wetter sphagnums, such as *Sphagnum pulchrum*. In some parts of the bog the presence of *Carex rostrata,* and the increased abundance of shrubs such as sweet gale, *Nemopanthus mucronata,* and *Viburnum cassinoides* indicate some influence of mineral enrichment (minerotrophic) on underlying peats. The major part of the bog, however, is ombrotrophic (deriving nutrients only from precipitation).

The peat substrate is usually more than 2.5 m deep, with an upper 30–120 cm of sphagnum or sphagnum-sedge peat, relatively undecomposed (H2 – 3), whereas middle and lower layers consist of more decomposed peats (H4+) with increased sedge content.

Morphologically, these bogs are sometimes characterized by raised centers, although not as pronounced as those found in true raised bogs. Also, the bog pools are irregularly patterned.

Sedge-sphagnum bog. Whereas the dwarf shrub-sphagnum bog is associated with forest regions, the sedge-sphagnum bogs (Fig. 7) are most often in juxtaposition with heathland, barrens, and scrub forest. With the exception of areas in the southern part of the Peninsula, the sedge-sphagnum bogs are not large, but are confined to poorly drained slopes and depressions. Such bogs are dominated by bulrushes and in the more nutrient-rich, wetter sites, sedge species are abundant. Sphagnum hummocks are flat and less common. However, *Rhacomitrium lanuginosum,* especially in the south, increases in importance as a cover species. The moss layer is dominated by *Sphagnum* species such as *S. papillosum* and *S. plumulosum*. *S. tenellum* and *S. pylaesii* occur in hollows and small shallow pools.

Sedge bogs are often minerotrophic, because they receive groundwater from surrounding upland soils.

Fig. 6. Dwarf shrub bogs.

However, because of the poor nutrient quality of such waters, the bogs are mainly oligotrophic with scattered mesotrophic sites. In mesotrophic sites, more nutrient-demanding plant species such as *Calamagrostis inexpansa,* goldenrod, bog aster, and sweet gale are found.

The peat layer is usually between 60 and 200 cm thick, and is well decomposed (H4+) below the upper few centimetres of sphagnum-sedge. Sedge peat is predominant in the lower layers. The water table is near the surface and the soils are permanently wet.

Fig. 7. A sedge-sphagnum bog near Colinet.

Fens

Fen deposits are most often found in areas where nutrient-rich soils are located. Usually the fens (Fig. 8) are found in the forested regions occupying poorly drained seepage slopes and depressions, or near bog drainage channels. Fen vegetation is distinguished from bog vegetation by the presence of more exacting plant species such as Newfoundland dwarf birch, mountain fly-honeysuckle, and rose. Also, there is a greater variety of herbs such as aster, goldenrod, *Habenaria,* burnet, and sedge. *Sphagnum* plays a less dominant role in the moss layer, yet *S. strictum* and *S. warnstorfianum* are often found in the mat, and *S. fuscum, S. imbricatum,* and *S. flavicomans* form fen hummocks. Most of the fens on the Peninsula are mesotrophic. Where eutrophic fen sites are found, they are differentiated by the presence of shrubby cinquefoil, tall meadow rue, and *Campylium stellatum.*

Fen peats are thin, usually less than 1 m deep, black, well decomposed, and comprised of a sedge-woody or herbaceous-woody peat (H6+). In comparison with the peatlands of central, western, and northern Newfoundland, the Avalon bogs are richer in nutrients and usually wetter as a result of the high annual precipitation and a supply of sea salts. Conversely, the fens are low in nutrients and less abundant because of the lack of calcareous soils.

Fig. 8. A fen near Tor's Cove.

INDICATOR SPECIES

The following species may be used in site classification and possible interpretation of Avalon Peninsula peatlands:

Nutrient indicators

Poor	Moderate	Rich
Rubus chamaemorus (baked-apple)	*Carex exilis* (abundant)	*Potentilla fructicosa* (shrubby cinquefoil)
Kalmia angustifolia (sheep-laurel)	*Lonicera villosa* (mountain fly-honeysuckle)	*Campylium stellatum*
Sphagnum fuscum	*Betula michauxii* (dwarf birch)	*Thalictrum polygamum* (tall meadow rue)
Sphagnum rubellum	*Linnaea borealis* (twinflower)	*Rosa nitida*
Mylia anomala	*Carex livida*	*Sphagnum strictum*
Cetraria islandica	*Sphagnum warnstorfii*	*Selaginella selaginoides*

Moisture indicators

On dry sites, dwarf shrubs and lichens dominate with bulrushes subordinate. As moisture content increases, bulrushes become more abundant, and in wet sites, they codominate with sedge. Dwarf shrubs play a minor role, and lichens are rare on wet peats.

On bogs, with typical high and low spots, the following indicators are present:

Dry
Ichmadaphila ericatorum
Polytrichum strictum
Sphagnum fuscum
Sphagnum papillosum
Sphagnum magellanicum
Sphagnum plumulosum
Sphagnum pulchrum
Sphagnum pylaesii
Sphagnum cuspidatum
Sphagnum terryanum
Wet

Exposure indicators

Bogs and fens in exposed, windswept locations are indicated by the presence of:

Cetraria nivalis
Rhacomitrium lanuginosum (abundant)

Through the identification of a few plant species, researchers interested in peatland classification and utilization can interpret and select sites according to their individual requirements.

SOIL MAPPING AND CLASSIFICATION

Field methods

The soils of the Avalon Peninsula were examined in the field by digging holes, spaced irregularly depending on the topography, and by observing road cuts, ditches, gravel pits, and riverbanks. In most of these exposures the soils have layers, called horizons, running parallel to the surface; these horizons collectively are known as the soil profile. These horizons vary in color, texture, structure, consistence, and other properties. It is the combination of these properties that enables the soil scientist to group the soils into broad categories of similar kinds of soils and to make subdivisions within these categories based on similarities in degree of development.

Stereoscopic examination of aerial photographs was used initially to delineate soil areas. Obvious landform boundaries were the basis of many delineations, and forest vegetation boundaries were often used to separate areas within major landforms. These boundaries were checked in the field. Lack of roads was a problem and much of the work was done by traverses on foot. Access to some areas was made by boat.

The initial mapping was on aerial photos using scales of 1 inch = 2640 ft and 1 inch = 3333 ft, but more recent photos used a scale of 1 inch = 1320 ft. The soil boundaries and other information were transferred from the aerial photos to map sheets at a scale of 1:50 000. The final map was published at a scale of 1:100 000.

In addition to observing profile characteristics, other properties of the soils that were recorded include the depth of soil over bedrock, slope, stoniness, degree of erosion, presence of compact layers, the nature of the parent material, and the vegetation. The soils were sampled at appropriate locations and their chemical and physical properties were determined in the laboratory.

Soil classification

The soils of the Avalon Peninsula represent five orders in *The Canadian system of soil classification* (1). Each soil order contains soils developed by a pedogenic process that is determined by a particular kind of environment. All the soils in an order have one or more characteristics in common. The five soil orders represented in the Avalon Peninsula are Podzolic, Brunisolic, Gleysolic, Regosolic, and Organic.

Soils of the Podzolic order are well to imperfectly drained and have developed under coniferous and mixed forest vegetation and heath in cold to temperate climates. Under undisturbed conditions, the soils have organic surface horizons (L-H), and they may have an Ah horizon below the surface organic layer. Generally they have leached, light-colored horizons (Ae) that may be thick or thin enough to be indistinct. The soils have Podzolic B horizons in which the main accumulation products are organic matter combined in varying degrees with iron and aluminum. The soils are acid.

The soils in the Podzolic order on the Peninsula may be further subdivided into the Humic, Ferro-Humic, and Humo-Ferric great groups, based on the relative proportions of iron, aluminum, and organic matter in the B horizon.

The soils of the Brunisolic order are imperfectly to well drained and have developed under forest, mixed forest and grass or heath, and tundra. These soils lack the degree and kind of development specified for soils of other orders, but have sufficient development to exclude them from the Regosolic order. The Brunisolic soils have brownish-colored B horizons (Bm) and they may have weakly to strongly developed leached (Ae) horizons. The order also includes soils of various colors with both Ae horizons and weakly expressed B horizons of accumulation of either clay (Btj), or amorphous iron and aluminum compounds (Bfj), or both.

The Brunisolic soils on the Peninsula belong to the Dystric Brunisol great group and have weakly to moderately well developed Ae horizons.

The soils of the Gleysolic order have developed under hydrophytic vegetation and they may be expected to support hydrophytic vegetation if left undisturbed. These soils are saturated with water and are under reducing conditions (oxygen deficient) continuously or during some period of the year, unless artificially drained. They may have an organic surface layer of up to 60 cm of fibric moss peat. The A and B horizons are dull colored and usually have distinct to prominent mottling within 50 cm of the surface. Only one great group, the Gleysols, occur in the Avalon Peninsula.

The Regosolic order includes those soils with horizon development too weak to meet the requirements of other orders. They include imperfectly to well drained soils with good to moderate oxidizing conditions. The Regosolic soils on the Peninsula are classified in the Regosol great group.

The Organic order includes soils that have developed mainly from organic deposits. They contain more than 30% organic matter and the majority of them are saturated with water for most of the year. The Fibrisol and Mesisol great groups occur on the Peninsula.

Further subdivision of the great groups into subgroups and soil series provides a classification of the units used in mapping.

The soil series is a taxonomic or classification unit in which the soils within the unit are regarded as being developed on similar parent material and having the same horizon characteristics (color, texture, structure, consistence, thickness, and other properties). In field mapping, it is impractical to make separations on such a detailed basis. Thus, the map unit delineated on the map closely approaches the concept of the soil series, but the delineated area may contain up to 20% of one or more contiguous series. Each soil is identified on the soil map by a symbol, which is explained in the map legend.

In some areas, the soils are so intricately mixed that it is difficult to separate them at the scale of mapping. Such areas are mapped as complexes and may contain two or three soil series. The delineated complex area contains 80% or more of a combination of the included soil series. These series are identified in decreasing order of dominance in the map symbol.

Table 5 shows a classification of the soil map units of the Avalon Peninsula. Table 6 shows the relationship between the parent materials and the kinds of soils developed on them under different local environmental conditions.

Table 5. A classification of the soils mapped on the Avalon Peninsula

Order	Great group	Subgroup	Series*
Podzolic soils Soils of this order have B horizons (Podzolic B) in which the dominant accumulation product is amorphous material composed mainly of humified organic matter, combined in varying degrees with Fe and Al. The Podzolic B horizon is at least 10 cm thick.	Humic Podzol Soils that have a dark-colored Podzolic B (Bh) horizon, at least 10 cm thick, that contains very little pyrophosphate-extractable Fe. They occur typically in wet sites under heath, forest and heath, sphagnum, and in peaty depressions.	Placic Humic Podzol Profile type: LFH or O, Ae, Bh, Bhfc or Bfc, BCgj, Cgj	Low Point Point Lance
		Orthic Humic Podzol Profile type: LFH or O, Ae, Bh, Bhf or Bf, BCgj, Cgj	Old Perlican
	Ferro-Humic Podzol Soils that have a dark-colored Podzolic B horizon with a high content of organic C and an appreciable amount of extractable Fe and Al. The Bhf horizon is at least 10 cm thick and contains 5% or more organic C. These soils lack a Bh horizon at least 10 cm thick. They occur under humid conditions under forest or forest with heath or moss undercover.	Orthic Ferro-Humic Podzol Profile type: LFH or O, Ae, Bhf, Bf, BC, C	Angel's Cove Turk's Cove
		Placic Ferro-Humic Podzol Profile type: LFH or O, Ae, Bhf, Bhfc or Bfc, Bf, BC, C	Patrick's Cove Bauline St. Stephen
		Gleyed Ferro-Humic Podzol Profile type: LFH or O, Aegj, Bhf, Bfgj, RCg, Cg	Biscay Bay Red Cove
	Humo-Ferric Podzol Soils with brownish Podzolic B horizons with less organic matter than those of the Ferro-Humic Podzols. They lack Bh or Bhf horizons at least 10 cm thick. The Bf horizon contains 0.5-5% organic C and 0.6% or more of pyrophosphate-extractable Al and Fe. Typically, this horizon has higher color values and chromas than the Bhf horizon of the Ferro-Humic Podzols.	Orthic Humo-Ferric Podzol Profile type: LFH, Ae, Bf, BC, C	Placentia Junction Markland Peter's River Cochrane Holyrood Butterpot Shearstown
		Placic Humo-Ferric Podzol Profile type: LFH or O, Ae, Bf, Bfc, BC, C	Trepassey Fair Haven North Harbour Seal Cove

Table 5. A classification of the soils mapped on the Avalon Peninsula (Continued)

Order	Great group	Subgroup	Series*
		Gleyed Humo-Ferric Podzol Profile type: LFH or O, Aegj, Bfgj, BCg, Cg	Carbonear Victoria Pond Vivian Cuslett Heart's Content Pouch Cove Foxtrap Kelligrews
Brunisolic soils Soils that have sufficient development to exclude them from the Regosolic Order, but lack the degree or kind of development specified for soils of other orders. The order includes soils of various colors, with Ae horizons, and weakly expressed B horizons of accumulation of either clay (Btj) or amorphous Al and Fe compounds (Bfj) or both. They have a Bm, Bfj, and a thin Bf or Btj horizon at least 5 cm thick. They occur under Boreal forest, mixed forest, shrubs and grasses, and heath and tundra.	Dystric Brunisol These are acid Brunisolic soils that lack a well-developed mineral-organic surface horizon. They occur widely, usually on parent materials of low base status, and typically under forest vegetation.	Gleyed Dystric Brunisol Profile type: LFH, Bmgj or Bfjgj, Cgj or Cg	Rabbit Branch
		Eluviated Dystric Brunisol Profile type: LFH, Ae or Aej, Bm or Bfj, C	Manuels Chapel Arm
Gleysolic soils These soils have features indicative of periodic or prolonged saturation with water and reducing conditions. They have within 50 cm of the mineral surface either matrix colors of low chroma or distinct to prominent mottles of high chroma.	Gleysol Soils of this great group lack well-developed mineral-organic surface horizons.	Orthic Gleysol Profile type: LFH or O, Bg, Cg	Upper Gullies Gull Cove
		Rego Gleysol Profile type: LFH or O, Cg	Bay de Verde Torbay Waterford
Regosolic soils These soils have a horizon development too weak to meet the requirements of any other order. They occur under a wide range of vegetation and climates.	Regosol Soils that do not have an Ah horizon at least 10 cm thick at the mineral surface. They may have buried mineral-organic layers and organic surface horizons, but no B horizon at least 5 cm thick.	Orthic Regosol Profile type: C	Mutton Barasway
Organic soils Soils composed largely of organic materials that contain 17% or more of organic C (30% organic matter) *to a depth of:* (a) at least 60 cm if the surface layer is fibric material, with or without mesic or humic Op horizons thinner than 15 cm; or (b) at least 40 cm if the surface layer is mesic or humic; or (c) at least 10 cm if a lithic contact occurs within 40 cm of the surface.	Fibrisol Soils composed mainly of fairly undecomposed fibric organic material. The middle tier (40–120 cm) is fibric and contains more than 40% rubbed fiber.	Typic Fibrisol Profile type: Of or Om, Of	O_1, O_2, O_3, O_4
		Mesic Fibrisol Profile type: Of or Om, Of, Om, Of	O_5, O_6, O_7, O_8

Table 5. A classification of the soils mapped on the Avalon Peninsula (Concluded)

Order	Great group	Subgroup	Series*
		Humic Fibrisol Profile type: Of, Om or Oh, Of, Oh, Of or Om	O_9, O_{10}
	Mesisol Soils composed of organic material in an intermediate stage of decomposition. The middle tier (40–120 cm) is mesic and contains 10–40% rubbed fiber by volume.	Fibric Mesisol Profile type: Of, Om or Oh, Om, Of, Om	M_1, M_2, M_3, M_4
		Typic Mesisol Profile type: Of, Om or Oh, Om	M_5, M_6, M_7, M_8
		Humic Mesisol Profile type: Of, Om or Oh, Om, Oh, Om	M_9, M_{10}

*For organic soils, symbols indicate miscellaneous map units, not series.

Table 6. Relationship between parent materials and kinds of mineral soils

Order:	Podzolic								Brunisolic			Gleysolic		Regosolic
Great Group:	Humic Podzol		Ferro-Humic Podzol			Humo-Ferric Podzol			Dystric Brunisol			Gleysol		Regosol
Parent materials / Subgroup:	Placic	Orthic	Orthic	Placic	Gleyed	Orthic	Placic	Gleyed	Gleyed	Eluviated	Gleyed Eluviated	Orthic	Rego	Orthic
Very dark grayish brown gravelly clay loam till (50% gravel)										Manuels				
Dark reddish brown very gravelly sandy clay loam till (90% gravel)										Chapel Arm				
Light olive gray gravelly sandy clay loam till (20-30% gravel)	Low Point						Trepassey							
Olive to pale yellow very gravelly loam till (80% gravel)								Carbonear Victoria Pond Vivian						
Very dusky red very gravelly loam till (80% gravel)		Old Perlican						Cuslett						
Dark reddish brown gravelly loam till (50% gravel)						Placentia Junction								
Pale olive gravelly loam till (40% gravel)								Heart's Content					Bay de Verde	
Reddish brown to dark reddish brown very gravelly sandy loam till (70% gravel)			Angel's Cove	Patrick's Cove	Red Cove		Fair Haven							
Light brownish gray to olive very gravelly sandy loam till (70% gravel)	Point Lance		Turk's Cove			Markland Peter's River	North Harbour	Pouch Cove					Torbay	
Light brownish gray to light gray cobbly and gravelly sandy loam till (80-90% gravel)						Holyrood Butterpot								
Dark brown to dark reddish brown gravelly sandy loam till (50% gravel)									Branch			Gull Cove		
Light olive gray to pale olive very gravelly loamy sand till (60-90% gravel)				Bauline St. Stephen	Biscay Bay	Shearstown Cochrane								
Light olive gray to pale olive very gravelly loamy sand till from granitic materials (60-90% gravel)								Kelligrews Foxtrap				Upper Gullies		
Very dark grayish brown to olive gray, gravelly loamy sand till (50% gravel)					Biscay Bay		Seal Cove		Rabbit					
Grayish brown very gravelly glacio-fluvial loamy sand (80% gravel)	Indian Pond													
Light yellowish brown aeolian sand														Mutton
Dark gray marine gravel														Barasway
Light olive gray deltaic sands and gravel													Waterford	
Organic deposits														

DESCRIPTION OF THE SOILS

This section contains a general description of each map unit. Each description tells where the soil occurs, its area, its position on the landscape, and the environmental factors that influence the development of that soil (parent material, topography, drainage, and vegetation).

Representative profiles of nearly all the map units have been sampled and analyzed. These analyses and descriptions of the profiles are given in the Appendix.

The range in characteristics or soil properties (Table 7) and some of the attributes of other soils occurring in the same area are also given. Table 8 lists the areas occupied by each map unit.

The use and management of the soils (Table 9) are described. All the soils are very acid and most of them have low natural fertility.

Angel's Cove map unit 9683 ha

Location. These soils occur on the western side of the southwest arm of the Peninsula, mostly on hilltops and upper slopes.

Parent material. The soils are developed from moderately coarse textured, gravelly and stony, reddish brown glacial till derived from red and greenish sandstone and other acidic rocks.

Topography. The soils occupy moderately sloping terrain with occasional steep and very steep slopes of 8–15%.

Drainage. The soils have good to rapid surface drainage. The internal drainage is moderately good to imperfect.

Vegetation. The main vegetation is balsam fir and spruce forest, interspersed with small barrens having a heath–shrub cover.

Soil classification. Orthic Ferro-Humic Podzol

Range in characteristics. The soil depth is 45–90 cm, with the deeper soil usually on the upper slopes. Bedrock is exposed at the tops of the hills. Surface stoniness ranges from moderate (enough stones to cause some interference with cultivation) to exceedingly stony (enough stones to prevent cultivation unless clearing is done).

Associated soils. The imperfectly drained Patrick's Cove soils occur in lower slope positions or in depressions. In these soils the colors are much duller, the leached horizon (Ae) is much thicker, and a pronounced iron pan occurs in the profile. These soils are generally stonier than the Angel's Cove soils. Organic soils, with an organic surface more than 60 cm thick, also occur in this area, in depressions and near the bottom of slopes.

Land use. Angel's Cove soils are extremely acid, low in natural fertility, and stony. In many places the topography is too steep for cultivation. Small areas have been cleared and are used for growing potatoes and turnips. Other small areas are in grass. The soils range in capability for agriculture from Class 4 to 7. The main limitations are stoniness, topography, low fertility, and some undifferentiated limitations. The soils in Class 4 are suitable for only a few crops, and the limitations severely affect farming practices. Productivity for most crops is low, but the soils may have good productivity for some crops. Class 7 soils are unsuitable for agriculture or permanent pasture. There are some small areas that could be cleared and used for cropland, and a few larger areas that would be suitable for pasture.

Angel's Cove soils range in capability for forestry, from Class 7 to 6. Their use for forestry is limited by low fertility and exposure to wind.

Barasway map unit 396 ha

Location. Small deposits can be found in nearly all coastal areas as banks at the mouth of rivers, at the entrance of bays, or along the coast. These banks are locally called barasways or barachois (Fig. 9). Some of the larger deposits, which are extensive enough to be mapped, occur in the southwestern part of the Peninsula.

Parent material. These soils are developed from dark gray marine gravels deposited mainly by wave action and derived mainly from slate and sandstone.

Topography. The soils occur on gently to strongly rolling topography with slopes between 15 and 30%.

Drainage. Barasway soils have rapid surface and internal drainage.

Vegetation. Because of their porous nature and very low water-holding capacity and general absence of fine material, almost no vegetation is possible. In some areas where fine sand is present, some grass and small shrubs occur.

Soil classification. Orthic Regosol

Range in characteristics. The size of gravel varies within and between deposits from very coarse to medium and fine. Coarse sand occurs in some small areas.

Associated soils. Barasway soils are well-defined deposits with no other soils occurring in the same location.

Land use. These soils have very low water-holding capacity and lack fertility. Their capability for agriculture is Class 7. Their use is limited mainly by stoniness and lack of moisture. They are unsuitable for crop production and their main use is for construction and road-building materials.

The capability for forestry is Class 7, with limitations of exposure to wind and deficiency of moisture.

Table 7. Properties of soils mapped in the Avalon Peninsula

Soil symbol and map unit	Subgroup classification	Parent material	Texture	Stoniness	Rockiness	Drainage class	Capability class for	
							Agriculture	Forestry
Ac Angel's Cove	Orthic Ferro-Humic Podzol	till	gsl	2–4	0–2	2–3	4–7	7–6
Bar Barasway	Orthic Regosol	marine	gravel	5	0	1	7	7
Ba Bauline	Placic Ferro-Humic Podzol (Lithic)	till	gsl	4–5	4–5	1–2	7	7–6
Bv Bay de Verde	Rego Gleysol	till	gsl	3–4	1–4	5	6–7	7
Bb Biscay Bay	Gleyed Ferro-Humic Podzol	till	gsl	4–3	0–1	4	6–7	7
Br Branch	Gleyed Dystric Brunisol	till	cl	1–2	0	3	5–6	6–7
Bp Butterpot	Orthic Humo-Ferric Podzol	till	gsl	4	3–5	1–2	7	7
Car Carbonear	Gleyed Humo-Ferric Podzol	till	l	2–4	0–2	2–3	5–7	5–7
Cha Chapel Arm	Eluviated Dystric Brunisol	till	cl	3–4	0–3	3	5–7	5–7
Cr Cochrane	Orthic Humo-Ferric Podzol	till	l	2–4	0–3	2–3	4–7	5–7
Cu Cuslett	Gleyed Humo-Ferric Podzol (Lithic)	till	l	4–5	0–3	4–5	7	7
Fh Fair Haven	Placic Humo-Ferric Podzol	till	sl	3	0–2	4	5–7	7
Fx Foxtrap	Gleyed Humo-Ferric Podzol	till	gsl	3–4	0–2	2–3	5–7	5–7
Gul Gull Cove	Orthic Gleysol	till	l	2–3	0	4	5–7	6–7
Hc Heart's Content	Gleyed Humo-Ferric Podzol	till	l	3–4	0–1	3–4	5–7	6–7
Hr Holyrood	Orthic Humo-Ferric Podzol	till	gsl	4–3	0–2	2	7–5	7–5
Kg Kelligrews	Gleyed Humo-Ferric Podzol	till	gsl	4	0–2	4–5	7–6	7
Lpt Low Point	Placic Humic Podzol	till	l	5–4	0	4–5	7	7
Ms Manuels	Eluviated Dystric Brunisol	till	c	2–0	0	3	3–4	4–5
Ml Markland	Orthic Humo-Ferric Podzol	till	sil	2	0	3	4–6	5–6
M Mesotrophic bog	Typic Mesisol	organic		0	0	6–5		
Mut Mutton	Orthic Regosol	aeolian	s	0	0	1–3	7	7
Nh North Harbour	Placic Humo-Ferric Podzol	till	gl	3–4	0–2	3–4	6–7	6–7
Op Old Perlican	Orthic Humic Podzol	till	gl	4	1–3	3–4	5–7	7–5
O Oligotrophic bog	Sphagno and Mesic Fibrisols			0	0	6		
Pat Patrick's Cove	Placic Ferro-Humic Podzol	till	sl	4	1–4	4	5–7	5–7
Pr Peter's River	Orthic Humo-Ferric Podzol	till	gl	2–4	0–1	3–4	5–7	6–7
Pj Placentia Junction	Orthic Humo-Ferric Podzol	till	cl	2–4	0	3	4–6	5–6
Pl Point Lance	Placic Humic Podzol (Lithic)	till	l	4–5	0–3	4–5	7–6	7
Pc Pouch Cove	Gleyed Humo-Ferric Podzol	till	gl	4–3	0–2	4	5–7	5–7
Rab Rabbit	Gleyed Dystric Brunisol (Lithic)	till	cl	2–3	0–2	3–4	5–6	7
Re Red Cove	Gleyed Ferro-Humic Podzol (Lithic)	till	gsl	4–5	3–5	1–4	7	7
Sc Seal Cove	Placic Humo-Ferric Podzol	alluvium	gsl	4–5	0	1–3	7	7
St Shearstown	Orthic Humo-Ferric Podzol	till	gsl	2–4	0	1–3	5–7	5–7
Swd Smallwood	Complex of Cochrane and Turk's Cove soils—Orthic Humo-Ferric Podzols	till	gl	2	0	2–3	5–7	5–7
Ss St. Stephen	Placic Ferro-Humic Podzol	till	gl	3	0	3–4	7–6	7–6
Tb Torbay	Rego Gleysol	till	gsl	4	0–1	5–6	7	5–7
Tp Trepassey	Placic Humo-Ferric Podzol	till	gsl	5–4	0–1	4–5	7	7
Tc Turk's Cove	Orthic Ferro-Humic Podzol	till	gl	4	0–3	2–3	5–7	6–7
Ug Upper Gullies	Orthic Gleysol	till	gsl	4	0–1	5–6	7	6–7
Vad Victoria Pond	Gleyed Humo-Ferric Podzol	till	gl	3–5	0–2	3	6–7	6–7
Van Vivian	Gleyed Humo-Ferric Podzol	till	l	3–5	0–2	3	7	7
Wat Waterford	Rego Gleysol	alluvium	sl	2–4	0	4–5	4–7	5–7

Table 8. Area occupied by each map unit

Soil map unit	Hectares	Soil map unit	Hectares
Angel's Cove	9 683	North Harbour	23 706
Barasway	396	Old Perlican	3 165
Bauline	99 498	Oligotrophic bog	109 578
Bay de Verde	2 004	Patrick's Cove	18 019
Biscay Bay	59 188	Peter's River	7 432
Branch	6 311	Placentia Junction	2 587
Butterpot	4 711	Point Lance	7 313
Carbonear	14 488	Pouch Cove	87 400
Chapel Arm	2 734	Rabbit	1 181
Cochrane	168 146	Red Cove	14 667
Cuslett	12 921	Seal Cove	582
Fair Haven	18 363	Shearstown	1 161
Foxtrap	9 709	Smallwood	1 526
Gull Cove	1 333	St. Stephen	12 841
Heart's Content	14 493	Torbay	60 194
Holyrood	10 810	Trepassey	2 886
Kelligrews	23 852	Turk's Cove	36 940
Low Point	1 327	Upper Gullies	2 129
Manuels	920	Victoria Pond	12 011
Markland	7 665	Waterford	563
Mesotrophic bog	2 549		
Mutton	59	Total area of map units	877 084

Fig. 9. A barasway or barachois (baymouth bar) across the mouth of an estuary near Topsail.

Table 9. Fertilizer recommendations for selected crops and soils of the Avalon Peninsula

Soil	Pasture						Additional treatments
	Limestone, kg/ha	10-10-10, kg/ha	10-20-20, kg/ha	15-5-15, kg/ha	15-15-15, kg/ha	12-24-24, kg/ha	
Angel's Cove	4477	627					Regular additions of limestone every 5–8 years
Bay de Verde	6716			560			Add 3% of trace elements for first 2 years
Biscay Bay	4477	896					Add 3% of trace elements for first 2 years
Branch	4477–6716					560	Seed with a 2-8-2 mixture*
Carbonear	4477		560				Add 2% of trace elements for first 2 years Seed with a 2-8-2 mixture
Chapel Arm	4477	672					Add 2% of trace elements for first 2 years
Cochrane	6716				336–895		Add 6716 kg/ha of limestone every 7 years
Fair Haven	6716	560					Add 2% of trace elements for first 2 years
Foxtrap	6716					448	Land should be disced with a breaking disc Add 2% of trace elements for first 2 years For pastures low in legumes, annual application of 448 kg/ha of 12-24-24 with summer dressing of 81–168 kg/ha of ammonium nitrate and annual treatment of 448–784 kg/ha of 0-20-20
Gull Cove	6716–8954	672					Add 2% of trace elements for first 2 years
Heart's Content	6716			448			Add 2% of trace elements for first 2 years
Holyrood	6716					448	Add 2% of trace elements
Kelligrews	8954		448				Add 3% of trace elements in year of seeding; further applications of fertilizer depend on amount of clover present Seed with a 2-8-2 mixture For hay land, seed with 6.7 kg/ha of red clover, 7.8 kg/ha of timothy, and 3.3 kg/ha of alsike clover
Markland	4477	672					Summer dressing of ammonium nitrate
North Harbour	4477		896				Treat with limestone every 5–7 years
Old Perlican	6716		672–895				Add 2% of trace elements for first 2 years Seed with a 2-8-2 mixture
Patrick's Cove	6716		672–896				Add 2% of trace elements for first 2 years Seed with a 2-8-2 mixture
Peter's River	6716		560–784				Add 2% of trace elements for first 2 years Seed with a 2-8-2 mixture
Placentia Junction	6716	448					
Point Lance	4477		448				Trace elements may be required on a regular basis
Pouch Cove	6716					448	Seed with 3.4 kg/ha of white clover, 6.7 kg/ha of timothy, and 3.4 kg/ha of reed canarygrass For hay land add 896 kg/ha of 10-10-10, with summer treatment of 112 kg/ha of ammonium nitrate for second cut For established pastures, annual spring treatment of 448 kg/ha of 12-24-24
Rabbit	6716		448				Add 4% of trace elements at time of seeding For hay land, each year add 672–896 kg/ha of 10-20-20 For pasture, in spring add 224–448 kg/ha of 10-20-20 with ammonium nitrate or urea at 168 kg/ha in summer
Shearstown	6716		336				Add 2% of trace elements For hay land, each spring add 783 kg/ha of 10-20-20 Pasture may need a summer dressing of 168 kg/ha of ammonium nitrate
Smallwood	6716		896				Seed with mixture of 2.2 kg/ha of timothy and 8.9 kg/ha of birdsfoot trefoil Add 3% of trace elements Maintain legume–grass mixtures with 672 kg/ha of 10-10-30 For pure grass stands, 672 kg/ha of 15-5-15 is recommended
St. Stephen	6716		896				Add 3% of trace elements in first year
Trepassey	8954		1120				Add 2% of trace elements
Turk's Cove	6716		672				Add 4% of trace elements Seed with a 2-8-2 mixture
Victoria Pond	4477		672				Add 3% of trace elements
Waterford	4477		672				Add 3% of trace elements

*A 2-8-2 seed mixture consists of 2.24 kg/ha of white clover, 8.9 kg/ha of timothy, and 2.24 kg/ha of Kentucky bluegrass.

Table 9. Fertilizer recommendations for selected crops and soils of the Avalon Peninsula (Concluded)

Soil	Turnips		Additional treatments
	Limestone, kg/ha	3-15-6, kg/ha	
Angel's Cove	6716	2238	Admixture of 3% boron for first 2 years Side dressing of 168 kg/ha of ammonium nitrate
Branch	8954	2238	Add 3.17 kg of boron Side dressing of 112–168 kg/ha of ammonium nitrate
Carbonear	8954	2238	Add 3.17 kg of boron
Cochrane	6716–8954	1120–2238	Add 3.17 kg of boron Repeat lime treatment every 5–9 years
Foxtrap		2238	Add 3.17 kg of boron Side dressing of 224 kg/ha of ammonium nitrate
Manuels	Amount and frequency depend on crop and fertilizer used	1680	Add 3% boron when required Side dressing of 112–224 kg/ha of ammonium nitrate
Placentia Junction	6716	896	Add 1.35 kg of boron for first 2 years Side dressing of 112 kg/ha of ammonium nitrate
Shearstown	6716	1680	Add 3% boron for first 2 years Side dressing of 112–224 kg/ha of ammonium nitrate
Waterford	6716	1680	Add 2.71 kg of boron Side dressing of 112 kg/ha of ammonium nitrate

Soil	Potatoes		Additional treatments
	10-20-20, kg/ha	6-12-12, kg/ha	
Angel's Cove		2238	Admixture of 2% magnesium instead of limestone
Branch	1344		Admixture of 2% magnesium
Carbonear	1344		Admixture of 2% magnesium
Cochrane	784–1344		Admixture of 2% magnesium
Foxtrap	1344		Admixture of 2% magnesium
Manuels	1120		Admixture of 2% magnesium
Markland	1120		Admixture of 2% magnesium
Placentia Junction	840		Admixture of 2% magnesium
Shearstown	1344		Admixture of 2% magnesium
Waterford	1344		Admixture of 2% magnesium

Soil	Cabbage		Additional treatments
	12-24-24, kg/ha	10-20-20, kg/ha	
Cochrane	672–1120		Side dressing of 112–224 kg/ha of ammonium nitrate Apply 6716 kg/ha of limestone every 5–7 years
Waterford		1120	Side dressing of 112 kg/ha of ammonium nitrate Initial application of 6716 kg/ha of limestone

For blueberries, the recommended practice is to burn the area every 3 years, and add 56 kg/ha of nitrogen in the year of burning. Heart's Content and Victoria Pond soils require 67 kg/ha of nitrogen in the year of burning.

Bauline map unit 99 498 ha

Location. This land type has been recognized in practically every part of the Peninsula, but more particularly on the northeastern tip, on the isthmus, on the Bay de Verde arm, and in the center, east of St. Mary's Bay.

Parent material. The soils are developed from shallow, stony, medium textured glacial till derived from siltstone, greywacke, slate, and minor volcanic rocks. This material is interspersed among extensive areas of rock outcrop.

Topography. Bauline soils occupy moderately to steeply sloping terrain with slopes of 15–40%.

Drainage. Surface and internal drainage is rapid on steep slopes, but in small valleys wet conditions are prevalent most of the year.

Vegetation. Fire has caused extensive damage to the original tree cover. Subsequently, water has removed the moss and thin soil cover from the steeper slopes and has exposed the bedrock. Stunted fir and spruce with small heathlike shrubs and some creeping plants are the main vegetation.

Soil classification. Shallow lithic Placic Ferro-Humic Podzol

Range in characteristics. The depth of the profile varies widely, ranging from 20 to 75 cm. Also stoniness varies: some small areas have only a few stones and fine gravel in the profile, whereas in coastal areas a thin iron pan in the profile is common, usually in the BC horizon.

Associated soils. Torbay and Pouch Cove soils may occur in the same area as Bauline soils. Torbay soils are poorly drained and gray throughout the profile, whereas Pouch Cove soils have mottled, dull colors and a leached horizon (Ae) of silty clay to clay loam texture. Small patches of organic soils are usually present, and also some Regosols.

Land use. Bauline soil areas are exceedingly stony and shallow with many rock outcrops. The topography is rugged. The main use of the land is for recreation and some hunting. The capability for agriculture is Class 7. The main limitations are rockiness, stoniness, and topography.

The capability for forestry is Class 6–7, with severe limitations of exposure to wind and bedrock.

Bay de Verde map unit 2004 ha

Location. The soils of this map unit occupy much of the northern tip of the Bay de Verde arm of the Peninsula. They occur on lower slopes, in shallow depressions, and in drainage channels.

Parent material. The soils are developed from stony, moderately coarse textured reddish brown glacial till derived from sandstone, siltstone, and some volcanic rocks.

Topography. The terrain is gently to very gently sloping with most slopes between 2 and 5%.

Drainage. Surface soil is usually moderately well to imperfectly drained. Drainage is sometimes impeded by surface vegetation. Internal drainage is poor to very poor.

Vegetation. The main vegetation consists of mosses, small heath plants, blueberry, lamb-kill, and some alder.

Soil classification. Rego Gleysol

Range in characteristics. The thickness of the organic surface layer varies and many boulders protrude through it. Fragments of a thin iron-manganese pan, 0.6 cm thick, may occur under large stones or boulders in the soil.

Associated soils. Old Perlican soils occupy the better drained positions on the upper slopes or near the tops of hills in the same general area. Old Perlican soils have only a thin organic surface layer and well-defined soil horizons of rather dull colors.

Land use. Bay de Verde soils are extremely acid, poorly drained, and very stony. At present they are used mainly for unimproved pasture or hay land. There are extensive areas that could be improved for this purpose. The capability for agriculture is Class 6–7. The main limitations are wetness, stoniness, and rockiness.

The capability for forestry is Class 7. Their use is restricted by wetness, exposure to wind, and rockiness.

Biscay Bay map unit 59 188 ha

Location. These soils occur mainly in the southeastern part of the Peninsula, except in depressions and poorly drained areas.

Parent material. Biscay Bay soils are developed from medium textured, olive gray glacial till derived from hard gray slate, siltstone, and some acid volcanic rocks.

Topography. The topography is gently to moderately rolling with moderately to steeply sloping hills with slopes of 8–25%.

Drainage. Surface drainage is impeded by dense growth of moss, heath, and stones. Internal drainage is poor. The organic surface prevents air from penetrating into the soil and also keeps the soil moist all year. A high rainfall and much fog are common in this area.

Vegetation. The area is generally treeless and the vegetative cover is mainly heath and moss barrens with a few scattered trees.

Soil classification. Gleyed Ferro-Humic Podzol

Range in characteristics. The stone content of Biscay Bay soils ranges from enough to constitute a serious handicap to cultivation to stony enough to prevent any cultivation. The peaty surface varies from 60 cm to only a few centimetres in thickness on very steep slopes or on wind-exposed areas. In some areas there is evidence that wind has removed the organic topsoil, possibly after initial lifting by frost.

Associated soils. Low Point, Trepassey, and Peter's River soils occur in this area. Low Point and Trepassey soils do not have the cemented dark reddish brown iron pan, they have a red horizon much deeper, in the olive-colored BC horizon. Peter's River soils have no cemented thin iron pan and only a thin dark (Bhf) horizon under the leached horizon. They are much better drained than the other associated soils.

Land use. Biscay Bay soils are extremely acid, very stony, and low in natural fertility. Small areas are cultivated around the villages of Trepassey and Portugal Cove South. More remote areas are used for grazing by caribou during the winter. These soils are generally unsuitable for cultivated crops, but they could be used for grazing sheep. The agricultural capability of the soils is Class 6–7, with limitations of stoniness, wetness, rockiness, adverse climate, and low fertility.

The capability for forestry is Class 7. The main limitations are exposure to wind, low fertility, wetness, and rockiness.

Branch map unit 6311 ha

Location. Branch soils are found in the southwest arm of the Peninsula around the town of Branch. They occupy the upper slopes.

Parent material. These soils are developed from moderately coarse to moderately fine textured glacial till derived from shales with pockets of limestone, conglomerate, siltstone, sandstone, and manganese beds.

Topography. The soils occupy moderately sloping to very steeply sloping land. The slopes range from 15 to 25%.

Drainage. Surface drainage is good to rapid. Internal drainage is good to moderately well drained.

Vegetation. The main vegetation is balsam fir forest with a ground cover of various shrubs.

Soil classification. Gleyed Dystric Brunisol

Range in characteristics. The leached horizon (Ae) is usually very thin or absent. The thickness of the solum varies from 45 to 75 cm. Where erosion has taken place, outcrops of bedrock are common.

Associated soils. Rabbit soils occur on the flat uplands near the coast. They are imperfectly drained, have pronounced mottling, and may also have a thin Ae horizon and a thin iron pan. Gull Cove soils occur in poorly drained locations. They have a light brownish gray silty clay loam B horizon with pronounced orange mottling.

Land use. Stones are not usually a problem in Branch soils, but the topography in many places is too steep for cultivation. The soils are strongly to extremely acid and fairly low in natural fertility. Small areas are used for growing potatoes and turnips. Fish and fish offal are used as fertilizer for garden plots. Other areas are used as pasture for horses and sheep.

The agricultural capability of the soils is Class 5–6. The limitations are topography, adverse climate, and low fertility. Most Branch soils are used only for grassland or pasture (Fig. 10), but some areas are suitable for growing root crops.

The capability of the soils for forestry is Class 6–7, and use is limited by exposure to wind and low fertility.

Butterpot map unit 4711 ha

Location. Butterpot soils occur on the summits and upper slopes south of Conception Bay, east of Holyrood.

Parent material. These soils are developed from shallow, stony, light brownish gray glacial till derived mainly from granite.

Topography. Most of the soils are strongly to steeply sloping with slopes between 20 and 60%; some smaller areas have slopes between 5 and 20%.

Drainage. Surface and internal drainage are rapid.

Vegetation. Butterpot soil areas hold very little moisture because of steep slopes and coarse, porous soil. Most hilltops are bare and other areas have a shallow cover of moss and heathlike shrubs. Stunted spruce (white and black) forest stands are common in small areas where the soil accumulates. Forest fires pose a threat to the vegetation, even in short dry periods. Erosion tends to wash away much of the cover remaining after a forest fire.

Soil classification. Very shallow lithic Orthic Humo-Ferric Podzol

Range in characteristics. The soils vary in depth to the underlying bedrock.

Fig. 10. Pasture on Branch clay loam.

Associated soils. Soils of the Holyrood and Foxtrap series occur in the same area as Butterpot soils together with small areas of organic soils. Holyrood soils are at least 45 cm deep and have a reddish brown to yellowish red B horizon 15–30 cm thick under the leached (Ae) horizon. Foxtrap soils are at least 45 cm deep and have mottled, dull colors and a rather hard, cemented B horizon.

Land use. Butterpot soils are Class 7 capability for both forestry and agriculture. The limitations for agriculture are rockiness, stoniness, and topography and for forestry, rockiness, exposure to wind, and low fertility. The soils are not used at present.

Carbonear map unit 14 488 ha

Location. These soils occur west of Conception Bay on the Bay de Verde arm of the Peninsula. They occupy middle slopes and uplands.

Parent material. Carbonear soils are developed from medium textured olive gray glacial till derived from siltstone, slate, and acid volcanic rocks.

Topography. These soils occur on gently to moderately rolling hills with slopes between 5 and 25%.

Drainage. Surface soil is moderately well to well drained, but internal drainage is imperfect to moderately well drained.

Vegetation. The main vegetation consists of heath barrens with an abundance of small berry-bearing shrubs and scattered open-wooded areas.

Soil classification. Gleyed Humo-Ferric Podzol

Range in characteristics. The surface organic horizon (L–H) is usually about 7.5 cm thick, but it may be absent. The thickness of the Bfgj horizon appears to depend on the topographic position and the drainage. It is thicker on the upper slopes (up to 30 cm), but on the lower slopes this horizon is 7.5 cm or less in thickness.

Associated soils. Cochrane and Torbay soils occur in the same area. Cochrane soils do not have the hard, cemented BCcgj horizon found in Carbonear soils. Torbay soils are poorly drained and gray below 15 cm deep.

Land use. Extremely acid conditions and low fertility are common in Carbonear soils. In most areas, surface stones interfere with cultivation; therefore clearing is required (Fig. 11). Rock outcrops are common in some locations. Small areas are used for growing potatoes, cabbages, and turnips. Berries are abundant on the heath-covered lands.

With proper seeding and management these soils can provide excellent pasture. Other areas can be improved for growing potatoes, turnips, and cabbages. Improved blueberry culture is possible in most areas.

These soils have a capability for agriculture of Class 5–7. Limitations are stoniness, rockiness, undesirable structure, and low permeability.

Fig. 11. Newly broken land on Carbonear loam.

The soils have a capability for forestry of Class 5–7. The main limitations are exposure to wind, moisture deficiency, low fertility, and rockiness.

Chapel Arm map unit 2734 ha

Location. These soils occur on the upper slopes and tops of hills south of Trinity Bay.

Parent material. Chapel Arm soils are developed from moderately fine textured, dark reddish brown glacial till derived from red and some green shale, with some limestone, manganese beds, and other materials.

Topography. The soils occupy gently rolling to strongly rolling hills and moderately to steeply sloping terrain, with slopes between 8 and 30%. Rock outcrops are common.

Drainage. The soils are moderately well drained on the surface. Internal drainage is imperfect in some locations where bedrock is close to the surface.

Vegetation. The main vegetation is balsam fir forest with some spruce and birch.

Soil classification. Shallow lithic Eluviated Dystric Brunisol

Range in characteristics. The soil is 30–75 cm deep, but usually 37–50 cm. The surface horizons are extremely acid, but acidity decreases with depth. These soils are moderately stony to exceedingly stony where there are enough stones to prevent cultivation unless clearing is done.

Associated soils. Cochrane and Pouch Cove soils occur in the same area. Cochrane soils are lighter colored and do not have the thin iron pan that is common in Chapel Arm soils. They also contain gray slate and siltstone, whereas Chapel Arm soils contain mostly red shale. Pouch Cove soils contain rock material similar to that in Cochrane soils, but they are dull, mottled colors.

Land use. The amount of surface stone hinders cultivation; therefore stones must be cleared in order to use the land for crops. The soils have a capability for agriculture of Class 5-7 and their use is limited by stoniness, topography, rockiness, and several other factors. Small areas are used for growing potatoes and turnips, but the best use of these soils would be for improved pasture.

The soils have a capability for forestry of Class 5-7, with limitations imposed by exposure to wind, moisture deficiency, low fertility, and rockiness.

Cochrane map unit 168 146 ha

Location. These soils occupy middle and upper slopes and hilltops in the central and eastern part of the Peninsula. They also occur on level areas.

Parent material. Cochrane soils are developed from medium textured, dark olive gray glacial till derived mainly from gray slate and siltstone.

Topography. The soils occur on undulating to hilly terrain with gentle to very steep slopes ranging between 5 and 20%.

Drainage. They are well to rapidly drained on the surface and there is good runoff on the slopes. They are moderately well to well drained internally. Small areas of contiguous soils with some signs of imperfect drainage in the lower horizons have been included with the Cochrane soils. These areas have the most vigorous tree growth.

Vegetation. The natural vegetation is balsam fir forest with some spruce and birch. Other areas (barrens), where recurring fires have destroyed the natural vegetation and the seed sources, are covered with small shrubs (Fig. 12).

Soil classification. Orthic Humo-Ferric Podzol

Range in characteristics. The surface stoniness varies from moderately stony land (stoniness 3) to excessively stony land (stoniness 5), which is too stony for cultivation. The leached horizon (Ae) is often thin and barely visible on slopes, but it may be more than 15 cm on dry hilltops. The soil depth to bedrock varies from 35 to 90 cm, but usually is from 35 to 60 cm.

Fig. 12. Cochrane soils under heath and partly burned forest.

Associated soils. The imperfectly drained Pouch Cove soils with dull colored mottled B horizons and a thicker organic (F) horizon occur in the Cochrane soil area. Usually they have more surface stones than do the Cochrane soils. Torbay soils occupy poorly drained positions. They are gray (gleyed) and have thick (15-45 cm) organic surface horizons.

Land use. Most of the farming on the Avalon Peninsula is on Cochrane soils. The capability for agriculture is Class 4-7. The main limitations are stoniness and rockiness. The soils are used extensively for growing potatoes, turnips, and cabbages. Other areas are in grass.

The soils are acid, stony, and low in natural fertility, but when they have been cleared they become light to medium textured, friable, with good structure. Much more land could effectively be developed for improved pasture or hay land. Some heath lands provide good natural blueberry crops. With proper management, blueberry yields could be greatly improved.

The capability for forestry is Class 5-7 with limitations imposed by exposure to wind, low moisture, rockiness, and low fertility. Forests grow fairly well in areas not too exposed to wind, but forest plantations suffer severely from frost damage (soil heaving), especially in the slower draining soils.

Cuslett map unit 12 921 ha

Location. Cuslett soils are located in the southwestern part of the Peninsula, between Placentia and St. Brides.

Parent material. These soils are developed from stony, medium textured, very dusky red glacial till derived from siltstone, slate, and other acidic rocks.

Topography. The soils are found on gently sloping to moderately sloping and, occasionally, strongly sloping terrain. Most slopes are between 5 and 20%.

Drainage. Surface and internal drainage of these soils varies from imperfect to poor.

Vegetation. Some areas have a stunted forest cover, but most areas support a vegetation of low heath and shrubs, mosses, and creeping plants.

Soil classification. Very shallow lithic Gleyed Humo-Ferric Podzol

Range in characteristics. The thickness of the organic surface horizon varies widely and in some places it appears to be subjected to wind erosion. Stoniness varies from exceedingly stony to excessively stony.

Associated soils. Patrick's Cove and Angel's Cove soils occur in the same area. Patrick's Cove soils are less stony than Cuslett soils and have a pronounced leached horizon (Ae) and a thin, black B horizon (Bh) high in organic matter under the leached layer. Angel's Cove soils are much better drained and less stony than Patrick's Cove soils and have a brighter colored Bhf and, especially, a Bf horizon of yellowish red to reddish brown under the leached horizon.

Land use. Cuslett soils have a capability for agriculture of Class 7 and have severe limitations of stoniness, rockiness, wetness, and adverse climate. They are generally too stony to permit any cultivation, but small areas may be used for unimproved pasture. They are very strongly acid and low in natural fertility.

These soils have a capability for forestry of Class 7 with limitations imposed by exposure to wind, low fertility, rockiness, and stoniness.

Fair Haven map unit 18 363 ha

Location. These soils are located on the southeastern part of the isthmus connecting the Avalon Peninsula with the larger part of the island of Newfoundland. Fair Haven soils occupy the upper slopes, often below Pouch Cove soils on the summits.

Parent material. Fair Haven soils are developed from stony, moderately coarse textured, dark reddish brown till derived from siltstone, slate, red sandstone, and granitic rocks.

Topography. The soils are on gently to strongly rolling topography with slopes from 8 to 20%.

Drainage. Surface drainage is good, but may be impeded somewhat by the vegetation. Internal drainage is imperfect, as shown by mottling in the profile. The thin organic surface with heath vegetation keeps the soil moist and prevents good aeration. The soils are located in an area of wet climate and frequent fog.

Vegetation. The ground cover consists of moss barrens, low shrubs, herbaceous plants, and scattered stands of trees.

Soil classification. Placic Humo-Ferric Podzol

Range in characteristics. The depth of the organic surface horizon increases from the upper to the lower part of the slopes. Outcrops of bedrock are common at the tops of many hills. Surface stoniness usually increases toward the bottom of the slope, but a crown of stones is not uncommon around the top of the hills. The larger stones are near the bottom of the slopes.

Associated soils. Pouch Cove soils, which do not have an iron pan but have lighter colored B horizons, and Torbay soils, which are poorly drained and have a thicker surface horizon, occur in the same locations as Fair Haven soils.

Land use. Fair Haven soils are moderately wet, very acid, and low in natural fertility. In many places they are too stony or too steep for cultivation. Their capability for agriculture is Class 5–7 and they are severely limited by stoniness, rockiness, topography, and adverse climate.

Small patches around settlements are used for growing potatoes and turnips. Some areas could be made productive for blueberries, and large areas could be utilized for pasture.

Their capability for forestry is Class 7, with very severe limitations imposed by exposure to wind, rockiness, and low fertility.

Foxtrap map unit 9709 ha

Location. Foxtrap soils are located south of Conception Bay and south and east of Holyrood. They are usually found on the lower middle slopes.

Parent material. These soils are developed from moderately coarse textured, light olive gray glacial till derived from granitic rocks.

Topography. Foxtrap soils occur on gently rolling to very hilly terrain with slopes between 10 and 30%. In a few areas the slopes are less than 5%.

Drainage. Surface drainage is rapid, but internal drainage is imperfect because the moisture from higher elevations accumulates on the lower slopes and is held up by the presence of a hardpan. A thin, peaty surface also tends to keep the soil moist and reduces the movement of air in the soil.

Vegetation. Spruce, balsam fir, and small shrubs are the main vegetation on the Foxtrap soils.

Soil classification. Gleyed Humo-Ferric Podzol

Range in characteristics. The thickness of the organic surface horizon (F) varies throughout the area, but it is usually thicker on the lower slopes. The leached horizon (Ae) is thicker on the higher or better drained positions.

Foxtrap soils are very stony to exceedingly stony. On the upper slopes or near the tops of hills, the soils in the better drained positions have many stones on the surface, but the upper part of the profile is less stony. In poorly drained sites on lower slopes, the soils are very stony throughout the solum, but are not very stony at the surface. Rock outcrops are common on hilltops and ridges.

Associated soils. Holyrood and Kelligrews soils occur in the same area as Foxtrap soils. Holyrood soils occupy better drained positions and have a thin organic surface, which may be absent, a well-developed white leached horizon, and a yellowish to reddish yellow Bf horizon. They are usually free of mottling and the horizons are not cemented.

Kelligrews soils occupy the lower slopes. They have a pronounced organic surface horizon 10–20 cm thick and dull colored mottled B horizons. The horizons below 30 cm are generally hard.

Land use. Foxtrap soils have a capability for agriculture of Class 5–7. They are limited in use by stoniness, topography, and rockiness. They are very stony and in many places occupy steep slopes. In some locations it appears feasible to remove the stones with a bulldozer to obtain land for cultivation.

The soils have a poor water-holding capacity, and crops located on upper slopes often suffer from lack of moisture during short periods without rain. Crops on middle or lower slopes are less affected by drought, but stones generally prohibit cultivation in these locations.

Some areas are used for growing cabbages, turnips, potatoes, and good forage crops. Smaller areas along the coast are used for pasture (Fig. 13) and hay land.

Forest growth is limited by exposure to wind, low moisture in the soil, and low fertility. The soil capability for forestry is Class 5–7.

Gull Cove map unit 1333 ha

Location. Gull Cove soils are located mainly in the southeastern part of the southwest arm of the Peninsula. They occupy depressions on middle and, especially, lower slopes and sometimes on higher elevations with poor drainage in conjunction with organic soils.

Parent material. These soils are developed from medium textured, dark brown glacial till derived from red shale.

Topography. The soils occur on gently to strongly sloping surfaces with slopes between 1 and 5%.

Drainage. Surface drainage is imperfect to poor, and the soils have poor internal drainage.

Vegetation. Vegetation consists of balsam fir forest with some spruce, birch, and gray alder and open areas covered with moss and heath plants.

Soil classification. Orthic Gleysol

Range in characteristics. The organic surface varies with the vegetation cover, which may range from a dense forest of stunted trees to open bog areas. The soils vary considerably in stoniness and are extremely stony in lower slope positions. In the poorly drained areas on the flat upland, stoniness is not usually a problem. Small patches of a thin iron pan occur mainly under large stones. In some areas poor drainage and wet conditions occur only in spring and early summer; in others, nearly continuous wet conditions prevail. The latter areas are of little value for any production, but those areas with only temporary excess moisture are capable of forest production.

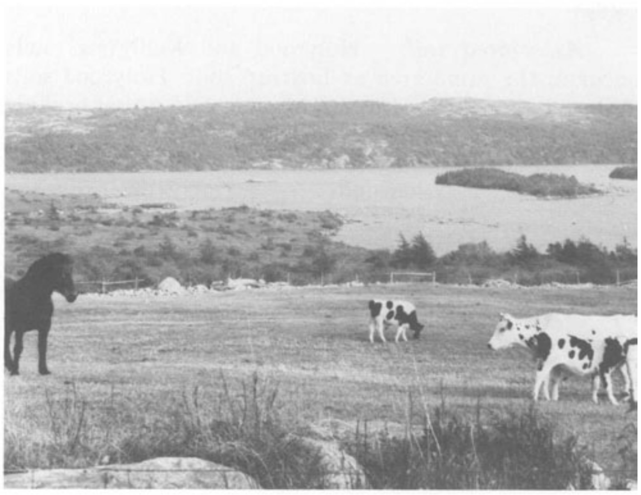

Fig. 13. A pasture on Foxtrap sandy loam.

Associated soils. Branch soils are found in the better drained locations on the landscape. They have little or no leached horizon and a dark reddish brown to brown B horizon with almost no mottling or none. Organic soils with a surface layer thicker than 60 cm are also located in the Gull Cove soil area.

Land use. The use of the Gull Cove soils for agriculture is limited by wetness and topography. The soils have a capability for agriculture of Class 5–7. Some areas are presently used for pasture and other areas could be improved, if necessary, to provide good forage.

The soils have a capability for forestry of Class 5–7. The main limitations are exposure to wind, wetness, and low fertility.

Heart's Content map unit 14 493 ha

Location. These soils were mainly mapped in coastal regions east of Trinity Bay, with some smaller tracts south of the bay on the isthmus.

Parent material. Heart's Content soils are developed from medium textured, pale olive glacial till derived from acid siltstone and some acid volcanic rocks.

Topography. The soils occupy the upper and middle slopes of gently to moderately rolling low hills with slopes between 5 and 12%.

Drainage. They are moderately well drained on the surface, but internal drainage is imperfect. An organic surface horizon several centimetres thick keeps the soil moist and also causes reducing conditions in the profile.

Vegetation. Vegetation is mainly heath barrens with small shrubs and mosses.

Soil classification. Gleyed Humo-Ferric Podzol

Range in characteristics. In sheltered locations the organic surface horizon can be 60 cm deep, but in better drained locations or more exposed ones, such as at the tops of hills and on upper slopes, the surface horizon is thinner. Surface stones are usually hidden by the vegetation and the organic horizon. Soils in lower slopes have more organic matter and stones in the profile, and poorer drainage. On hilltops there are more stones on the surface. Upper horizons contain more fine material than those lower in the profile. Pockets of sand are not uncommon under a clay loam or clay Ae horizon. The solum is 30–75 cm thick, with the thickest part in the better drained locations.

Associated soils. Pouch Cove soils usually occur in upper slope positions. They have a thicker Bf horizon that does not become thin or cemented. Torbay soils occupy depressions and valleys in lower slope positions in the same area. They are poorly drained and have dull gray colors in the B horizon.

Land use. Heart's Content soils have a capability for agriculture of Class 5–7. Their use is limited by stoniness, topography, and rockiness. At present, only small areas are used for growing potatoes and turnips or for pasture. With proper management the soils can be used for blueberry production. Some sheltered areas are suitable for growing potatoes; other areas could be improved for pasture.

Forest production is limited by exposure to wind, low fertility, and lack of moisture. The soils have a capability for forestry of Class 5–7.

Holyrood map unit 10 810 ha

Location. Holyrood soils occupy hilltops, ridges, and upper slopes south of Conception Bay, and generally east, northeast, and southeast of Holyrood. They are more extensive on northerly and easterly exposures than on southwest-facing slopes.

Parent material. The soils are developed from moderately coarse textured, light brownish gray glacial till derived mainly from granite.

Topography. They occupy rolling to hilly terrain with slopes between 6 and 40%.

Drainage. Holyrood soils are well drained on the surface and well to rapidly drained internally.

Vegetation. The main vegetation consists of open stands of spruce and balsam fir and heath barrens.

Soil classification. Orthic Humo-Ferric Podzol

Range in characteristics. The thickness of the F and the Bhf horizons increases downslope. Hilltops and upper slopes have more stones on the surface, but there is more stone in the solum in lower slope positions. The soils are porous with low water-holding capacity. Trees and plants suffer from lack of moisture in dry periods. Valleys that are protected from the wind and receive moisture from higher elevations generally provide much better growing conditions. Seasonal dry periods and human mismanagement have contributed greatly to extensive forest fires that have left large treeless areas. Subsequent erosion has removed soil and exposed bedrock. Holyrood soils are generally exceedingly stony, and in many places, too rocky to permit cultivation. Small areas with fewer stones and no rock outcrops occur.

Associated soils. Foxtrap and Kelligrews soils and small areas of Upper Gullies soils are located in the same area as Holyrood soils. Foxtrap soils have some mottling in the cemented Bfcgj horizon (ortstein) and in the hard BC horizon. Kelligrews soils are more strongly mottled in the solum than Foxtrap soils. Upper Gullies soils are poorly drained, dull colored, and often have a peaty surface horizon.

Fig. 14. Newly broken land on very stony Holyrood sandy loam.

Land use. Holyrood soils are generally unsuitable for farming. Their capability for agriculture is Class 7–5. The main limitations are stoniness, rockiness, and topography. The soils have a low water-holding capacity. In some places it is feasible to remove surface stones with a bulldozer to clear small areas for cropland (Fig. 14). Lack of moisture is a problem in dry seasons. Small acreages are used for growing potatoes and turnips and for grazing. Some of the barrens produce a fair blueberry crop. Frost prevents satisfactory tree planting except where there is a thick organic surface horizon. Trees can be successfully planted only on the side of furrows in the organic horizon. The capability for forestry is Class 7–5, with limitations imposed by exposure to wind, low moisture, and low fertility.

Kelligrews map unit 23 852 ha

Location. Kelligrews soils occupy small depressions, lower slopes, and slopes with generally a southwesterly exposure, in an area northeast, east, and southeast of Holyrood, south of Conception Bay.

Parent material. Kelligrews soils are developed from moderately coarse textured, pale olive glacial till derived mainly from granite.

Topography. The soils occupy undulating to moderately rolling terrain with slopes between 8 and 30%.

Drainage. Surface soils are moderately well drained, but internal drainage is imperfect to poor. A thin organic surface horizon of moss and heath keeps the soil moist and hinders aeration.

Vegetation. A heath-type vegetation is common, with occasional open stands of black spruce, balsam fir, tamarack, and some white birch.

Soil classification. Gleyed Humo-Ferric Podzol

Range in characteristics. The soil is 37–75 cm deep, with the deeper soil in the upper slopes. In lower slopes the organic surface horizon is thicker, as well as the Bhfgj horizon, which is enriched with organic matter. The thin, brightly colored and often cemented Bfc horizon is generally more apparent in better drained sites in coastal areas.

Associated soils. Holyrood, Foxtrap, and Upper Gullies soils are located in the same area. The properties of these soils are described in the section on Holyrood soils.

Land use. Kelligrews soils have a capability for agriculture of Class 7–6, with limitations imposed by stoniness, rockiness, and topography. Small areas are used for grassland. Many areas are too steep for cultivation with mechanized equipment.

Very severe limitations of exposure to wind, low fertility, and rockiness restrict the use of Kelligrews soils for forestry. The soils have a capability for forestry of Class 7.

Low Point map unit 1327 ha

Location. Low Point soils occupy shallow depressions in the southern part of the Peninsula, particularly northeast of Trepassey Bay.

Parent material. Low Point soils are developed from moderately fine textured, light olive gray glacial till derived from slates and siltstone.

Topography. The soils occur on gently to moderately rolling hills with slopes between 1 and 5%.

Drainage. Surface and internal drainage are poor, but the latter improves slightly with depth.

Vegetation. Except for an occasional stunted tree, vegetation consists of low heath and shrub barrens.

Soil classification. Placic Humic Podzol

Range in characteristics. The surface is very stony in all areas. The organic surface horizon varies in thickness and composition. In wetter locations this horizon consists of decomposing moss, and on drier sites, small shrubs and other plant remains. The leached horizon and the horizon under it are generally very stony, but stoniness decreases with depth. Pockets of sandy soil may occur at 90–150 cm deep.

Associated soils. Biscay Bay soils occur on slopes and hills. They have a leached horizon (Ae) that is usually not more than 7.5 cm thick, but they do not have the thick black Bhgj horizon or the bright yellowish red iron pan found in Low Point soils.

Trepassey soils have a very thin Ae horizon and a reddish black Bhfgj horizon containing iron, whereas the Bhgj horizon in Low Point soils is black and does not contain iron.

Land use. Low Point soils are too stony to permit cultivation. They have a capability for agriculture of Class 7, with very severe limitations imposed by stoniness and wetness. They also have a capability for forestry of Class 7. In some areas the soils provide winter grazing for caribou.

Manuels map unit 920 ha

Location. Manuels soils occupy middle and upper slopes along the southern shore of Conception Bay.

Parent material. These soils are developed from moderately fine textured, very dark grayish brown glacial till derived from shale and slate.

Topography. Manuels soils occupy gently to steeply sloping terrain with slopes between 4 and 16%.

Drainage. The surface soils are moderately well to well drained. The internal drainage is moderately good.

Vegetation. The original vegetation of balsam fir forest with white birch has been removed, except on the very steep slopes. Most areas are under cultivation.

Soil classification. Eluviated Dystric Brunisol

Range in characteristics. The soils vary somewhat in texture and are lighter colored near the hilltops and upper slopes. These soils vary from nearly free of stones to moderately stony, with enough stone to interfere with cultivation. The soil is 70 cm deep in well-drained locations on the hills to 35 cm on the lower slopes. On hilltops and upper slopes, the leached horizon (Ae) is better defined and thicker than in the lower slopes, where it is very weakly expressed.

Associated soils. Cochrane and Pouch Cove soils occur in the same area. These soils differ from Manuels soils in having a greater stone content. Pouch Cove soils usually have a partly decomposed organic surface horizon several centimetres thick.

Land use. Practically all Manuels soils are under cultivation. The soils are nearly free of stones, have medium fertility, and are very acid. They have good water-holding capacity and produce excellent crops when limed and fertilized.

Their capability for agriculture is Class 3–5, with moderate limitations of climate, topography, and fertility.

For forestry, limitations are wind and low moisture conditions. The soils have a capability for forestry of Class 4–5.

Markland map unit 7665 ha

Location. Markland soils occupy the tops, upper slopes, and most of the middle slopes in the center of the Peninsula, about equidistant from Trinity, Conception, and St. Mary's bays.

Parent material. Markland soils are developed from moderately coarse to medium textured, dark grayish brown glacial till derived from siltstone, slate, and acid volcanic rocks.

Topography. The soils occur on gently to strongly rolling terrain with slopes between 7 and 17%. The hills often have an east–west alignment. The south-facing slopes are steeper than those on the north and northeast.

Drainage. Surface and internal drainage are moderately good. In some places surface drainage may be hampered by vegetation.

Vegetation. Tree cover consists mainly of balsam fir, and mixed balsam fir and white birch. The stands appear to be more vigorous on the northeast slopes than on the southwest slopes.

Soil classification. Orthic Humo-Ferric Podzol

Range in characteristics. The soil depth varies widely. Shallow soils are common on the north side of the hills. Much deeper soils generally are found on the south-facing slopes. The hummocky nature of the topography provides a variety of drainage conditions and soil development.

Associated soils. Pouch Cove and Torbay soils, as well as organic soils, are located in the area. Organic soils are 60 cm deep or deeper. Pouch Cove soils occur in depressions and on mid to lower slopes below the Markland soils (Fig. 15). They are stony, poorly drained, and have dull-colored mottled B horizons. They are more extensive on the south than on the north slopes.

Torbay soils occupy depressions and lower slopes that often border on organic soils. They are very poorly drained, gray colored, very stony, and have an organic surface horizon.

Land use. Markland soils have fair natural fertility. Many of the slopes are too steep for cultivation. Their capability for agriculture is Class 4–6. The main limitations are topography, low fertility, and low moisture. Small areas are used for growing potatoes and turnips, but larger tracts could be brought under cultivation and used for pasture or hay land.

Moisture deficiency and low fertility limit the use of the soils for forestry. Markland soils have a capability for forestry of Class 5–6.

Mutton map unit 59 ha

Location. Mutton soils are found on barasways, or barachois, at the mouth of rivers, bays, or estuaries near Biscay Bay, Portugal Cove South, and other wind-exposed areas near the south coast of the Peninsula.

Parent material. Mutton soils are developed from coarse textured, light yellowish brown windblown sand.

Topography. The soils occur on gently to moderately rolling terrain with slopes between 5 and 15%.

Drainage. Surface and internal drainage are good to rapid.

Vegetation. There is very little vegetative cover except for a sparse growth of beachgrass and weeds.

Soil classification. Orthic Regosol

Range in characteristics. The soil material is of quite recent deposition by the wind and is constantly stirred and moved downwind to be deposited in other areas. Particle size varies somewhat at different sites because heavier particles do not move as readily as finer ones. Gravel may underlie these sands.

Land use. The soils are very dry except in low-lying areas and are subject to wind erosion. Their capability for agriculture is Class 7 because of low moisture, adverse climate, and erosion. Their capability for forestry is also Class 7, with limitations imposed by exposure to wind, low moisture, and low fertility. The soils are used mainly as construction and road-building material. They also have a recreational value.

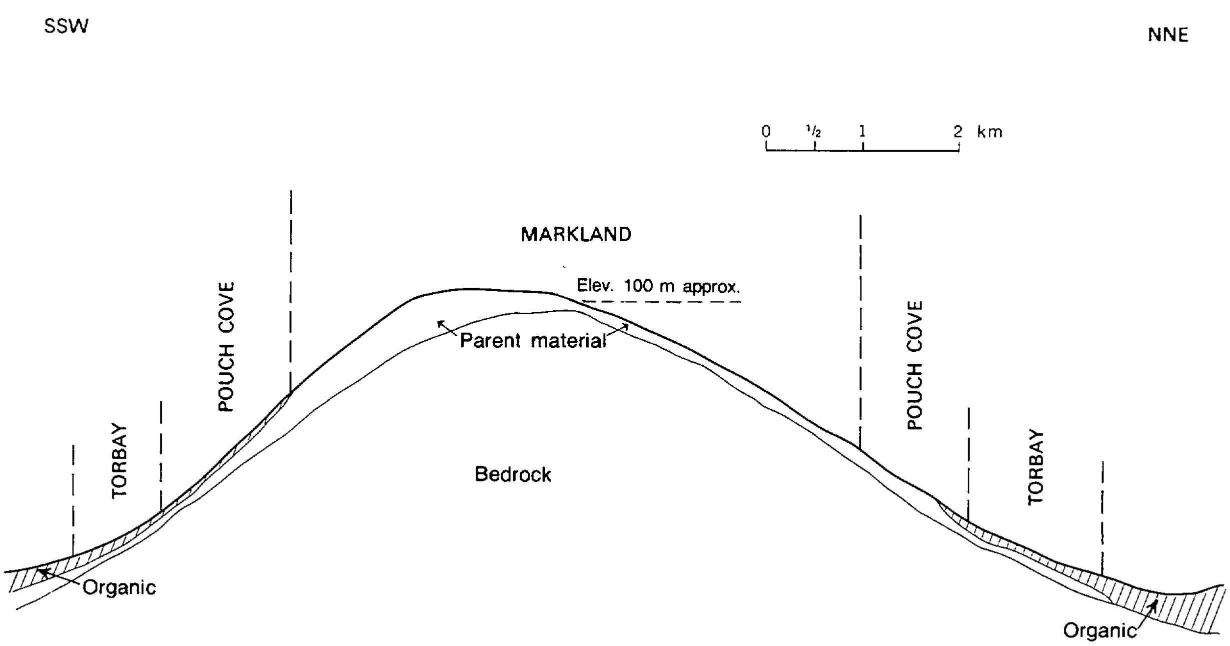

Fig. 15. Topographic relationship of Markland, Pouch Cove, Torbay, and organic soils.

LRRI

North Harbour map unit 23 706 ha

Location. North Harbour soils occupy slopes and hilltops northeast of Placentia Bay.

Parent material. The soils are developed from moderately coarse textured, dark grayish brown till derived from siltstone, slate, and acid volcanic rocks.

Topography. The landscape of North Harbour soils is gently to strongly rolling, with most slopes between 7 and 15%.

Drainage. Surface drainage along the slopes is hampered by a dense growth of small shrubs and moss. Internal drainage is imperfect to poor. Aeration is hampered by the organic surface.

Vegetation. Tree cover consists of black spruce with balsam fir and tamarack. There is a thick moss ground cover.

Soil classification. Placic Humo-Ferric Podzol

Range in characteristics. The organic surface horizon is 20–60 cm thick, with pockets that exceed 60 cm. The surface stoniness varies, and in some locations large boulders and rock outcrops occur. The soil characteristics vary with the location in the landscape and the depth of the organic surface horizon. Soils in lower positions have a thick organic surface horizon, an iron pan, and a hard BC horizon. In slightly better drained positions, the surface horizon and iron pan are thinner and the BC horizon is less hard.

Associated soils. Organic soils deeper than 60 cm and Pouch Cove soils occur in the area. Pouch Cove soils occur on the tops of hills. They lack a dark, dusky red B horizon under the leached horizon and an iron pan such as occurs in North Harbour soils. They usually have organic surface horizons less than 20 cm thick.

Land use. Most areas of North Harbour soils are either too stony or too steep to cultivate. Their capability for agriculture is Class 6–7. Their use is limited by very severe conditions of wetness, stoniness, and poor structure. It is impractical to apply mechanical improvement regularly with mechanized equipment. These soils are used in some areas for grazing.

Their capability for forestry is Class 6–7. Severe limitations are imposed by exposure to wind, low fertility, and wetness.

Old Perlican map unit 3165 ha

Location. Old Perlican soils occur on upper and middle slopes, south and west of Bay de Verde.

Parent material. The soils are developed from very stony, medium textured, dusky red glacial till derived from sandstone, siltstone, and conglomerate.

Topography. Old Perlican soils occupy gently to moderately rolling terrain with slopes between 5 and 15%. There are many rock outcrops.

Drainage. Surface drainage is impeded by the organic, peaty surface. Internal drainage is poor and the organic surface prevents good aeration of the profile and keeps the soil moist.

Vegetation. Most of the vegetation consists of low heath and shrubs, with a few scattered trees.

Soil classification. Orthic Humic Podzol

Range in characteristics. The organic surface horizon is absent in places through what appears to be simultaneous action by frost and wind. Many very large boulders and large stones are usually present at the surface. Some small areas have few or no stones on the surface and the profile is relatively free of stones. Some areas have a layer of gravel and no vegetation on the surface, and only a few stones in the profile to 45 cm deep. This is probably caused by frost churning in the soil. Rock outcrops occur in many areas.

Associated soils. Grayish Bay de Verde soils and organic soils occur on poorly drained and depressed sites. The organic soils have an accumulation of organic material 60 cm or thicker.

Land use. Old Perlican soils are usually very stony with many rock outcrops. Some areas are too steep to cultivate. Small areas are used for growing potatoes and turnips or for pasture and meadowland. Large areas could be improved and used for pasture.

Their capability for agriculture is Class 5–7, with limitations imposed by stoniness, rockiness, and topography.

The capability for forestry is Class 7. Exposure to wind, low fertility, and rockiness impose very severe limitations to the growth of trees.

Organic soil map unit 112 127 ha

Location. Organic soils occur in many parts of the Peninsula. They are particularly abundant in the southwest arm of the Peninsula, north of St. Mary's Bay, and northeast of Trepassey Bay.

Parent material. The soils are developed from the growth and decomposition of mosses, sedges, heath plants, and other hydrophytic vegetation.

Topography. Most of these soils occupy basins, or depressions, or gentle slopes where there is sufficient moisture to promote their development.

Drainage. The soils are poorly drained and usually saturated with water most of the year unless artificially drained.

Vegetation. The vegetation of the organic soils is discussed by F. C. Pollett in another part of this report.

Soil classification. Typic, Mesic, and Humic Fibrisols and Fibric, Typic, and Humic Mesisols.

Range in characteristics. Soils are called organic if they contain at least 60 cm of fibrous peat or 40 cm of well-decomposed material. The soils were mapped according to their nutrient status at formation, their decomposition, and the presence of mud ponds or flashets.

The nutrient status is called oligotrophic if mainly fibrous mosses occur, eutrophic if the soils are composed of the remains of a great variety of plants, and mesotrophic if they are composed of mosses and a small amount of other plant remains. Thus, the organic soils have been indicated with the letters O, E, and M. Only a few eutrophic organic soils occur in the Peninsula: along the Salmonier Line (the road from Holyrood to St. Mary's Bay) and elsewhere in the central part of the Peninsula. The areas are too small to be shown on the map.

The decomposition of these soils has been established according to the Von Post scale (24), at a depth of 60 cm. In this scale of 1 to 10, 1 indicates raw peat and 10 indicates well-decomposed peat. The presence of mud ponds is of particular importance to the possible drainage of the organic soils (Fig. 16). The ponds are obstacles to equipment and machinery. It may be necessary to fill them with boughs and peat to provide a bearing surface for equipment. Ditches for draining these ponds require hand labor, and cattle can drown in unfenced ponds.

The depth of the organic deposits has been recorded where practical. The nutrient status, decomposition, presence of mud ponds, and depth are shown in the following convention:

O5FV indicates a nutrient-poor organic soil (oligotrophic) of medium decomposition (5), with the presence of mud ponds, or flashets (F), and five (V) feet (1.5 m) deep.

Land use. See discussion by A. P. Rayment in Part II of this report.

Patrick's Cove map unit 18 019 ha

Location. Patrick's Cove soils are located east of Placentia Bay in the southwestern part of the Peninsula.

Fig. 16. An organic soil with mud ponds, or flashets.

Parent material. The soils are developed from stony, moderately coarse textured, dark brown glacial till derived from sandstone, siltstone, and acid volcanic rocks.

Topography. Patrick's Cove soils occupy gently to steeply sloping land, with most slopes between 8 and 25%.

Drainage. Surface drainage is impeded by moss and low shrub vegetation. Internal drainage is poor. The organic surface cover inhibits aeration and keeps the soils moist throughout the year. Internal drainage is also restricted by the structure of the soils. Much rain and fog provide excess moisture throughout the year.

Vegetation. Vegetation consists of dense, stunted balsam fir and black spruce forest, with a ground cover of moss and small shrubs.

Soil classification. Placic Ferro-Humic Podzol

Range in characteristics. Rock outcrops are common in areas of Patrick's Cove soils. Whereas some areas have only scattered rock outcrops, others are too rocky to permit cultivation. All these soils are stony. Usually stones must be removed before cultivation is possible. The organic surface varies in thickness. Drainage is much better on the upper slopes. The lower slopes are usually too wet and stony to permit cultivation.

Associated soils. Angel's Cove soils that occur in the Peninsula are better drained and generally less stony than Patrick's Cove soils. They have reddish brown to yellowish red horizons under the leached Ae horizon and do not have a thin iron pan.

Organic soils are common in the depressions and other poorly drained areas, and also on lower slopes.

Land use. Small tracts of Patrick's Cove soils are used for gardens. There are some areas that could be used for grazing. The capability for agriculture is Class 5–7. The main limitations are stoniness, rockiness, topography, and a few undifferentiated factors.

These soils have a capability for forestry of Class 6–7, with limitations imposed by exposure to wind, low fertility, and wetness.

Peter's River map unit 7432 ha

Location. Peter's River soils occupy upper slopes and hilltops near the east shore of the southern part of St. Mary's Bay, small areas along the coast east of Trepassey Bay, and small areas in the southern part of the Peninsula near the Atlantic Ocean.

Parent material. The soils are developed from medium textured, olive glacial till derived from slate, siltstone, and acid volcanic rocks.

Topography. Peter's River soils occur on moderately to strongly rolling topography and some small areas of gentle slopes. The slope range is between 8 and 20%.

Drainage. The soils have moderately good to imperfect surface drainage. Internal drainage is moderately good.

Vegetation. Tree cover consists mainly of balsam fir and white spruce. Ground cover is made up of shrubs and mosses.

Soil classification. Orthic Humo-Ferric Podzol

Range in characteristics. Stoniness varies from moderately stony, with enough stones to cause some interference with cultivation, to exceedingly stony, where stones must be cleared in order to cultivate the soil. There are generally more stones in the profile in the lower slope positions. In some places the organic surface horizon is 25 cm thick.

Associated soils. Biscay Bay and Organic soils occur in the Peninsula. Biscay Bay soils have a thicker organic surface horizon than Peter's River soils and a dark-colored Bhf horizon 7.5–20 cm thick, with mottling in several horizons. Organic soils have an organic surface horizon of 40 cm or more.

Land use. The capability of Peter's River soils for agriculture is limited by stoniness, topography, and adverse climate. They are rated Class 5–7. The soils are quite stony on the surface and have fairly steep slopes. Their main use is for pasture and hay land. Small areas are used for growing potatoes, turnips, and cabbage. Some of the larger areas provide winter grazing for caribou.

Exposure to wind and low natural fertility are limitations to growing trees. Peter's River soils have a capability for forestry of Class 6–7.

Placentia Junction map unit 2587 ha

Location. These soils occupy the upper slopes and hilltops in the west central part of the Peninsula, south of Trinity Bay.

Parent material. Placentia Junction soils are developed from medium textured, dark reddish brown glacial till derived from shale with limestone and occasional manganese beds.

Topography. The soils have slopes between 8 and 15% on gently to moderately rolling topography.

Drainage. Both surface and internal drainage are moderately good.

Vegetation. Tree cover is balsam fir, with birch, white spruce, and speckled or gray alder. Ground cover is largely shrubs and mosses.

Soil classification. Orthic Humo-Ferric Podzol

Range in characteristics. The topography of these soils is important. Some areas consist of a series of rolling hills that hinder cultivation. Other areas with gentle to moderate slopes can provide good farmland. The leached horizon (Aej) is thin in most places, but may form vertical tongues that suggest local more intense leaching. Stoniness generally increases with depth. There is more stone and more pronounced mottling in the lower part of the B horizon in soils on the lower slopes. Rock outcrops occur in some areas.

Associated soils. Chapel Arm soils and Organic soils occur in the area with Placentia Junction soils. Organic soils have surface horizons more than 60 cm thick. Chapel Arm soils are shallow, stony, and have a well-defined thin iron pan.

Land use. Placentia Junction soils are fairly productive and have good moisture-holding capacity and texture. Stoniness is not usually a hindrance to cultivation, but some areas are too steep for this purpose. Only small areas are used for hay and pasture. The capability of the Placentia Junction soils for agriculture is Class 4–6, and the main limitations are stoniness and steep slopes.

Nearly all Placentia Junction soils could be developed for hay or pastureland, and some areas are suitable for cropland.

The capability for forestry is Class 5–6 with limitations imposed by low fertility and exposure to wind.

Point Lance map unit 7313 ha

Location. Point Lance soils occur on upper and middle slopes, except in depressions, in the south and southwestern part of the southwest arm of the Peninsula.

Parent material. The soils are developed from shallow, stony, moderately coarse textured, dark grayish brown till derived from siltstone, slate, and acid volcanic rocks.

Topography. The topography ranges from gently to moderately sloping to undulating or moderately rolling, with most slopes between 2 and 12%.

Drainage. The soils are moderately well drained on the surface, but internal drainage is poor. An abundance of cool moist winds from the ocean, fog, and an organic surface keep the soil moist and poorly aerated.

Vegetation. Most areas of these soils are covered with moss and heath.

Soil classification. Placic Humic Podzol

Range in characteristics. The surface stoniness is greater and the organic surface horizon is thinner on upper slopes and hilltops, but there is more stone in the soil on lower slopes.

Associated soils. Organic soils, with a surface horizon more than 60 cm thick, and Cuslett soils, with a thin surface and leached (Ae) horizon and no iron pan, are associated with Point Lance soils.

Land use. Point Lance soils are very wet and stony and occur in a windswept area where only low shrubs, grass, and moss survive (Fig. 17). They provide unimproved pasture for sheep and winter grazing for caribou. The capability for agriculture is Class 7–6. Their use is limited by stoniness, wetness, and adverse climate. For forestry, they are rated Class 7 and have very severe limitations imposed by exposure to wind and low fertility.

Fig. 17. Poorly drained very stony Point Lance loam and organic soils.

Pouch Cove map unit 87 400 ha

Location. Pouch Cove soils occur in the eastern, northeastern, central, and northwestern part of the Peninsula.

Parent material. They are developed from stony, coarse textured, dark olive glacial till derived from siltstone and slate.

Topography. The soils occur on undulating to gently rolling topography, but also on steeper slopes in the south central and western part of the Peninsula, and sometimes on strongly to steeply sloping land. Generally the slopes range from 2 to 10%.

In the north central part of the Peninsula, Pouch Cove soils occur on nearly level to very gently rolling terrain or on convex or lower slopes. In the western part of the Peninsula in the south central and coastal areas, these soils are not restricted to the lower or more level topography. Here they occupy upper and middle slope positions, often under a heath vegetation.

Drainage. Pouch Cove soils are imperfectly to well drained on the surface, but have imperfect to poor drainage internally. In some areas moist conditions are maintained by fog and a humid atmosphere. A peaty surface horizon keeps the soils moist for prolonged periods, hampering aeration and producing mottled colors in the upper horizons.

Vegetation. In the north, east, and central parts of the Peninsula the soils are forested with balsam fir, black spruce, and some white spruce and tamarack. In the south central and western parts of the area the soils are mainly covered with heath (barrens).

Soil classification. Gleyed Humo-Ferric Podzol

Range in characteristics. Pouch Cove soils on the hilltops in the northwestern and south central part of the Peninsula have a thinner organic surface horizon and brighter colored profiles than in other areas. On the lower slopes they are exceedingly stony, but they are less stony on the hilltops and upper slopes. As drainage becomes poorer soil depth decreases.

Associated soils. Cochrane, Torbay, and Markland soils occur in association with Pouch Cove soils. Torbay soils are gray, very poorly drained, and occupy depressed sites or lower slopes. Cochrane and Markland soils are well drained and have bright colored horizons with little or no mottling.

Land use. Pouch Cove soils are generally exceedingly stony, low in natural fertility, and wet. In some areas they are too steep for cultivation. Their agricultural capability is Class 5–7 with limitations imposed by stoniness, wetness, and rockiness.

Pouch Cove soils that occupy midslope positions and, locally, some in lower slope positions that get much of their moisture through lateral moisture movement are among the best forest capability sites on the Peninsula. The limitations to forest growth are exposure to wind, low fertility, and wetness. Pouch Cove soils have a capability for forestry of Class 5–7. These soils are used mainly for pasture and hay land and to a limited extent for vegetable production. There are extensive areas that could be improved for pasture or hay land.

Rabbit map unit 1181 ha

Location. Rabbit soils occur on upper slopes in the southeast corner of the southwestern arm of the Peninsula.

Parent material. These soils are developed from moderately fine textured very dark grayish brown glacial till derived from shales with some limestone.

Topography. Rabbit soils occupy moderate to steep slopes between 8 and 15%.

Drainage. Surface drainage is good, but internal drainage is imperfect to poor.

Vegetation. Tree cover consists of a fairly open stand of balsam fir. Ground cover is mainly mosses and shrubs.

Soil classification. Gleyed Dystric Brunisol

Range in characteristics. Surface stones are absent in most locations, but may be numerous in a few areas. Rock outcrops occur in some locations. The thickness of the organic surface horizon (F–H) varies considerably. Thick organic surface horizons are found on moderate slopes or hilltops. The leached horizon (Ae) in these locations is also the thickest and contains more clay than in other locations with steeper slopes or thinner surface horizons. Pockets of limestone in the parent material cause variations in soil acidity.

Associated soils. Branch soils are well drained and have little or no organic surface horizon, a very thin leached (Ae) horizon, and no thin iron pan. The poorly drained Gull Cove soils occur in depressions and in lower slopes and have a pronounced mottled, leached horizon (Aeg).

Land use. Rabbit soils are acid, low in natural fertility, and fairly free from stones. They are limited for use by adverse climate, topography, and wetness and are Class 5–6 for agriculture. They are used mainly for pasture or hay land. Where the topography is favorable, some areas can be improved by fertilization.

In many places the soils are exposed to wind and they occupy steep slopes that make them unfavorable sites for forest growth. This factor, together with low fertility, reduces their capability for forestry to Class 7.

Red Cove map unit 14 667 ha

Location. Red Cove soils occur on upper slopes and hilltops on the coastal hills north, east, and south of St. John's.

Parent material. These soils are developed from extremely stony, coarse textured, reddish gray glacial till derived from red sandstone, siltstone, slate, and red conglomerate.

Topography. The soils occupy strongly to very steeply sloping topography with slopes ranging between 15 and 40%.

Drainage. The surface drainage is very rapid, but internal drainage is imperfect to poor.

Vegetation. Stunted spruce and balsam fir with heath barrens are the main vegetation cover.

Soil classification. Very shallow lithic Gleyed Ferro-Humic Podzol

Range in characteristics. Bare rock, rock with a thin moss cover, boulders, very stony land, and very thin soil over bedrock are included with Red Cove soils.

Associated soils. Organic soils and Patrick's Cove soils occur in the area with the Red Cove soils. Organic soils have a surface horizon more than 60 cm thick. Patrick's Cove soils are deeper and not as stony as Red Cove soils.

Land use. Red Cove soils are unsuitable for agriculture. Tree growth is very stunted. Their capability for agriculture is Class 7, with limitations imposed by rockiness and topography. They are also Class 7 for forestry because of very severe limitations of rockiness, exposure to wind, and lack of moisture.

Seal Cove map unit 582 ha

Location. Seal Cove soils occur mainly on terraces and benches on the southern shore of Conception Bay, near the villages of Seal Cove, Heart's Content, and Heart's Desire, east of Trinity Bay.

Parent material. These soils are developed from coarse textured, glaciofluvial material derived mainly from granite.

Topography. Seal Cove soils occupy gently to moderately rolling terrain with slopes between 6 and 15%.

Drainage. The soils have rapid to moderately good surface drainage and are moderately well drained internally.

Vegetation. Vegetation consists of open stands of black and some white spruce with occasional balsam fir and tamarack. Ground cover is mainly heath and shrubs.

Soil classification. Placic Humo-Ferric Podzol

Range in characteristics. Seal Cove soils have considerable variation in stratification of sands and gravels. Layers of stones with coarse sand or gravel as well as layers of very coarse sand occur in various places. Large boulders on the surface are not uncommon.

Associated soils. Organic soils with surface horizons thicker than 60 cm occupy depressions associated with Seal Cove soils. In some small areas with poor drainage there are several centimetres of peat on the surface and an iron–manganese pan is present in the solum. The soils in these sites were designated as Indian Pond, but the areas were not large enough to appear on the map.

Land use. Seal Cove soils are too coarse and stony for use in agriculture or forestry. They have severe limitations of stoniness, low moisture or droughtiness, and topography and are Class 7 capability for agriculture. Low moisture and exposure to wind limit their use for growing trees, and they are in Class 7 capability for forestry.

Shearstown map unit 1161 ha

Location. Shearstown soils are found on the tops and slopes of hills and ridges in an area southwest of Conception Bay and southwest of Bay Roberts.

Parent material. These soils are developed from very gravelly, olive gray loamy sand till derived from slate and acid volcanic rocks.

Topography. The soils occur on gently to strongly rolling terrain with most slopes between 5 and 30%.

Drainage. The soils have good surface drainage. Internal drainage is good to moderately good.

Vegetation. Vegetation is mainly balsam fir, white spruce, white birch, and some thinleaf alder with a ground cover of heath and shrubs.

Soil classification. Orthic Humo-Ferric Podzol

Range in characteristics. There are a few sites of relatively stone-free land, but stones are a serious problem in some areas. Lower slopes generally have more stones than upper ones. The soils are deeper on upper slopes and shallower on middle and lower or very steep slopes.

Associated soils. Cochrane soils occur in nearby areas. They are shallower and exceedingly stony with a pronounced leached horizon, but without a dark-colored

Bhf horizon. Torbay soils occupy the poorly drained depressions. They are dull gray and excessively stony. Carbonear soils occur in imperfectly drained locations under a heath vegetation north of the Shearstown soil area. They lack the dark-colored Bhf horizon, but have a thick, cemented, and mottled BCcgj horizon.

Land use. Shearstown soils are used extensively for pasture and hay land and also for growing turnips, cabbage, and potatoes. Stones are not a major problem, but some areas are too steep for cultivation. There are still some areas that could be cleared and cultivated or used for pasture.

The soils are in capability Class 5–7 for agriculture and their use is limited by topography and stoniness. Their capability for forestry is Class 5–7. Exposure to wind, low fertility, and low moisture-holding capacity are the main factors limiting their use for forestry.

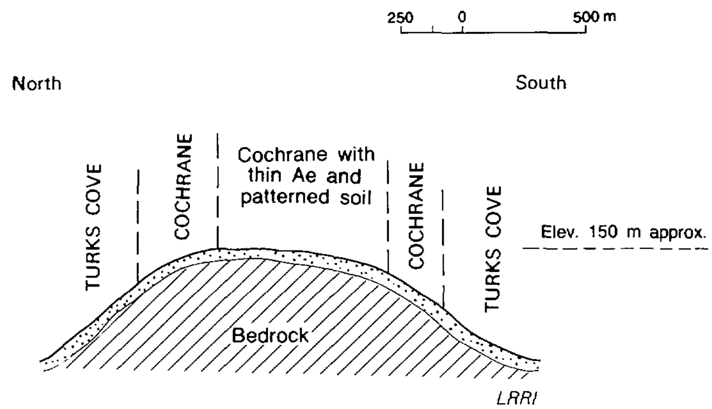

Fig. 18. Occurrence of Cochrane and Turk's Cove soils in relation to topography.

Smallwood map unit 1526 ha

Location. This map is a complex of Cochrane and Turk's Cove soils. Cochrane soils occupy the hills and upper slopes and Turk's Cove soils the middle and lower slopes, north of Mahers in the central part of the Peninsula.

Parent material. These soils are developed from medium to moderately coarse textured olive to dark olive gray glacial till derived from slate and siltstone.

Topography. The soils occupy gently to moderately rolling hills. Cochrane soils generally have slopes of 5–10% and Turk's Cove soils slopes of 8–18%.

Drainage. Both soils have good to rapid surface drainage. Cochrane soils have good internal drainage, but Turk's Cove soils are imperfectly drained.

Vegetation. These soils support a growth of scattered balsam fir with a ground cover of heath.

Soil classification. Both soils in the complex are Podzols, the Cochrane Humo-Ferric and Turk's Cove Ferro-Humic.

Range in characteristics. The relationship of Cochrane and Turk's Cove soils on the landscape is shown in Fig. 18. There are some exceptions to this pattern: some gently rolling hills have only Cochrane soils, whereas Turk's Cove soils are found only on steeper slopes in some areas.

Associated soils. Pouch Cove, Torbay, and Organic soils occur in the same area. Pouch Cove soils are found on fairly flat hilltops. They are imperfectly drained with mottled, dull-colored B horizons. Torbay soils are very poorly drained and have gray colors. Organic soils have a surface horizon more than 60 cm thick.

Land use. Small areas are used for growing potatoes and turnips. Larger areas are grazed, but the larger proportion of these soils is scarcely used. The soils will produce good yields of blueberries if well managed. The use of the soils for agriculture is limited somewhat by stoniness, topography, and a combination of factors that results in a capability rating of Class 5–6. More areas could be developed for grazing land and for cultivated crops.

The capability of these soils for growing trees is Class 5–7, and the limitations are mainly exposure to wind and low fertility.

St. Stephen map unit 12 841 ha

Location. St. Stephen soils occupy the upper and middle slopes on the southeastern shore of St. Mary's Bay, but not the lower slopes or depressions.

Parent material. These soils are developed from coarse textured olive gray till derived from slate and siltstone.

Topography. They occur on gently to steeply sloping hills with most slopes between 10 and 25%.

Drainage. St. Stephen soils have good to rapid surface drainage, but the internal drainage is only moderately good to imperfect.

Vegetation. Tree vegetation consists of stunted balsam fir and black spruce. Ground cover is low heath and shrub (barrens).

Soil classification. Placic Ferro-Humic Podzol

Range in characteristics. The organic surface horizon increased to a thickness of 37 cm on lower slopes. A thin iron pan occurs at different depths in different locations. It may occur just below the AE horizon or deeper in the solum. Soil depth ranges from about 30 cm on lower slopes to 70 cm on well-drained upper slopes or hilltops.

Associated soils. The poorly drained Biscay Bay soils and Organic soils with a surface horizon 60 cm or more thick occur in the same area. Biscay Bay soils have an organic surface horizon 25 cm or more thick, gleyed B horizons, and no iron pan.

Land use. St. Stephen soils are generally stony and occupy fairly steep slopes. Small areas are used for pasture. There are other areas that could be improved for pasture or grazing land. These soils have a capability for agriculture of Class 7–6, and are limited in use by stoniness, topography, and rockiness. The limitations for forestry are exposure to wind and low fertility. The capability for forestry is 7–6.

Torbay map unit 60 194 ha

Location. Torbay soils occur mainly in the central and northeastern part, as well as in most other parts of the Peninsula.

Parent material. These soils are developed from moderately coarse textured olive-colored glacial till derived from acid slate, siltstone, and acid volcanic rocks.

Topography. These soils occur in level to depressed areas, in basins or drainage channels, and at the bottom of hills or long slopes (Fig. 19). Occasionally, they are found on higher elevations such as nearly level mountaintops. Slopes are generally less than 3%.

Drainage. Surface drainage is poor in depressions, on level sites, and in locations where drainage is impeded by vegetation. In some drainage basins or lower slopes that receive abundant moisture for extended periods of the year surface drainage is adequate or even rapid. Internal drainage is from poor to very poor.

Vegetation. Black spruce and tamarack are the main trees and the ground cover is moss and heath plants.

Soil classification. Rego Gleysol

Range in characteristics. The soils are very stony to excessively stony. The organic surface horizon is 15–60 cm thick. Torbay soils on the slopes show little or no horizon development.

Associated soils. Organic soils with surface horizons more than 60 cm thick and Pouch Cove soils with well-defined mottled Ae horizons and dark-colored Bfg horizons occur in the area with Torbay soils.

Land use. With the exception of a few small areas used for pasture, these soils have little agricultural use. Stoniness, wetness, and rockiness are the main limitations. The capability for agriculture is Class 7. On sloping sites Torbay soils can support good tree growth. The main limitations are low fertility, wetness, and exposure to wind. In most areas these factors are severe enough that the capability for forestry is Class 5–7.

Trepassey map unit 2886 ha

Location. Trepassey soils occur on lower slopes, on fairly level land, and near drainage channels in the southern part of the Peninsula near Trepassey Bay.

Parent material. These soils are developed from very stony, moderately fine textured light olive gray glacial till derived from slate and siltstone.

Topography. Trepassey soils occupy undulating to gently rolling topography with most slopes between 2 and 7%.

Drainage. Surface drainage is impeded by heath and moss vegetation and excessive stoniness. The upper part of the solum shows evidence of poor drainage and aeration because the soil cover keeps the soil moist for prolonged periods and prevents aeration. At greater depths the soils seem to be better drained.

Vegetation. A few stunted trees are found in sheltered locations. The main cover is heath plants and mosses.

Soil classification. Placic Humo-Ferric Podzol

Range in characteristics. Surface stoniness ranges from exceedingly stony (enough stones to prevent cultivation unless considerable clearing is done) to excessively stony (not suitable for cultivation). The organic surface horizon is embedded with boulders and is 20–75 cm thick. The depth of the mineral profile ranges from 37 cm in the poorest drained locations to 90 cm in better drained sites. On better drained sites on hilltops there is less peat and fewer stones on the surface and in the profile.

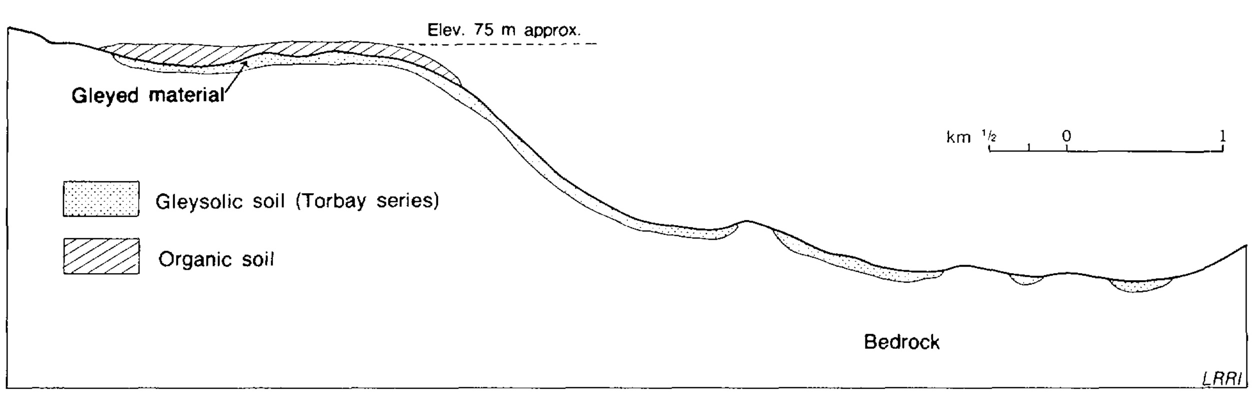

Fig. 19. Occurrence of Torbay gleysolic soils in relation to topography.

Associated soils. Biscay Bay and Low Point soils occur in the same area as Trepassey soils. Biscay Bay soils are not as stony on the surface as the other soils and they have a thin, somewhat cemented Bfhcg horizon and no iron–manganese pan above the C horizon. Low Point soils occupy depressional areas. They are excessively stony (boulder pavement), poorly drained, and have an iron–manganese pan above the C horizon, but no Bf horizon.

Land use. Trepassey soils are too stony to permit cultivation. Small areas are used for grazing sheep. Other areas provide winter grazing for caribou. Forage yields can be improved on such areas by fertilization. Their capability for agriculture is Class 7 because of severe limitations of stoniness, adverse climate, wetness, and rockiness. They are Class 7 in capability for forestry, with limitations imposed by exposure to wind, low fertility, and stoniness.

Turk's Cove map unit 36 940 ha

Location. Turk's Cove soils occupy the middle and lower slopes east of Trinity Bay on the northern part of the Bay de Verde arm of the Peninsula.

Parent material. These soils are developed from moderately coarse textured, olive-colored glacial till derived from slate, siltstone, and some acid volcanic rocks.

Topography. The soils lie on gentle to moderate and steep slopes of between 4 and 30%.

Drainage. Surface drainage is good to rapid, but internal drainage ranges from moderately good to imperfect.

Vegetation. Balsam fir, white spruce, black spruce, and thinleaf alder form the main tree cover. The ground cover consists of heath and mosses.

Soil classification. Orthic Ferro-Humic Podzol

Range in characteristics. Most areas are exceedingly stony, and stones have to be cleared to permit cultivation. There are small areas with relatively few stones, but rock outcrops are common. The thickness and depth of the cemented Bfcgj horizon varies considerably. This horizon is generally thicker on lower slopes and harder on middle slopes. The cemented BC horizon is thinner on middle slopes and thicker and closer to the surface on lower slopes.

Associated soils. The associated Cochrane soils do not have the dark-colored Bhf horizon of the Trepassey soils or a cemented Bfcgj horizon. Heart's Content soils in the same area also do not have a pronounced cemented Bfcgj horizon.

Land use. Turk's Cove soils are very acid and have low natural fertility. Small areas are used for growing potatoes, turnips, and cabbage. Other areas are used for grazing. Improved pastures can be established where the soils are not too stony. In the past, extensive areas were used for pasturing horses and these are used to some extent at present for cattle grazing (Fig. 20).

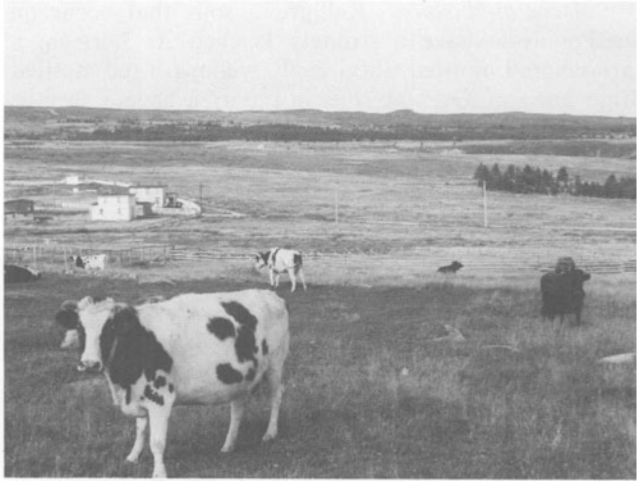

Fig. 20. Extensive areas of grassland on Turk's Cove soils north of Carbonear, only partly utilized.

The use of the soils for agriculture is limited by stoniness, topography, and rockiness. Their capability for agriculture is Class 5–7. For forestry, exposure to wind, lack of moisture, and rockiness are severe limitations. The soils are Class 6–7 in capability for forestry.

Upper Gullies map unit 2129 ha

Location. Upper Gullies soils occupy drainage channels, depressions, and lower slopes south of Conception Bay, north, east, and southeast of the town of Holyrood.

Parent material. These soils are developed from moderately coarse textured light gray glacial till derived from granitic rocks.

Topography. The soils occur on undulating to moderately rolling terrain in downslope positions below soils with imperfect to poor drainage. Most slopes are between 2 and 7%.

Drainage. The surface soil is moderately well to poorly drained and internal drainage is very poor.

Vegetation. Stunted black spruce and tamarack are the main trees. The ground cover is moss and heath.

Soil classification. Orthic Gleysol

Range in characteristics. The thickness and composition of the organic surface horizon varies considerably. Soils with lateral moisture movement due to slope have a much wider variety of plants than those with stagnant water. The moisture in the soil may fluctuate because of seepage and evaporation. The soils may appear to have the same characteristics, but some of them differ considerably in productivity. Soils with frequent fluctuations of water level often have more and larger pores. Soils with a continuous downward water movement have a more pronounced Ae horizon. Such soils may have movement of organic matter to a Bh horizon under the Ae horizon.

Associated soils. Kelligrews soils that occur on the Peninsula have a strongly leached Ae horizon, a dark-colored mottled Bhfgj, and a yellowish red mottled Bfhgj horizon. Organic soils in the area have a surface horizon more than 60 cm thick.

Land use. Upper Gullies soils have little or no value for agriculture. A few small areas are used for pasture or hay land. Some areas could provide timber or pulpwood. Stones would have to be cleared and drainage improved for the land to be used for agriculture. The capability for agriculture is Class 7 because of very severe limitations of wetness, stoniness, and low fertility.

Upper Gullies soils have a large amount of nitrogen in the upper horizons of the soil, especially where there is little water movement. Such areas and especially those on slopes with lateral water movement have a fair to good capability for forestry. Upper Gullies soils have capability for forestry of Class 5–7, with limitations imposed by wetness, exposure to wind, and low fertility.

Fig. 21. Surface pattern of Victoria Pond soils with vegetative cover and Vivian soils with a bare gravelly surface.

Victoria Pond map unit 12 011 ha

Location. Victoria Pond soils occupy middle and upper slopes and some lower slopes and hilltops in the center of the Bay de Verde arm of the Peninsula.

Parent material. These soils are developed from stony, moderately coarse textured pale yellow glacial till derived from slate, siltstone, and acid volcanic rocks.

Topography. The soils occur on gently to strongly rolling topography with moderate to steep slopes between 8 and 18%.

Drainage. The soils are moderately well to rapidly drained on the surface. Internal drainage is moderately good to imperfect.

Vegetation. Some open stands of balsam fir, tamarack, and spruce occur, but the cover is mainly heath and shrubs.

Soil classification. Gleyed Humo-Ferric Podzol

Range in characteristics. Some places have relatively few stones on the surface and others have excessive stoniness or rock outcrops. In several areas the surface stones form unusual patterns. The stones have their thin edges upward and appear to have been placed in this position by frost action. This is particularly noticeable on hilltops. The soil itself is very stony, but there are small areas interspersed throughout Victoria Pond soils that have gravel only at the surface and relatively few stones in the upper part of the solum. These soils were named the Vivian series, but the areas are too small (Fig. 21) to appear on the map.

Victoria Pond soils are wet in spring, but they dry out in summer. On almost level ground and on lower slopes, the soils stay wet longer. Mottling in the profile does not seem to be a reliable indicator of the duration of wet conditions in Victoria Pond soils.

Associated soils. Carbonear soils in the area do not have the dark-colored Bhf horizon found in Victoria Pond soils, but they do have a cemented BCcgj horizon. Poorly drained Torbay soils in the depressions have dull grayish-colored B horizons. Organic soils in the area have a surface horizon 50 cm or more thick.

Land use. Victoria Pond soils are too stony or rocky and have slopes too steep for cultivation except in small areas. The severity of these factors diminishes their capability for agriculture to Class 6–7. Small patches have been used for growing crops, and others for grazing. The production of blueberries can be improved in areas where there are sufficient plants.

Very severe limitations of exposure to wind, depth to bedrock, and low fertility restrict the capability of these soils for forestry to Class 6–7.

Waterford map unit 563 ha

Location. Waterford soils are found near the estuaries of rivers near St. Shott's, along the Northwest River north of Trepassey, near Branch, and in other river valleys on the Peninsula.

Parent material. These soils are developed from moderately coarse to coarse textured light olive gray water-deposited material derived mainly from gray slate.

Topography. The soils occupy undulating to gently rolling topography with most slopes between 2 and 6%.

Drainage. The surface drainage fluctuates from moderately good to poor, depending on the level of the water in the adjacent river, the height of the deposit above the water, and the slope. The internal drainage may be very poor or rapid, depending on the average water level in the river, the frequency of high water, and the height of the land above the average water level.

Vegetation. In some areas the cover is balsam fir and birch, with low shrubs and some alder. In others, black spruce and peat form the surface cover.

Soil classification. Rego Gleysol

Range in characteristics. The organic surface horizon ranges from thin to thick and may vary from fairly well decomposed to only moderately decomposed. Areas of poorly drained soils too small to map are interspersed throughout the Waterford soils areas. In some places, Waterford soils are very gravelly, but in others, fine material predominates and gives the soil good moisture-holding capacity.

Associated soils. Small areas of Cochrane soils occur in the Peninsula. They have a thin organic surface, a well-developed Ae, and a reddish brown Bf horizon. The stones are flat or angular in contrast with the rounded stones in Waterford soils. Organic soils in the area have a surface horizon more than 60 cm thick.

Land use. Waterford soils are suitable for pasture or meadow. High water levels in the rivers in the early part of the growing season, and sometimes during the growing season, may flood or create a hazard for crops. In dry seasons, crops need to be irrigated. Small areas are used for vegetable production and some larger ones for grazing. Because of the variation in degree of stoniness, flooding hazard, and wetness the capability for agriculture is Class 4–7 and for forestry is Class 5–7.

Large areas on the Avalon Peninsula are severely limited for agriculture by topography, stoniness, rockiness, wetness, or a combination of these factors. Where crops are to be grown, the soil moisture and soil temperature are important factors in production.

Soil moisture and temperature in relation to plant growth

The relationship between the supply and loss of soil moisture at Argentia and Colinet (Fig. 22) gives some indication of what may be expected in other parts of the Peninsula. The possible loss of soil moisture through evaporation and transpiration is indicated in the figure by the area under the solid line, which is obtained from climatic data such as average air temperature, day length, and amount of precipitation. Most soil is capable of storing 10 cm of water; surplus water saturates the soil and the excess drains away.

The graphs show that there is no shortage of water in any month at Argentia or Colinet in soils with a minimum of 10 cm of moisture storage. In Argentia, 6 cm of water stored in the soil is removed by September, whereas only 0.5 cm is removed by late August at Colinet.

The form of precipitation, its distribution through the year, and the rate of evaporation indicate that moisture is not a limiting factor in plant production. An adequate water supply exists at all times near Colinet and in the southern part of the Peninsula.

In spite of the abundant supply of moisture and the low evaporation rate, the amount of moisture available is often inadequate where the soils are coarse and have a low moisture-holding capacity. Some of the well-drained soils on the Peninsula (for example, the Holyrood series) are so porous that surface water and rainfall percolate rapidly through the soil. Thus, if a dry period occurs during the growing season, for even a week or two, the soil becomes too dry for satisfactory plant growth.

Table 10 shows soil temperatures at various depths measured near St. John's. The temperatures have been recorded since 1963. The temperature probes are located at various depths in the soil profile down to 150 cm. Apparently, no frost has occurred in the soil for any length of time, but in 1963 temperatures below freezing were recorded at 1 cm deep in February and March, and up to 20 cm deep in March and April. In 1964, 1965, and 1966, frost was recorded at 1 cm deep in January only.

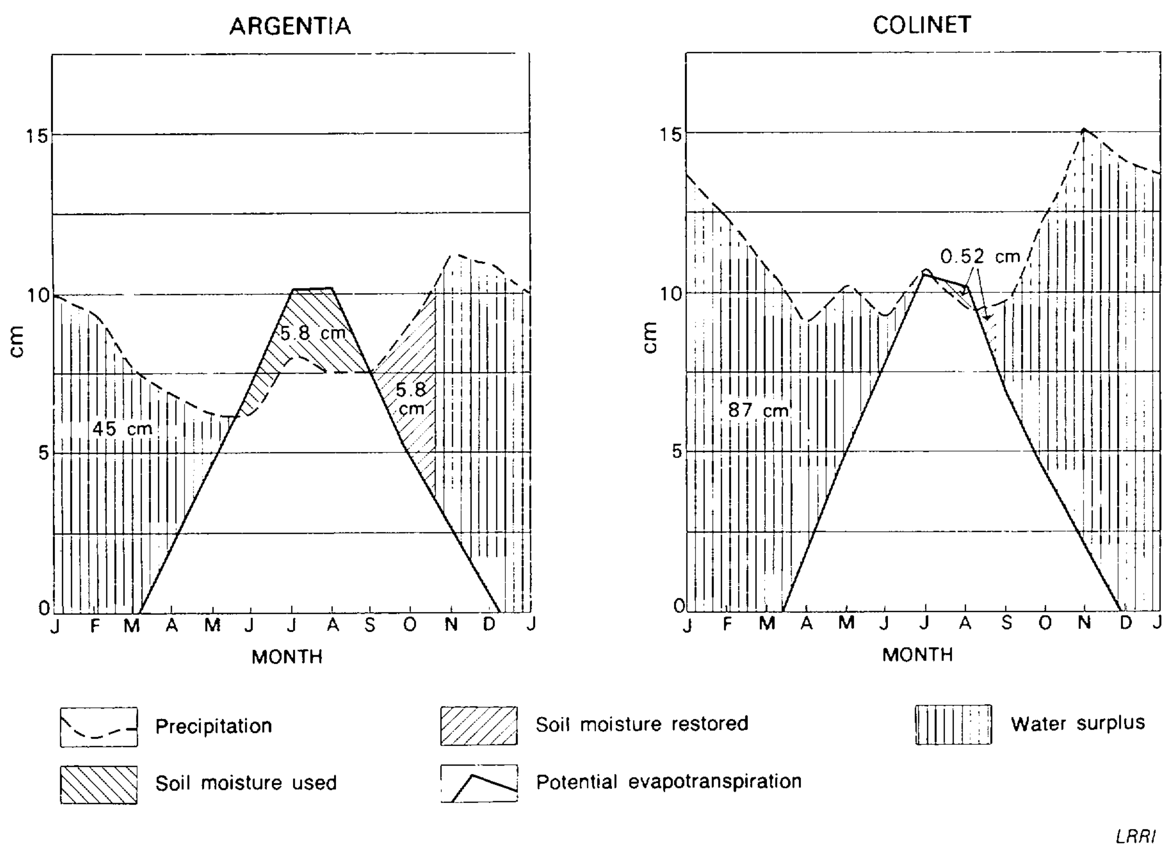

Fig. 22. Monthly changes in precipitation and soil moisture conditions at two stations on the Avalon Peninsula.

Table 10. Average monthly soil temperatures at the Agriculture Canada Research Station, St. John's West

	Temperature, °C					
Depth:	1 cm*	10 cm*	20 cm*	50 cm	100 cm	150 cm
January	0.3	0.6	1.2	2.4	4.2	4.2
February	0.1	0.4	0.5	1.5	3.3	3.2
March	0.3	0.5	0.6	1.4	2.9	2.7
April	2.4	2.0	1.7	1.8	3.0	2.6
May	8.1	7.1	6.2	5.5	5.3	4.2
June	12.8	11.6	10.6	9.3	8.5	6.8
July	17.0	15.7	14.3	12.7	11.6	9.6
August	16.8	15.9	15.1	14.0	13.3	11.4
September	13.3	13.1	12.7	12.6	12.9	11.5
October	9.2	9.4	9.5	10.0	11.1	10.3
November	5.3	5.7	6.1	6.9	7.8	8.2
December	2.7	2.6	3.3	4.1	5.5	6.1

*Temperatures at 1 cm, 10 cm, and 20 cm were read twice daily; others once daily.

The degree-day is used to measure the ability of a crop to mature under a given climate. A degree-day is calculated by multiplying the daily number of degrees of temperature above 5.5°C by the number of days that the temperature is above 5.5°C, sometimes called the growing season. The value for St. John's is 2400 degree-days compared with 2950 for Greenwood, N.S.; 3300 for Trenton, Ont.; 2750 for Lethbridge, Alta.; and 3150 for Penticton, B.C. Not considered in the degree-day values are diurnal fluctuations of temperature, day length, moisture, and frost.

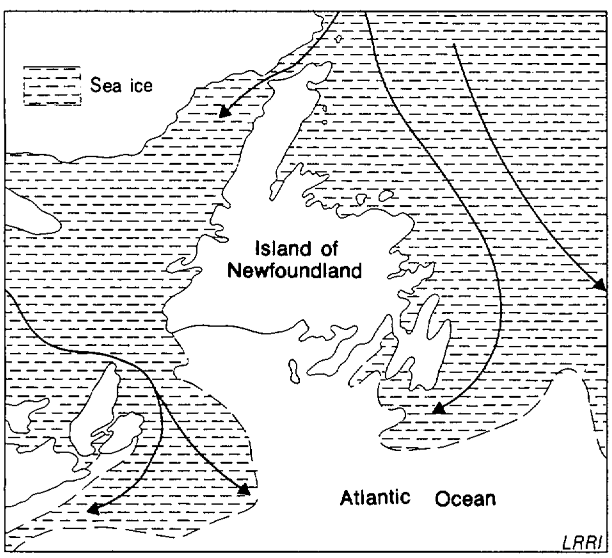

Fig. 23. Extent of sea ice in March.

Soil capability for agriculture

Whether or not land is suitable for agriculture or other uses depends on the number of limitations imposed by the physical factors mentioned previously and the properties inherent in the soil. On this basis, the soils have been assigned to capability classes, depending on the severity of these restrictions.

The soils are grouped into seven classes in which the degree of limitation to use becomes more severe from Class 1 to Class 7. The kinds of limitations are denoted by subclasses. For agriculture on the soils of the Peninsula these include adverse climate (C), undesirable structure or low permeability (D), low fertility (F), inundation or flooding (I), moisture deficiency (M), stoniness (P), bedrock (R), a combination of two or more of D, F, and M (S), topography (T), and excess soil moisture (W).

In general, soils in the first three classes are considered capable of sustained production of the common crops grown in the area. The soils in Class 4 are marginal for sustained arable agriculture and in Class 5 they are capable of use only for permanent pasture and hay. The soils in Class 6 are suitable only for natural pasture. The Class 7 soils are not suitable for agriculture. A detailed description of the limitations of each class may be found on the soil capability map accompanying this report.

A broad grouping of the soils according to their capability class range is shown in Table 11 together with the limiting factors and area covered by each map unit. Within each group the proportion of each soil that is suitable for a particular use differs. For example, nearly all Manuels soils are under cultivation, indicating that there is a relatively small proportion of Class 5 areas of this soil. Such areas are indicated by the map unit symbols on the soil capability map.

The scarcity of good arable land is evident. There are no Class 1 or 2 soils on the Peninsula. The soils in Class 3–5 occupy only 0.1% of the land area of the Peninsula, those in Class 4–6 about 1.2%, and those in Class 4–7 about 20.4%. The latter group, which occupies about 19% of the area, includes Cochrane soils, on which most of the farming is done.

About 27.7% of the land (Class 7) is unsuitable for agriculture. The remainder, Classes 5–6, 5–7, and 6–7, have small areas suitable for crops and in some places, many areas suitable for grazing. These classes of land occupy nearly 43% of the area. The use and management of the soils is given in the description of the individual soil map units.

Organic soils cover nearly 13% of the Peninsula. Some of these areas can be developed for agriculture. The potential use and development of these soils is described by A. F. Rayment in the following section.

Table 11. Capability class range and subclass limitations of the soils for agriculture

Soil	Soil capability class range (3, 4, 5, 6, 7)	Subclass limitation	Hectares
Manuels	3–5	C,T,F	920
Markland	4–6	T,F,M	7 665
Placentia Junction	4–6	P,T,F,S	2 587
Angel's Cove	4–7	P,T,F,S	9 683
Cochrane	4–7	P,R,T,F	168 146
Waterford	4–7	P,I,W	563
Branch	5–6	T,C,F	6 311
Rabbit	5–6	C,T,W	1 181
Smallwood	5–6	P,T,S	1 526
Carbonear	5–7	P,R,D	14 488
Chapel Arm	5–7	P,T,R,S	2 734
Fair Haven	5–7	P,R,T,C	18 363
Foxtrap	5–7	P,T,R	9 709
Gull Cove	5–7	W,T	1 333
Heart's Content	5–7	P,T,R	14 493
Holyrood	5–7	P,R,T,S	10 810
Old Perlican	5–7	P,R,T	3 165
Patrick's Cove	5–7	P,R,T,S	18 019
Peter's River	5–7	C,P,T	7 432
Pouch Cove	5–7	P,W,R	87 400
Shearstown	5–7	T,P,S	1 161
Turk's Cove	5–7	P,T,R,S	36 940
Bay de Verde	6–7	W,P,R	2 004
Biscay Bay	6–7	P,W,R,C,F	59 188
Kelligrews	6–7	P,R,T	23 852
North Harbour	6–7	W,P,D	23 706
Point Lance	6–7	P,W,C	7 313
St. Stephen	6–7	P,T,R	12 841
Victoria Pond	6–7	P,R,T	12 011
Vivian	6–7	P,R,T	
Barasway	7	P,M	396
Bauline	7	R,P,T	99 498
Butterpot	7	R,P,T	4 711
Cuslett	7	P,R,W,C	12 921
Low Point	7	P,W	1 327
Mutton	7	M,C	59
Red Cove	7	R,T	14 667
Seal Cove	7	P,M,T	582
Torbay	7	W,P,R	60 194
Trepassey	7	P,C,W,R	2 886
Upper Gullies	7	W,P,R	2 129

Limitations

- C adverse climate
- D undesirable structure, low permeability
- F low fertility
- I inundation
- M moisture deficiency
- P stoniness
- R bedrock
- S a combination of two or more of subclasses D, F, and M
- T topography
- W excess soil moisture

THE AGRICULTURAL POTENTIAL OF PEAT SOILS

A. F. Rayment
Research Station, Agriculture Canada,
St. John's West, Newfoundland

To evaluate the agricultural potential of peat soils, consider the different classes of peat and their suitability for various uses.

Peat soils can be adapted to several uses besides agriculture. These uses vary from conservation of the peat in its original state for water control or as wildlife preserve, through its use in varying degrees for forestry, to its removal for sale as peat moss litter or fuel.

The consequences of each of these uses of peat as a natural resource vary considerably. For example, when peat is burned as fuel the resource is irreversibly expended. Also, the hydrology of the terrain from which the peat is taken may be permanently changed, and the future use of the land profoundly affected. Therefore, using peat for fuel should only be considered after a careful evaluation of the alternatives.

When peat is removed for sale as peat moss litter, the resource is transferred from one area to another, where its benefits may extend for several years. However, the land from which the peat is removed is irreversibly affected.

Use of peat soils for forestry or agriculture conserves the resource for a short term. However, peat bogs subside or shrink when they are drained and this becomes a problem for long-term production. Subsidence is directly associated with three main factors: compression of the organic matrix due to water removal; destruction of organic matter by microbiological oxidation or similar processes; and removal of organic matter by fire or erosion. Although shrinkage caused by water removal is mostly reversible, losses by microbiological oxidation are permanent and difficult to control. Such oxidation occurs when nutrients have been added in the presence of aeration; one of the best control methods is to keep water tables and anaerobic conditions as high as production methods allow (13, 22). These conditions are most readily achieved under perennial forage crops, many of which are relatively tolerant of high water tables and at the same time they provide a sod to support machinery and livestock. Also, without annual cultivation, losses from erosion and aeration are reduced.

Under forest production, few if any nutrients are added and the soil undergoes practically no disturbance after the initial drainage operation. However, where developments are confined to nutrient-rich bogs or fens, and drainage is intense, soil losses due to oxidation can be heavy.

Production of horticultural crops mostly requires a high degree of drainage and the addition of nutrients, which together with annual cultivation can lead to a rapid loss of the peat resource.

High rainfall in the Avalon Peninsula keeps water tables at a high level (10), thus maintaining a relatively low rate of subsidence. Especially designed flotation machinery for coping with the resulting soft terrain may be widely used if water tables are kept high as a conservation measure.

Provided the subsidence rates can be controlled, use of the land for forestry or agriculture maintains its hydrological properties. However, fertilizers and other chemicals added to peat soils to support production may adversely affect the quality of drainage waters. Do not supply extra nutrients to crops, especially when water tables are high. Use toxic substances such as pesticides with extreme caution. With careful management, the ecology will not be damaged by farming peat soils.

To evaluate the potential of peat soils for agriculture, you must first determine the class of soil, its nutrient content, drainage properties, and other such relevant factors and then decide what would be the most effective use of the land.

Forestry involves cultivation of such a long-term crop that the use of fertilizer is not economical. Therefore, afforestation is best confined to nutrient-rich bogs, fens, and marshes. Valuable agricultural crops can support a large investment in fertilizer, so the nutritional aspects of the bog are not as critical as they are for forestry. However, oligotrophic and ombrotrophic peat bogs, which are extremely low in nutrients, are better suited to exploitation as peat moss litter. Such bogs are indicated by a low state of decomposition deep in the soil profile. Only those peats that are unsuitable for any other purpose should be mined for fuel.

Good drainage is especially important to a successful agricultural operation on peat soils. Soils derived from woody materials such as shrubs and small trees are fairly permeable (Fig. 24). Sphagnum and sedge–sphagnum peats have poor permeability, especially when

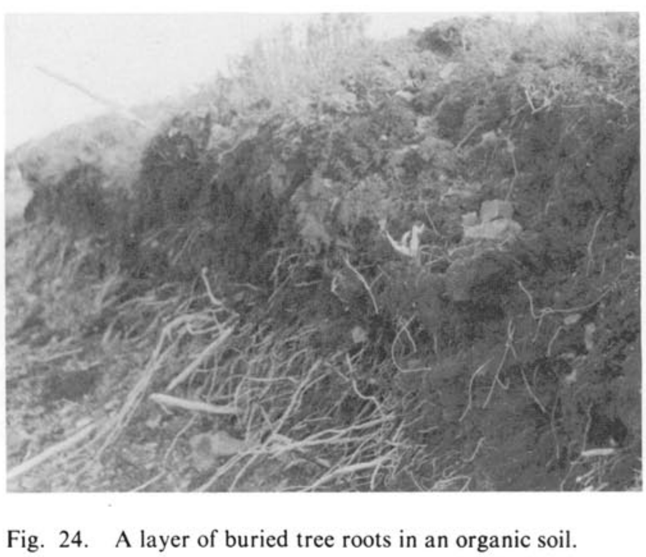

Fig. 24. A layer of buried tree roots in an organic soil.

decomposed beyond the H_3–H_5 range on the Von Post scale (23). This type of peat can be used for agriculture if the degree of decomposition at the 1 m level is H_5 or higher. Bog ponds can be incorporated successfully into fields by draining them and then backfilling with peat over a layer of boughs. However, this operation is costly, and areas pockmarked by ponds should not be used for agriculture (Fig. 25).

The agricultural productivity of sedge-sphagnum peats has been studied for 15 years at the Colinet Peat Substation in Newfoundland (16). The peats investigated are moderately decomposed (H_3–H_5 at 1 m) and poor in nutrients, although not entirely ombrotophic. These soils possibly benefit from sea salt deposited from St. Mary's Bay during frequent windstorms. The studies at Colinet have been supplemented by data obtained from farmers working on various community pastures and projects on the Avalon Peninsula, where nutrient content, stage of decomposition, and permeability differ from conditions at the Substation. Generally, the results achieved at Colinet could be duplicated in the neighboring areas by slightly modifying drainage and fertilizer practices. The practices needed to obtain good productivity on sedge-sphagnum peat soils are discussed in the following sections.

Drainage

Under prevailing climatic conditions sedge-sphagnum peats are difficult to drain (14, 17). During the driest season, July, open ditches 1.2 m deep and spaced 15 m apart are needed to maintain the water table between 30 and 60 cm below the surface. Only in an exceptionally dry season does the water level fall below 60 cm. The water table rises rapidly during heavy rains; when high rainfall persists, as normally occurs in fall, the water table rises to within a few centimetres of the surface, regardless of the drainage treatment. The distance between ditches appears to be more important than the depth of ditch in lowering the water table.

Fig. 25. Areas pockmarked by ponds should not be used for agriculture.

When a fairly water-tolerant forage mixture such as reed canarygrass, timothy, bluegrass, red clover, and white clover is grown, no significant improvements in yield are obtained for different drainage treatments up to ditches 60 cm deep and spaced 46 m apart. However, in order to achieve adequate drainage of the usually irregular surface while still providing a firm surface for machinery during the wet season, a ditch spacing no greater than 25 m is recommended for forage production. Mole drains placed diagonally to open ditches provide an inexpensive form of supplementary drainage.

Generally, vegetable crops are much more sensitive to high water tables than forage mixtures. Even when covered ditches are spaced as close together as 7 m, vegetable crops can still benefit from supplemental drainage such as can be obtained from growing the crops on ridges. However, more effective drainage procedures than these are needed for growing valuable vegetable crops on a large scale. The use of plastic drain liners backfilled with a stable, porous material may be a useful improvement.

Fertility

Uncultivated sedge-sphagnum peats are highly acidic (pH 3.7). The addition of limestone at 7 t/ha usually increases the soil pH to between 5 and 6, depending on the choice of fertilizer (19). Although satisfactory yields of forage crops can be obtained from the application of limestone at 2.2 t/ha, reapplication of lime is needed more often at the lower rate than at the higher rate. Also, the nutritive value of the forage is increased significantly at the higher rate of limestone application. Excellent crops of turnips, cabbage, and other garden vegetables can be produced with one application of limestone at 7 t/ha. Additional limestone is needed the following year to neutralize new raw material brought up through cultivation. Sensitive crops such as carrots need two applications of limestone. Therefore, this type of crop is best grown after another crop, or one application of limestone should be applied in the fall before seeding and the second application applied the following spring. Fall application is also recommended when time is needed for limestone to react with the soil to make essential nutrients available. For instance, a severe molybdenum (Mo) deficiency is induced in cauliflower that has received an adequate supply of Mo in the fritted form, applied to newly cultivated virgin peat limed the same spring as planting. The limestone is mixed more completely with the soil and to a greater depth when the crop is grown on ridges. Carrots especially benefit from this practice.

In the uncultivated state, sedge-sphagnum peats are extremely low in available nitrogen, phosphorus, and exchangeable potassium. In the first year of cultivation the demand for nitrogen is high, but in subsequent years, the requirement gradually declines as demands for cellulose decomposition diminish and as combined nitrogen is released in an available form. The initial demand for phosphorus is also high, and again there is a sharp drop in subsequent requirements, because soluble phosphorus carries over well from one year to the next.

The requirement for potassium is not great the first year, but the potassium supplement must be increased substantially in subsequent years to replenish the amount removed by crops.

Peat soils are also low in trace nutrients. Boron, molybdenum, and copper are essential to some crops, and interactions between these and other trace elements are also suspected to be necessary for good growth. A fritted trace element mixture containing 3% B, 3% Cu, 1% Fe, 2% Mo, and 7% Zn has been effective, but further research is expected to show that changes are needed. For example, levels of more than 14 ppm Mo have been detected in grass fertilized with this mix; such high levels are known to cause molybdenum-induced copper deficiencies in livestock.

To fertilize newly cultivated peat for forage crop production, excellent stands can be established with N at 56 kg, P at 50 kg, K at 93 kg, and the fritted trace element mixture at 22 kg/ha (14). Excellent nodulation of inoculated clovers can be produced in these soils, and good yields of almost pure clover have been obtained from grass-legume mixtures receiving no nitrogen fertilizer. However, higher total yields are obtained while maintaining a high legume content by using moderate rates of nitrogen (56 kg/ha) in maintenance years (14). Maintenance phosphorus should be reduced to about 25 kg/ha, because excessive rates overstimulate clover in the year after seeding, which causes a reduction in both clover percentage and total yield in the following year. Forage crops high in clover do not produce well without a high level of maintenance potassium, at least 186 kg/ha. After the legumes have diminished, extra growth of grass is stimulated by doubling the nitrogen rate and maintaining the same rates of phosphorus and potassium.

When fertilizing newly cultivated peat for vegetable production, nutrient requirements are more critical than when fertilizing for forage crops. The production of a full-grown marketable crop in the year of seeding places a heavy demand on the soil nutrients. The crop must compete for nutrients, especially nitrogen, with the rapidly increasing numbers of microflora engaged in cellulose decomposition, a process largely initiated by addition of nutrients to the newly cultivated peat. Consequently, the total requirement for nitrogen the first season is at least 336 kg/ha and sometimes more, depending on the crop and the season. All the nitrogen may be applied in the spring, or one-third may be reserved and applied as a side dressing. In successive years, the nitrogen requirement is gradually reduced to about 224 kg/ha. Usually, phosphorus at 112 kg/ha is sufficient, though occasionally more is required, particularly when the water table is high and rainfall is heavy. Phosphorus requirements are reduced to half the initial rate by the second year. Potassium applied at 280 kg/ha is needed to obtain the best results from high rates of nitrogen. High levels of potassium must be maintained, at least in the initial years of development.

Crop adaptations

Most crops adapted to the climate of Newfoundland can grow on peat soils. However, some crops are particularly well adapted, whereas others have limitations. As new varieties are developed soil amendments and drainage techniques improve, and the range of crops that can be grown successfully will expand.

The peats in the area surrounding the Colinet Substation are suitable for the production of forage crops. Grasses that are successful include timothy, Kentucky bluegrass, meadow fescue, tall fescue, creeping red fescue, perennial ryegrass, and reed canarygrass; the legumes red clover, alsike clover, and white clover including the hardy ladino clovers also thrive. These crops are hardy under normal conditions, though they may be killed occasionally by ice sheeting. The longevity and ecology of legume-grass mixtures grown on peat soils are similar to those on mineral soils and are affected by management. White clover persists for many years under grazing; red clover in hay mixtures persists well for 1 or 2 years, but is nearly depleted by the fourth year. Timothy persists for many years in mixtures with reed canarygrass when cut as hay, but neglected stands eventually revert to open stands of reed canarygrass. Experiments with a rangeland seeder have shown that neglected stands can be renovated fairly cheaply. Experiments are under way to find cultural and drainage techniques suitable to prolong the life of legumes such as alfalfa and birdsfoot trefoil.

First-cut yields of hay exceeding 7 t/ha of dry matter have occasionally been obtained from mixtures containing timothy, reed canarygrass, and red clover. More than 9 t/ha have been obtained from two cuts, so that a normal production goal of more than 7 t/ha appears realistic. Similarly in pasture production, a carrying capacity of more than one head of beef (363 kg) per 0.4 ha for a 120-day grazing period with mean weight gains of 0.7 kg per day appears attainable. However, animals finish poorly on peat pasture (Fig. 26), perhaps because weight gains are limited by a lack of essential trace nutrients or by some other nutritional factor or combination of factors. This program is under investigation.

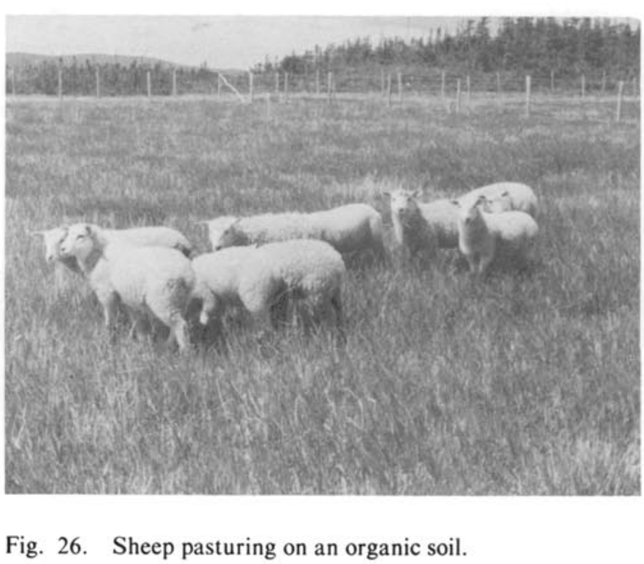

Fig. 26. Sheep pasturing on an organic soil.

The common cereals tested on the peat soils at Colinet developed normally, but the grain was low in weight. Although this problem may be overcome through improved drainage or nutrition, or both, at present cereal grain production is not economical. However, oats produce excellent vegetative growth and can be grown for forage with yields of 4.5–5.6 t of dry matter per hectare (Fig. 27).

Vegetable crops, such as spinach, lettuce, onions, radishes, celery, cabbage, cauliflower, broccoli, brussels sprouts, rutabagas, and carrots, produced for their leafy growth or vegetative storage organs are particularly suited to the peat soils. Not only do the yields of these crops often surpass those normally obtained on mineral soils, but the quality is often superior. In vegetable crop production studies, emphasis has been placed on quality. Investigation is now needed on improving quantity by using land more efficiently, perhaps by spacing plants closer together in the row, or by setting two rows together on a ridge, or by growing the crops in beds (Fig. 28).

Fig. 27. Oats and rutabagas growing on an organic soil.

Fig. 28. Onions, rutabagas, carrots, and radishes growing on an organic soil.

Machinery

Specially designed or modified machinery is required for most agricultural operations on peat soils. Special support systems or flotation devices for the machinery is the first requirement. Because of the high annual precipitation and the low permeability of the peat soils on the Avalon Peninsula, the water table is usually only a maximum of 1 m below the surface of the drained peat. Consequently, neither uncultivated nor continually cultivated peat can support ground pressures higher than 14 kPa, even in winter; therefore specialized wide-tracked crawler tractors are required (16). However, peat sod can support considerably higher pressures, and farm tractors fitted with half-tracks have been found suitable for grassland operations.

Because peat soils are generally free from stones and have a high degree of workability and plasticity, mechanical draining and tilling are efficient and easy on equipment. However, sufficient flotation of machinery must be provided, and machine parts that are affected by the acid peat waters must be lubricated regularly to minimize strain and wear.

A spinning-disc excavator (Fig. 29) developed by J. V. Healy of the Newfoundland Government is a reliable machine for initial drainage (14, 16). Other machines are also available commercially. Because highly specialized machinery is needed for the initial draining and each farm has a limited requirement for this service, it is best to contact a separate central agency, such as the government, for assistance. However, several ditch-cleaning devices that can be attached to the power takeoff of standard tractors are available. This equipment can be owned cooperatively and operated by the individual during the off-season.

Mole drains, which are made by pulling a bullet-shaped opener through the bog, provide an inexpensive supplemental drainage, especially useful in grassland operations. This tool can be operated from the three-point hitch of a farm tractor and can be used during the off-season, and like the ditch-cleaning devices, can be cooperatively owned or rented.

To increase drainage for special crops, ditches can be spaced closer together, from 6 to 7.5 m apart. For efficient cultural operations, these ditches must be covered. In accordance with the Norwegian system, the ditches should be excavated when the field is first drained. A special disc is used to dig narrow primary ditches about 85 cm deep. With a simple hand-operated device, 2 cm boards are installed at intervals across the ditch (Fig. 30) to support saw slabs covered with waste that cover the ditch. Then the ditches are backfilled using a rotovator (14). This operation is fairly inexpensive but an abundant supply of saw slabs must be available. The labor input is high, but the work can be done in the off-season. Several ditchers are also available that excavate underground drains in the peat into which plastic pipe is inserted or that insert pipe into drains that have been already established. Porous materials or fills to surround the pipe are being investigated. This method is more efficient than the Norwegian system, but the mechanical part of the operation is slower and more expensive, and the cost of the plastic

Fig. 29. A spinning-disc excavator digging a drainage ditch in organic soil.

Fig. 30. A Norwegian-type ditch in an organic soil.

pipe is extra. This procedure can be used to carry out the primary drainage; it should be done by a central authority or contractor.

For special problems such as draining dished bogs, special outflow or catchment ditches can be dug with a backhoe fitted with flotation tracks. This implement can be operated from a farm tractor, preferably a crawler type. Because this implement is only needed occasionally, for excavating main drains or preparing roadbeds, it is best hired or owned cooperatively. Where deep drains are cut through soft bogs, the sides should be shored with braces and waste saw slabs.

Limestone and fertilizer can be applied by tractor-drawn spreaders fitted with oversize wheels and tires. However, the high cost of transporting and applying limestone can be substantially reduced by bulk handling. Special bulk-spreading equipment must still be developed for use on the peat soils.

The tractor-powered rototiller (16) and the rotary ridger are the main tools needed for cultivation of vegetable crops (Fig. 31). Both implements should be fitted with special flotation shoes or wheels so that they can be operated in the "float" position. The ridger also needs a special compacting device to produce well-formed firm ridges. Different models of ridgers can be obtained for preparing ridges 70 or 90 cm apart, or for preparing beds about twice as wide as the drill spacing. Deep plowing is advantageous when cultivating grassland for vegetable crop production. This operation requires a single-furrow breaker plow fitted with flotation wheels, a special coulter, and extended landslide and moldboard attachments.

Forage crops have been seeded successfully with a simple cyclone seeder followed by rolling and with various highly specialized grassland seeders. If seeding is carried out under the favorable conditions that exist in spring and early summer, a high germination rate can be expected, regardless of the method used, and excellent stands are usually obtained. However, seeding when the peat is dry and fluffy may result in failure. For vegetables, hand-operated single-row seeders fitted with disc openers are satisfactory. However, seeding equipment can be readily adapted for use with the ridging equipment to allow simultaneous seeding and seedbed preparation. Vegetable transplants also grow exceptionally well at the Colinet Substation, and no particular problems are anticipated in adapting various transplanting tools to peat soils.

No satisfactory interrow cultivation equipment has been developed for peat soils. Therefore, weeds are best controlled by rotating crops properly and planting cleaning crops that tolerate broad-spectrum herbicides. Special tractor roadways should be left at intervals to allow sprayer boom coverage of the cropped land.

Fig. 31. A rotary cultivator and ridger behind a wide-track tractor. Rollers behind the rototiller compact the top of the ridges.

Vegetable harvesting equipment has not been studied extensively at Colinet. However, the roadways left for spraying equipment can also be used by vehicles carrying a conveyor belt system on either side on which hand-harvested produce can be loaded. If packing or crating in the field is practical for the crop and suitable storage is available, field-loading systems should be adapted for the use of forklifts.

Systems for harvesting and storing forage crops produced on peat soils have been studied extensively. The standard reciprocating-type mower, though usable, is highly inefficient and has been replaced by a four-drum rotary-type mower. A conditioner fitted with oversize tires operates satisfactorily in a separate pass after the rotary mower, though ideally the two operations should be done simultaneously.

Two methods of storage are practicable, depending on the weather. Either the material can be left to wilt for silage or it can be allowed to dry to below 40% moisture for flue-dried hay. Silage must be made in batches, and to economize, the hay can be made loose, using the same equipment for hay as for silage. A flail-type forage harvester fitted with flotation tracks can pick up windrows of silage or hay left by the conditioner, and blow it into a trailer. To make good silage the pick-up machine should have a short-cut chopper that can be readily adjusted if longer-cut hay is required. This blower can also be used for unloading. Machines capable of self-feeding both hay and silage from these systems are available.

Or, hay can be picked up and baled in the field by a baler fitted with flotation tracks, provided the bales are flue-dried to prevent spoilage. However, on the Avalon Peninsula many seasons are too wet to preserve the whole crop by this method, and the quality often suffers when harvest must be delayed by bad weather.

Heavy loads of materials such as limestone and silage must sometimes be transported over the bog, and overloaded trailers can cause severe damage to the surface of the field in only one or two passes. Trailers carrying heavy loads should be provided with a greater flotation than is usually found on commercial vehicles. Based on the maximum pressure of 14 kPa as a guide, if you have a trailer weight of 450 kg, you need two tracks 127 × 25 cm each for the first 450 kg of load, and a similar increase for each additional 900 kg of load.

Roads

The recent increase in the number of tracked vehicles that can be driven on peat terrain has led to the popular misconception that traffic can proceed on peat without restriction. However, a tract of peat has a specific limit to the number of passes it can bear at a particular weight per unit area before the binding structure is broken, after which the peat deteriorates rapidly (12). Any structural feature, such as a gate, that funnels traffic continuously over the same ground causes a rapid breakdown of the peat surface in the area and the eventual formation of a quagmire. Problems often occur in areas low in fiber, which are usually indicated by a wet surface, and also along the perimeter of bogs at the interface of the mineral and peat terrains. Consequently, at the early stages of development of a bog, long-range plans should include a road system adequate to meet future transportation requirements. This plan should be flexible enough to be developed in stages, as the need arises.

Whenever possible, use mineral terrain and outcrops for roads. Provide access to the headlands of all fields by a firm roadbed based on mineral soil or by a firm corduroy-mineral roadway on a drained peat base. Culverts should be installed and good fill provided for all natural and artificial waterways. All traffic, especially machinery carrying heavy materials to and from the fields, should use only these roads. Only machines used in field operations should drive on the bog.

SOIL CAPABILITY FOR FORESTRY

B. B. Delaney
Alberta Forest Service,
Alberta Department of Energy and Natural Resources,
Edmonton, Alberta

The capability for forestry classification system consists of three categories: capability class, capability subclass, and indicator species.

Capability class

All land is assigned to one of seven classes. The best land for growing trees commercially is placed in Class 1, whereas land in Class 7 cannot be expected to yield timber in commercial quantities. Each capability class is related to a productivity class, that is, the volume of wood the land is capable of yielding. When land is assigned to a class, the soil, the subsoil, the surface, the local and regional climate, and the characteristic tree species are taken into account. Therefore, the capability class is an expression of all the environmental factors that affect tree growth.

Classes 1, 2, and 3 soils are not found on the Avalon Peninsula.

Capability subclass

The factors that limit tree growth are expressed as subclasses for all classes except Class 1. The kinds of limitations are important when they affect management, or when they can be corrected. The degree of limitation determines the class designation. When the limitations are not severe enough to affect the class level, they are not shown.

Indicator species

The tree species that can be expected to yield the volume of wood associated with each class are shown as part of the map symbol on the 1:250 000 forest capability maps.

Class 4 Lands having moderately severe limitations to the growth of commercial forests

The soils may vary from deep to moderately shallow, from excessive through imperfect to poor drainage, from coarse to fine texture, from good to poor water-holding capacity, from good to poor structure, and from good to low natural fertility. The most common limitations are deficient to excess soil moisture, adverse climate, restricted rooting depth, poor structure, exposure, and low fertility. Productivity is usually from 51 to 70 cubic feet per acre per annum.

Class 5 Lands having severe limitations to the growth of commercial forests

The soils are usually shallow to bedrock, stony, excessively or poorly drained, coarse or fine in texture, and they may have poor water-holding capacity and be low in natural fertility. The most common limitations are deficient or excess soil moisture, shallowness to bedrock, adverse regional or local climate, low natural fertility, exposure (particularly in maritime areas), and excessive stoniness. Productivity is usually from 31 to 50 cubic feet per acre per annum.

Class 6 Lands having very severe limitations to the growth of commercial forests

The mineral soils are usually shallow, stony, excessively drained, coarse in texture, and low in fertility. Most of the land in this class is composed of poorly drained organic soils. The most common limitations (often in combination) are shallowness to bedrock, deficient or excess soil moisture, low natural fertility, exposure, inundation, and stoniness. Productivity is usually from 11 to 30 cubic feet per acre per annum.

Class 7 Lands having severe limitations that preclude the growth of commercial forests

The mineral soils are usually extremely shallow to bedrock, subject to regular flooding, or contain toxic levels of soluble salts. Actively eroding or extremely dry soils may also be placed in this class. Most of the land is very poorly drained organic soil. The most common limitations are shallowness to bedrock, excessive soil moisture, inundation, active erosion, and extremes of climate or exposure. Productivity is usually less than 10 cubic feet per acre per annum.

Climate. Subclasses are used to denote a significant adverse departure from the median climate of the region, that is, a limitation as a result of local climate; adverse regional climate is expressed by the class level. The symbols used and the limitations they represent follow.

A — drought or aridity as a result of climate,
C — a combination of more than one climatic factor, or two or more features of climate that have significance,
H — low temperatures,
U — exposure.

Soil moisture. These subclasses denote that the soil moisture is less than optimum for the growth of commercial forests, but they do not include inundation. The symbols used and the limitations they represent follow.

- M — soil moisture deficiency,
- W — excess soil moisture,
- X — a pattern of M and W too intimately associated to map separately,
- Z — a pattern of wet organic soils and bedrock too intimately associated to map separately.

Permeability and depth of rooting zone. These subclasses denote limitations of soil permeability or physical limitations to rooting depth. The symbols used and the limitations they represent follow.

- D — physical restriction to rooting caused by dense or consolidated layers other than bedrock,
- R — restriction of rooting zone by bedrock,
- Y — intimate pattern of shallowness and compaction or other restricting layers.

Other soils factors. These subclasses denote factors of the soil that affect growth, either individually or in combination. The symbols used and the limitations they represent follow.

- E — actively eroding soils,
- F — low fertility,
- I — soils periodically inundated by streams or lakes,
- P — stoniness that affects forest density or growth,
- S — a combination of soil factors, none of which affects the class level by itself but cumulatively lowers the capability class.

Capability for forestry of the Avalon Peninsula

In mapping the Avalon Peninsula, as in other areas of Newfoundland, the first breakdown of the landscape was based on recurring patterns of landforms, soil, and vegetation. This breakdown usually served as the map unit for the 1:250 000 scale. Surficial geology maps were available for the area to aid in this stage of mapping. The refinement of the 1:250 000 map unit into units of more homogeneous areas of soils, landform, and moisture regime, as described earlier, is the basis of the 1:50 000 map unit.

The forest types of the Peninsula have been tentatively described by Damman (3). These ecological descriptions are comparable with the more comprehensive site investigations conducted in other forest regions of Newfoundland. As in other Newfoundland forest capability programs, a forest capability symbol is associated with the predominant forest types that occur in the area. This information is useful to forest managers.

The most important forests are located in the center of the Peninsula and in a few well-sheltered valleys. Capability Class 4 represents the most productive sites and was mapped on lower slopes of deep valleys. The soils of these sites are characterized by intense mottling in the B horizons caused by seepage; in some cases, gleysolic soils may develop. Low fertility was considered the most limiting factor. The forests of these sites always include a white birch-yellow birch component. The *Dryopteris* and *Hylocomium* forest types are commonly found here.

The ribbed moraines of the central part of the Peninsula extend over a large area and have a varied pattern of tree growth. The forests on the south slope of the east-west oriented moraines are poorer growing than on the top and north slopes. The forest on the tops of the moraines occurs on Orthic Humo-Ferric Podzol soils and is classified as 4^{F}, the *Dryopteris* white birch-balsam fir forest. On the south slope, the unmerchantable balsam fir that grows on a Gleyed Humo-Ferric Podzol soil has been mapped as 7^{F}_{W}, the *Sphagnum-Taxus* forest type. The differences in tree growth are caused by the climate.

The ground moraine that predominates around St. John's and extends south along the east coast and on the Bay de Verde Peninsula supports forests mainly of capability Class 5-6. The soils are mainly coarse, stony Humo-Ferric Podzols with *Pleurozium*-balsam fir type of forest. The map symbols 5^{U}_{M} and 6^{U}_{M} identify such conditions and indicate that the main limiting factor is exposure to wind. Trees seldom reach 12 m high, and because the diameter growth is good, the trees have extreme taper. Undisturbed second-growth stands are often very dense. A typical 55-year-old stand is 11 m high and has 3250 stems per hectare. These stands yield over 189 m^3/ha (2700 cu ft/ac).

The extensive peat and *Kalmia* barrens that occupy the southern and western parts of the Peninsula do not support any forestry. Although there is evidence that parts of the area were once forested, fires followed by the invasion of heath shrubs have made reestablishment of a forest cover difficult. The cool, moist climate produced by the adjacent ocean has favored the establishment of *Kalmia* vegetation. Afforestation attempts on these *Kalmia* barrens have not yet been successful partly because of severe frost heaving. Permanent barren areas are identified as 7^{U}_{F}. The map symbol 7^{F}_{U} identifies less exposed barrens, usually located on sheltered slopes, that supported merchantable stands in the past.

Table 12 shows a grouping of the soils according to their range in suitability for forestry, their limitations, and areas. Some soils occupy different groups for forestry than they do for agricultural capability (Table 11). For example, the Bauline and Upper Gullies soils are unsuitable for agriculture, but they may have some value for forestry. Also, the Rabbit soils, which have a fairly good rating for agriculture, are unsuitable for forestry. In many cases, exposure to wind is a severely limiting factor for tree growth.

About 17.5% of the soils are unsuitable for forestry, whereas 22% are unsuitable for agriculture. The soils best suited for agriculture are generally also those best suited for forestry and they occupy about 1.3% of the Peninsula. The soils in Classes 5, 6, and 7 make up nearly 70% of the land area and include considerable areas of windswept bedrock.

Table 12. Capability class range and subclass limitations of the soils for forestry

Soil	Soil capability class range	Subclass limitation	Hectares
Manuels	4–5	U,M	920
Markland	5–6	M,F	7 665
Placentia Junction	5–6	F,U,M	2 587
Carbonear	5–7	U,M,F,R	14 488
Chapel Arm	5–7	U,M,F,R	2 734
Cochrane	5–7	U,M,R,F	168 146
Foxtrap	5–7	U,M,F	9 709
Holyrood (7–5)	5–7	U,M,F	10 810
Pouch Cove	5–7	U,F,W	87 400
Shearstown	5–7	U,F,M	1 161
Smallwood	5–7	U,F	1 526
Torbay	5–7	F,W,U	60 194
Upper Gullies	5–7	W,U,F	2 129
Waterford	5–7	W,F,I	563
Angel's Cove (7–6)	6–7	F,U	9 683
Bauline	6–7	U,R	99 498
Branch	6–7	U,F	6 311
Gull Cove	6–7	U,W,F	1 333
Heart's Content	6–7	U,F,M	14 493
North Harbour	6–7	U,F,W	23 706
Patrick's Cove	6–7	U,F,W	18 019
Peter's River	6–7	U,F	7 432
St. Stephen (7–6)	6–7	U,F	12 841
Turk's Cove	6–7	U,M,R,F	36 940
Victoria Pond	6–7	U,R,F	12 011
Barasway	7	U,M	396
Bay de Verde	7	W,U,R	2 004
Biscay Bay	7	U,F,W,R	59 188
Butterpot	7	R,U,F	4 711
Cuslett	7	U,F,R,P	12 921
Fair Haven	7	U,R,F	18 363
Kelligrews	7	U,F,R	23 852
Low Point	7	W,F,U	1 327
Mutton	7	U,M,F	59
Old Perlican	7	U,F,R	3 165
Point Lance	7	U,F	7 313
Rabbit	7	U,F	1 181
Red Cove	7	U,R,M	14 667
Seal Cove	7	M,U,F	582
Trepassey	7	U,F,P	2 886

Limitations

- F low fertility
- M soil moisture deficiency
- P stoniness
- R restriction of rooting zone by bedrock
- W excess soil moisture
- U exposure to wind
- I inundation, flooding

PART III APPENDIXES

SOIL-FORMING PROCESSES AND SOIL DEVELOPMENT ON THE AVALON PENINSULA

SOIL DEVELOPMENT

Soils are developed by the interaction of climate, parent material, living organisms (including plants, microorganisms, animals, and man), groundwater and drainage, and topography over long periods of time.

Climate

Climate provides the environment and imposes limits on the use of an area. Over a long period of time, the climate shapes the landscape and determines the kind and abundance of vegetation, the kinds of soils that develop, and ultimately, the use of the area by humans. The climate of the Avalon Peninsula is described in the general description of the area at the beginning of this publication.

Parent material

The original composition of the parent material determines the mineral content of the young soil, whereas the mode of deposition, to a large extent, determines the distribution of the soil particle sizes in early development. When soil is young, development and fertility are determined by its parent material, which also plays an important role in the internal drainage or water movement in the soil. The changes that take place after the parent material has been deposited can be classed as weathering and soil development.

Soils develop from the different deposits or parent materials as they are laid down in a particular area. Residual soils develop from the original parent material as deposited by geological, including volcanic, action. Alluvial soils are developed from material transported and laid down by flowing water and are often recognized by rounded stones and gravel, and also by layering of coarser or finer material on top of each other. Aeolian materials are transported, sorted, and deposited by wind action. Lacustrine, or lake bottom, soils are composed of the materials that have settled in the water of lakes. These soils are often dark and composed of very fine particles or clay. Lacustrine and aeolian deposits are stone-free.

Marine sediments have been reworked by the sea and later they became exposed when the seabed rose above sea level. These soils vary in composition from coarse gravelly materials to very fine materials deposited in sheltered waters.

Glacial till is material transported and deposited by ice fields, which once covered the country. Little or no transportation by water was involved in the deposition of this material. Glacial till is generally not sorted or stratified (layered), but is made up of an unsorted or heterogeneous mixture of clay, silt, sand, gravel, stones, and sometimes, boulders.

Glaciofluvial deposits are made up of material produced by glaciers and then carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. The most important of these deposits is glacial outwash. This term includes all the material swept out, sorted, and deposited by streams of meltwater, mostly sand, silt, and gravel.

Glaciolacustrine materials are derived from reworked sediments from the glaciers laid down in glacial lakes. They may range in texture from fine clay to silts and sands. Many of the deposits are interbedded or laminated, that is, laid down in thin layers. The fine horizontal markings visible in a vertical section, each related to one year's deposition or one season's glacial ice melt, are called varves.

It is important to keep in mind that the terms gravel, sand, silt, and clay refer to the size of the individual particles that make up the mineral part of the soil. Textures, such as silty clay loam, loamy sand, or sandy loam, are certain combinations of these different particle sizes.

Organic deposits are formed where organic material, derived from plant or animal life, is accumulated more rapidly than it decomposes. These deposits consist mainly of partly decomposed sphagnum or other mosses, sedges or bulrushes, reeds, grasses, wood, green plants, and other material of vegetable or animal origin. According to the degree of decomposition, organic material is divided into three broad classes: fibric, mesic, and humic. Fibric is the least decomposed of all organic materials; it consists largely of well-preserved fibrous material whose botanical origin is readily identifiable. Mesic is the intermediate stage of decomposition; it has intermediate amounts of fiber that has been partly altered physically, or in strength and shape, and biochemically, or in its content. Humic is the most highly decomposed of the soil organic materials; it has the least amount of fiber and is often called muck.

Wide variations exist in the original material from which parent material has developed, and often the character of a soil can be correlated with a particular rock or mineral. Parent material derived from quartzite rocks differs greatly from parent material derived from alkaline or basic rocks, and the soils that develop from these parent materials differ greatly. Also, various parent materials can be produced from similar or even identical rocks under different weathering conditions. Thus, a soil developed from a particular rock in a dry climate or desert differs greatly from a soil developed from the same kind of rock in a moist, cool climate.

Groundwater and drainage

Groundwater, especially where it occurs close to the surface, and drainage play an important role in the soils of the Peninsula. Moisture is usually abundant and groundwater is close to the surface in many locations. Well water for the householder is usually available at between 1.5 and 3.5 m deep, but shortages may occur in September and October. Groundwater can be a source of food and moisture for plants. It can also prevent aeration and cause reducing or air-hungry conditions in the soil. Many poorly drained soils in Newfoundland appear to have large amounts of available nitrogen, especially in the surface mineral horizons. This condition is probably due to reduced leaching or drainage, or to the presence of alders, which along with microorganisms fix nitrogen from the air. Where a high water table is caused by poor drainage, the amount of soil nutrients may be increased by receiving moisture from higher surrounding land. Poor drainage causes an accumulation of soil nutrients and salts. A gray color, due to reducing or low oxygen conditions, is characteristic of soils with a high groundwater table. In such areas, plant growth is generally poor except in locations where inflowing water maintains fertility and replenishes oxygen.

Topography

Topography also plays a role in the development of soils. The amount of heat received by a soil depends on the location of that soil in the landscape, such as in a valley or on top of a hill, and on its angle of exposure to the sun or its aspect. Drainage is also largely controlled by topography. In the Avalon Peninsula, the differences in soil development on the top of a hill, on various positions on the slope, at the bottom of a hill, or in a depression are conspicuous.

The amount of leaching of soil materials depends on the location of the soil in the landscape, drainage conditions, and the underlying bedrock. A thick Ae or leached horizon is often present, at or near well-defined summits or hilltops. On slopes and hillsides much of the water movement within the soil is along the direction of the slope. Signs of abundant moisture and alternate wet and dry conditions, shown by mottling, are common. The flow of water in the soil along the slope also improves the transportation of soil nutrients, and possibly oxygen, to the benefit of plants. Near the bottom of slopes, a gray soil color denoting reducing conditions caused by a prolonged high water table is common. At higher elevations or on gentle slopes, these conditions occur mainly under a cover of heath plants or moss.

Living organisms

Animals, such as moose, caribou, rodents, worms, and insects, and plants, bacteria, and fungi are abundant in or on the soil and together with man play an important part in soil development. Whereas the influence of large animals can be very small, the influence of man is important. Plowing and the application of fertilizer are of profound importance in cultivated areas. The accumulation of animal or vegetable waste in confined areas has been well recognized. A detrimental influence has been exerted in many parts of the Peninsula by man-made forest fires. These fires have destroyed the original vegetation and changed the microclimate; the formation and influence of ash appears to speed up soil leaching. The destruction of the protective tree and shrub cover is followed by the erosion of the soil, particularly on rocky, steep, or other exposed terrain. Repeated fires in large areas of the Peninsula have destroyed not only the forest vegetation but also the sources of seed and the fertility of the surface soil. The large heath and moss barrens that are growing on these areas now have resulted in a poorly aerated surface, which remains wet for long periods of time. There is a noticeable increase in transported organic matter, visible as a dark layer or soil horizon 8–13 cm deep, which generally does not occur in the wooded areas.

Other examples of biological activity are demonstrated by microorganisms. They, perhaps more than other factors, determine the rate and character of organic activity, breakdown, and buildup. Microorganisms govern the nature of the humus and also control the volume of carbon dioxide produced. The appearance of ammonium compounds is mainly a result of their activity, whereas certain bacteria govern the production of nitrates and sulfates. The formation of manganese pans in coarse soils under peat may be connected with the presence of bacteria.

Fungi and molds are probably of major importance in the decomposition of organic soils in the Peninsula, where acid humus occurs in a cool humic atmosphere.

Although earthworms are most active in less acidic conditions, they contribute to soil development in farming areas. Earthworms mix and move soil and pass large quantities through their bodies. The earth is subjected to their digestive process and the organic matter that furnishes the earthworms with energy and tissue-building material undergoes marked change. Earthworms are mainly located in fields that have been farmed, but anglers have probably assisted in spreading earthworms to other areas, especially along streams and lakes.

Plants are of major importance to soil development. They bring up nutrients from different depths of the soil to build up their living tissues. The growth of plants is thus dependent on the available soil nutrients, as well as on water, heat, light, and carbon dioxide. Soil and climate determine the composition of litter, which influences the kind of microbiological activity and thus the kind of products that are leached through the soil.

Climate is of major importance in the establishment of vegetation. In the Peninsula, softwood stands of mainly spruce and fir and also tamarack are abundant, with some hardwood, mainly birch and occasionally maple and aspen. The needle litter of softwood trees decomposes slowly. This partly decomposed organic material, or more, accumulates on the surface and together with moss, fungi, or molds yields acids and other solvents. Strong leaching of minerals, especially iron and aluminum, takes place in the upper or Ae horizon. These minerals are deposited again at lower depths. However, the presence of hardwood trees speeds up the decomposition of surface litter without the formation of the strong acidic solvents. Consequently, there is less leaching in the upper horizons. Much of the heath vegetation also decomposes slowly, which produces a peaty surface with poor aeration and generally moist conditions in the upper part of the soil. An accumulation of dark organic material in the Bhf and Bf horizon at 5-13 cm deep is common.

Time

Because soil development begins under the influence of the factors mentioned previously, the character of the soil is almost the same as that of the parent material. In a young soil, no layering or horizons are observed, except layering caused by geological or depositional processes such as layers of gravel or silt in alluvial, or water-laid, soils.

In an older soil, the influence of weather and organic matter is stronger. The acquired characteristics, caused by climate and vegetation, gradually become more prominent, but those from the parent material are still evident. With time, the acquired characteristics become more and more dominant and the original or inherited ones diminish, until a balance is reached with the environment. Examples of acquired characteristics are an increase in organic matter in the upper layer of the soil and bleached or reddish layers or horizons. The development of profile layers or horizons depends on climate and vegetation. A mature soil often shows a characteristic profile development and is more or less in equilibrium with its environment.

The soils on the Avalon Peninsula have formed since the retreat of the glacial ice about 7400 years ago and they can be considered mature.

SOIL-FORMING PROCESSES

The climate, particularly precipitation, humidity, temperature change, and frost, subjects bedrock and other parent materials to physical and chemical transformations: many minerals are hydrolyzed, metallic ions are replaced by hydrogen, and part of the iron is oxidized and hydrated. If hematite or limonite is thus formed, the decomposing mass becomes red or yellow; otherwise, the colors are subdued.

The minerals soften, lose their luster, and increase in volume. As organic matter gradually accumulates on the surface in the cool and moist climate, carbonic acid is generated and hydrogen ions are formed, which replace calcium, magnesium, sodium, and potassium. These minerals appear as carbonates in the water that drains away, leaving a soil more or less without soluble bases. Part of the iron and aluminum are removed from the surface soil to lower B horizons. As a result of this process, all but the most resistant of the original minerals are altered and are replaced by silicates that recrystallize.

A leached gray Ae horizon, high in silica, forms under the organic surface mat. The term podzolization, derived from the Russian words pod (under) and zola (ash), is applied to this process because of the ashy appearance of the Ae horizon. The majority of soils on the Peninsula have this horizon with little or no iron or aluminum content. Although these Ae horizons are white or gray, they may contain as much as 16% organic matter. Fine soil particles are also abundant and many of the Ae horizons have a clay content considerably higher than the underlying B horizon. This is a unique feature of the soils of the Avalon Peninsula. It is possible that recent weathering under the influence of the acids in the overlying peaty substance is responsible for this higher clay content.

Living organisms intervene, organic matter accumulates, especially at the surface, and constructive influences create a substance differing profoundly from the original parent material. The soil becomes a unique combination of minerals and living and dead organic material created through time and under particular climatic conditions. The influence of weathering decreases with depth in the soil, and also the transformations are somewhat different. Here, the transformations are less vigorous due to less influence of the weather, smaller temperature fluctuation, less influence of rotting organic material, less porosity, and less aeration.

The B horizon is enriched with iron, aluminum, or humus, or a combination of all three and possibly with salts. The action of moisture, oxidation, or reduction changes the color or structure in contrast with the horizons above or below or both. The C horizon is comparatively unaffected by the developing processes that take place in the A and B horizons, except for the process of gleying, or the accumulation of calcium and magnesium carbonates or soluble salts. Gleying is a soil-forming process in which iron and other elements are reduced under poor drainage (depleted of their oxygen), which results in gray colors or a mottled appearance.

Some chemical weathering has taken place in the C horizon, but otherwise the material is considered identical with that from which the A and B horizons were developed. The upper part of this horizon may be cemented, and silt accumulation on top of stones is common in well or imperfectly drained soils. Frost action may be responsible for this silt.

A thin iron pan is evident in nearly all the soils in coastal areas, especially near the south and west coasts of the Peninsula. These pans may be 3-18 mm thick and can be found at different depths, from just below the Ae horizon to well into the C horizon at a depth of several centimetres. They usually consist of two layers: one black and the other brown. A high iron and organic matter content is characteristic of these pans. In some very coarse soils overlain by peat, iron-manganese pans occur. The thin iron-organic matter pans may split into two or more pans, or merge into a cemented B horizon with coarse platy structure (ortstein).

Analytical methods

These methods were designed for conditions existing at the time of the survey and do not give sufficient information for present soil classification and interpretations of soil characteristics.

Reaction (pH). Glass electrode. 10 g soil in 20 cm^3 0.01 M $CaCl_2$ (pH $CaCl_2$) and also 10 g soil in 10 cm^3 water (pH water).

Particle size analysis. Bouyoucos, G. G. Hydrometer method. Soil Sci. 42:225-230; 1936.

Hygroscopic moisture. By heating at 105°C until the weight remained constant.

Loss on ignition at 450°C. Atkinson, H. J.; Giles, G. R.; MacLean, A. J.; Wright, J. R. Chemical methods of soil analysis. Contrib. 169 (rev.), Chem. Div., Sci. Ser., Can. Dep. Agric., Ottawa; 1958. 90 pp.

Free Fe_2O_3. McKeague, J. A.; Day, J. H. Dithionite and oxalate extractable Fe and Al. Can. J. Soil Sci. 46:13-22; 1966.

Exchangeable bases. Soil leached with 1 *N* ammonium acetate, leachate evaporated to dryness, ignited, dissolved in HCl, and back-titrated with NaOH. Jackson, M. L. Soil chemical analysis. Prentice-Hall, Inc.; 1958.

Exchangeable acidity. Soil leached with 1 *N* ammonium acetate to pH 7.0, back-titrated to original pH. Atkinson, H. J. et al. Chemical methods of soil analysis. Contrib. 169 (rev.). Chem. Div., Sci. Ser., Can. Dep. Agric., Ottawa; 1958.

Available nutrients. Soil shaken with 0.025 *N* acetic acid, according to Spurway. Determinations done with the aid of spectrometer and atomic spectrophotometer. Spurway, C. H. Soil testing. Michigan State College Bull. 132; 1933. 35 pp.

Angel's Cove soil 9683 ha

Orthic Ferro-Humic Podzol

The profile described below was on an 8% slope with western exposure, 0.4 km north of Angel's Cove on the east side of the road, at 91 m above sea level.

The parent material is stony and gravelly glacial till ground moraine with a thickness of 1.5-6 m. It is derived from red and greenish sandstone, gray siltstone, argillite, slate, conglomerate, and acid volcanic rocks.

The vegetation consists of stunted balsam fir, black spruce, white spruce, sheep-laurel, blueberry, bunchberry, raspberry, partridgeberry, crowberry, tall meadow rue, burnet, reindeer moss, *Cladonia squamosa, Dicranum undulatum, D fuscescens,* common club-moss, and *Pleurozium schreberi.*

Horizon	Depth, cm	Description
L	13.5–12.5	Litter of mainly needles, with leaves, grass, and moss of varying color.
F-H	12.5–0	Dark reddish brown (5YR 2/2 m), dusky red (2.5YR 3/2 d) medium to well decomposed organic matter; moderate, fine to medium granular; many very fine roots, common very fine vesicular pores; abrupt, smooth boundary; 7.5–20 cm thick; extremely acid (pH 4.0).
Ae	0–10	Reddish brown (5YR 5/3 m), pinkish gray (5YR 7/2 d) gravelly clay loam; weak, fine granular; friable, sticky when wet, soft when dry; abundant fine, medium, and a few coarse roots; common fine vesicular pores; 40% pink to gray, porous, lightweight angular gravel; clear, smooth boundary; 7.5–15 cm thick; extremely acid (pH 4.2).
Bhfgj	10–22.5	Dark reddish brown (5YR 3/2 m and d) gravelly sandy loam; few, fine, prominent yellowish red (5YR 4/8 m) mottles; amorphous; very friable, sticky when wet, slightly hard when dry; abundant fine roots; few very fine pores; 50% angular gravel and stones; gradual, wavy boundary; 1–12.5 cm thick; very strongly acid (pH 4.9).
Bfgj	22.5–35	Yellowish red (5YR 4/6 m), reddish brown (5YR 4/4 d) gravelly sandy loam; few small, distinct yellowish red (5YR 5/8 m) mottles; weak, fine granular; firm, slightly sticky when wet, slightly hard when dry; plentiful fine roots; very few fine vesicular pores; 50% angular gravel and stones; gradual, wavy boundary; 2.5–15 cm thick; very strongly acid (pH 5.0). Small sections of a thin iron pan about 0.6 cm thick, with a strongly cemented,

Chemical and physical analysis of Angel's Cove soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae	0–10	4.2	3.8	4.6	0.1	0.1	8.9	0.8	8.9	14.5	vl	38.2	vl	40	23	45	32
Bhfgj	10–22.5	4.9	4.4	12.4	0.8	1.3	7.9	0.2	2.5	19.1	vl	59.4	vl	50	56	34	10
Bfgj	22.5–35	5.0	4.3	6.4	1.7	2.2	6.7	0	0	14.5	vl	52.5	vl	50	53	36	11
BC	35–65	5.0	4.5	3.4	0.2	0.8	5.6	0.1	1.8	35.5	vl	125.4	vl	60	53	34	13
C	65+	5.1	4.5	2.0	0.1	0.1	2.3	0	0	17.9	vl	62.7	vl	60	47	40	13

lustrous black (10YR 2/1 m) upper layer and a moderately cemented dark red (2.5YR 4/8 m) lower layer, present.

Horizon	Depth, cm	Description
BC	35–65	Dark reddish gray (5YR 4/2 m), brown (10YR 5/3 d) very gravelly sandy loam; few medium, distinct reddish brown (5YR 4/4 m) mottles; weak, fine granular to amorphous; weakly cemented; few fine roots; 60% gray gravel and stones and greenish gravel with some red sandstone; stones covered with pale brown (10YR 6/3 m) silt caps; diffuse, wavy boundary; 15–37.5 cm thick; very strongly acid (pH 5.0).
C	65+	Reddish brown (5YR 5/3 m), brown (10YR 5/3 d) very gravelly sandy loam; amorphous; firm, hard when dry; 60% angular gravel and stones, with some green and red sandstones; strongly acid (pH 5.1).

Barasway soil 396 ha

Orthic Regosol

The profile described below is located on a 15% slope with easterly exposure, west of the village of Great Barasway on the east coast of Placentia Bay, at 3 m above sea level.

The parent material consists of shale, siltstone, and argillite. There is no vegetative cover.

Horizon	Depth, cm	Description
C1	0–60	Dark gray (5Y 4/1 m), gray to light gray (5Y 6/1 to 7/1 d) coarse gravel.
C2	60–120	Dark gray (5Y 4/1 m), gray (5Y 6/1 d) coarse and medium gravel.

Bauline soil 99 498 ha

Placic Ferro-Humic Podzol

The profile described below is located on a 15% slope with easterly exposure 0.4 km south of Cape St. Francis. It is on the east side of the road just north of the old cemetery, at 106 m above sea level.

The parent material consists of thin deposits of glacial till derived from siltstone, greywacke, slate, and minor volcanic rocks of Hadrynian age. The deposits are interspersed with extensive rock outcrops.

The vegetation is mainly stunted balsam fir and spruce (black-white spruce hybrids are common), with thinleaf alder, juniper, bunchberry, sheep-laurel, blueberry, burnet, hairgrass, and the mosses *Dicranum majus* and *Polytrichum juniperum*.

Horizon	Depth, cm	Description
L	5.5–5	Dark reddish brown (5YR 2/2 m), dark gray (5YR 4/1 d) needle and leaf litter with some moss and twigs; loose with many voids; abrupt, broken boundary; 0–1.2 cm thick.
F	5–0	Black (5YR 2/1 m), very dark gray (5YR 3/1 d) organic debris of needles, leaves, twigs, moss, and roots; fiber content 90%; matty or matlike; many fine and medium vesicular and horizontal flat, tubular pores; abrupt, wavy boundary; 3.7–10 cm thick; extremely acid (pH 3.6).
Ae	0–5	Pinkish gray (7.5YR 7/2 m), white (7.5YR 8/0 d) gravelly silt loam; amorphous to weak, fine

		subangular blocky; loose, slightly sticky when wet, soft when dry; abundant fine and medium roots; common fine vesicular pores; 95% white, angular gravel and stones; clear, wavy boundary; 5–12.5 cm thick; extremely acid (pH 3.6).
AB	5–10	Brown (7.5YR 4/2 m), pinkish gray (7.5YR 6/2 d) very gravelly sandy loam; weak, fine granular; friable, slightly sticky and slightly plastic when wet; abundant fine and medium roots; common vesicular pores; 95% angular gravel and stones; clear, wavy boundary; 5–12.5 cm thick; extremely acid (pH 3.9).
Bhf	10–17.5	Dark reddish brown (5YR 3/2 m), dark reddish gray (5YR 4/2 d) very gravelly loamy sand; amorphous; friable, slightly hard when dry; plentiful fine roots; 98% stones; clear, wavy boundary; 5–12.5 cm thick; very strongly acid (pH 4.6).
Bfgj	17.5–32.5	Strong brown (7.5YR 5/6 m), light brown (7.5YR 6/4 d) very gravelly sandy loam; common small to large, distinct strong brown (5YR 5/8 m) mottles; amorphous; firm, hard when dry; plentiful fine roots; 98% stones; clear, wavy boundary; 12.5–22.5 cm thick; very strongly acid (pH 4.6).
BCg	32.5–37.5	Olive (5YR 5/3 m), pale olive (5YR 6/3 d) very gravelly sandy loam; common fine, prominent strong brown (5YR 5/8 m) mottles; amorphous; firm, hard when dry; few fine roots; 98% stones; abrupt, wavy boundary; 7.5–20 cm thick; very strongly acid (pH 4.7).
Bfc1	37.5–38.5	Yellowish red (5YR 4/6 m) with black (5YR 2/1 d) bands; strongly cemented; abrupt, wavy boundary; 1.25–2.5 cm thick.
Bfc2	38.5–40	Black (5YR 2/1 m) moderately cemented, with high manganese content; abrupt, wavy boundary; 1.25–2.5 cm thick. Bfc1 and Bfc2 form a thin iron pan that shows up at irregular depths; it may split into two bands, double up, or form tunnels.
BCgj	40–60	Olive (5Y 5/3 m), pale olive (5Y 6/3 d) very gravelly loamy sand; few fine, prominent strong brown (5YR 5/8 m) mottles; amorphous; very firm, very hard when dry; 98% stones; gradual, wavy boundary; 15–25 cm thick; very strongly acid (pH 4.9).
C	60+	Olive (5Y 4/3 m), light olive gray (5Y 6/2 d) very gravelly loamy sand; 99% stones or rock.

Bay de Verde soil 2004 ha

Peaty Rego Gleysol

This profile is located on a 5% slope with southern exposure just south of the junction of the roads from Bay de Verde to Old Perlican and the road to Caplin Cove.

The parent material is coarse, stony glacial till derived from red arkosic sandstone with thin beds of argillite, siltstone, and slate, acid volcanic rocks, red conglomerates, and quartzitic sandstone of Lower Cambrian age.

The vegetation is generally 15–40 cm of partly decomposed sphagnum mosses, with speckled or gray alder, sheep-laurel, bog-laurel, Labrador-tea, blueberry, sedges, baked-apple, burnet, tall meadow rue, and occasionally swamp birch.

A description of the undisturbed profile is given below.

Horizon	Depth, cm	Description
L	40.5–40	Litter of leaves, mainly from sheep-laurel, Labrador-tea, and sedges; very irregular with many large voids; abrupt, broken boundary; 0–0.6 cm thick.
Of	40–0	Very dark grayish brown (10YR 3/2 m), dark brown (10YR 3/3 d) very weakly matted, slightly greasy, fibrous peat, mainly sphagnum, sedges, roots, and occasional twigs; fiber content 80%; abrupt, smooth boundary; 20–45 cm thick; extremely acid (pH 3.8).
Cg	0–45	Light brownish gray (10YR 6/2 m), pink (5YR 8/3 d) very cobbly sandy loam; few

Chemical and physical analysis of Bay de Verde soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Cg	0–45	4.2	3.8	0.3	0.3	0.9	1.5	0	0	78.5	6.7	29.2	60.5	70	54	33	13
C	45+	4.6	4.3	0	0.1	0.6	0.4	0	0	22.4	2.2	44.8	143.3	90	71	23	6

		fine, prominent yellowish red (5YR 5/8 m) mottles; amorphous; weakly to moderately cemented; 70% cobbles and boulders; diffuse, irregular boundary; 30–60 cm thick; strongly acid (pH 4.2).
C	45+	Pinkish gray (10YR 7/2 m and d) very gravelly sandy loam; amorphous; very firm, hard when dry; 90% cobbles and stones; very strongly acid (pH 4.6).
Cc		Within the Cg horizon, under boulders only, very dusky red (10YR 2/2 m and d) hard, cemented iron-manganese pan with abrupt upper and lower boundaries; 0.15–0.6 cm thick.

In slightly better drained areas, a thin Ah and a thin Bg were recognized with the following description, occurring under an F-H horizon and above the Cg horizon.

Horizon	Depth, cm	Description
Ah	0–0.5	Reddish brown (5YR 4/4 m), yellowish red (5YR 5/6 d) very cobbly sandy loam; weak, fine granular; friable, sticky when wet, soft when dry; plentiful fine roots; 70% gravel of gray-coated red and gray sandstone, argillite, and conglomerate; clear, wavy boundary; 0–1.25 cm thick; extremely acid (pH 3.8).
Bg	0.5–2	Dark reddish brown (5YR 3/4 m), reddish brown (5YR 4/3 d) very gravelly loamy sand; common coarse, prominent yellowish red (5YR 4/8 m) mottles; amorphous; friable, hard when dry; few fine roots; clear, wavy boundary; 70% gravel and stones; 0.5–2 cm thick; extremely acid (pH 3.2).

Biscay Bay soil 59 188 ha

Gleyed Ferro-Humic Podzol

The sample was taken on an 8% slope with northerly exposure, northeast of Portugal Cove South. It is south of the highroad and southeast of the Loran powerhouse at 137 m above sea level.

The parent material is very stony glacial till derived from slate, siltstone, greywacke, argillite, conglomerate, and some volcanic rock of the Conception Bay group of late Hadrynian or Cambrian age.

The vegetation consists of very scattered, stunted balsam fir in a generally treeless country, sheep-laurel, Labrador-tea, bog-laurel, baked-apple, small cranberry, reindeer mosses, ground-fir, bugleweed, and the following mosses: *Dicranum undulatum, Pleurozium schreberi, Polytrichum commune, Sphagnum imbricatum, S. flavicomans, S. cuspidatum,* and *S. molluscum.*

A description of a typical undisturbed profile is given below.

Horizon	Depth, cm	Description
L	25.5–25	Yellowish red (5YR 5/6 m) leaf litter, very loose, with large voids; often absent or mixed with live sedges and mosses; abrupt, wavy boundary; 0–1 cm thick.
F	25–1	Very dark gray (5YR 3/1 m), dark reddish brown (5YR 3/3 d) fibrous, somewhat matty, medium compact peat; very little decomposed; fiber content 90%, mainly sphagnum moss with roots and some twig remains; clear, smooth boundary; 15–40 cm thick.
H	1–0	Black (5YR 2/1 m), very dark gray (5YR 3/1 d) well decomposed greasy organic

material; abrupt, smooth boundary; 16–26 cm thick; extremely acid (pH 3.9).

Aegj 0–5 Light gray (10YR 7/2 m and d) very gravelly and slaty silty clay; common medium to coarse, distinct grayish brown (10YR 5/2 m) mottles; amorphous to weak, fine subangular blocky; friable, plastic when wet, soft when dry; plentiful very fine and fine roots; very few very fine pores; 95% stones; clear, wavy boundary; 2.5–12.5 cm thick; extremely acid (pH 4.1).

Bhfgj 5–20 Very dusky red (2.5YR 2/2 m), dark reddish brown (5YR 3/2 d) very gravelly sandy loam; few fine, distinct dark reddish brown (5YR 3/3 m) mottles; amorphous to weak, fine granular; friable, sticky when wet, soft when dry; plentiful very fine roots; few fine vesicular pores; 90% siltstone cobbles and slates; gradual, wavy boundary; 7.5–20 cm thick; extremely acid (pH 4.4).

Bfgj 20–32.5 Dark reddish brown (5YR 3/2 m), very dark grayish brown (10YR 3/2 d) very gravelly sandy loam; common fine, distinct dark reddish brown (2.5YR 3/4 m) mottles; amorphous to weak, fine granular; firm, slightly sticky when wet, slightly hard when dry; common micro roots; 80% cobbles and stones; abrupt, wavy boundary; 7.5–17.5 cm thick; very strongly acid (pH 4.8).

Bfcgj 32.5–37.5 Dark reddish brown (2.5YR 3/4 m), reddish brown (5YR 4/4 d) very gravelly sandy loam; common medium to fine, distinct red (2.5YR 4/6 m) mottles; amorphous, in places moderate, medium platy; very firm, hard when dry; weakly to moderately cemented; 80% gravel and stones; clear, wavy boundary; 2.5–12.5 cm thick; extremely acid (pH 4.2).

BC 37.5–52.5 Olive (5Y 4/3 m), light olive brown (2.5Y 5/4 d) very gravelly sandy loam; amorphous; firm, hard when dry; 60% gravel and stones; gradual, wavy boundary; 10–25 cm thick; extremely acid (pH 4.2).

C 52.5+ Olive gray (5Y 4/2 m), dark gray (2.5Y 4/0 d) gravelly loamy sand, with pockets of light olive gray (5Y 6/2 m), pale yellow (5Y 7/3 d) silt; amorphous to single grain; firm, slightly sticky when wet, hard when dry; 40% gravel and siltstones, argillites, and slates; extremely acid (pH 4.3).

Chemical and physical analysis of Biscay Bay soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
L	25.5–25																
F	25–1	3.9	3.3							22.4	5.6	50.4	56.0				
H	1–0	3.9	3.3														
Aegj	0–5	4.1	3.7	5.8	0.1	0.3	12.7	1.1	8.0	3.4	vl	10.0	48.2	95	10	48	42
Bhfgj	5–20	4.4	4.0	8.8	0.2	0.5	15.5	1.4	8.3	4.5	1.1	31.3	179.0	90	59	25	16
Bfgj	20–32.5	4.8	4.3	6.6	2.9	2.7	7.4	0.1	1.3	7.8	1.1	25.7	vl	80	69	21	10
Bfcgj	32.5–37.5	4.7	4.4	4.4	0.5	1.5	4.9	0.3	5.8	1.0	vl	7.8	vl	80	61	31	8
BC	37.5–52.5	4.2	4.2	2.0	0.2	1.1	3.0	0.3	9.1	3.4	1.1	25.7	14.5	60	55	33	12
C	52.5+	4.3	4.5	2.2	0.2	0.8	2.4	0.1	4.0	8.9	1.1	31.3	vl	40	80	10	10

Branch soil 6311 ha

Gleyed Dystric Brunisol

The profile described below is located on a 15% slope with southeasterly exposure, 4.8 km west of the town of Branch. It is on the edge of a woodlot 122 m above sea level.

The parent material is glacial till derived from shales with limestone, conglomerate, siltstone, sandstone, and thin manganese beds of Cambrian age.

The vegetation consists of a balsam fir forest with some blueberry, sheep-laurel, bunchberry, Labrador-tea, raspberry, juniper, wintergreen, and goldenrod as the shrub cover.

Horizon	Depth, cm	Description
L	1-0.5	Litter of mainly fir needles with some leaves and twigs; loose, with many voids; abrupt, smooth to broken boundary; 0.5-2 cm thick.
F-H	0.5-0	Very dark gray (5YR 3/1 m and d) semidecomposed remains of needles, twigs, and leaves; fine granular; somewhat loose, with many fine vesicular pores; abrupt, smooth boundary; 0.5-1 cm thick; extremely acid (pH 3.8).
Ae	0-1	Weak red (2.5YR 5/2 m), pale red (2.5YR 6/2 d) clay loam; weak, fine subangular blocky; friable, sticky and plastic when wet, soft when dry; abundant fine, medium, and coarse roots; common fine inped tubular random pores; 2% gravel of generally soft, rather porous pink shale and siltstone; abrupt, broken boundary; discontinuous; 0-2.5 cm thick; extremely acid (pH 3.9).
Bm	1-17.5	Dark reddish brown (5YR 3/4 m), reddish brown (5YR 5/4 d) clay loam; weak, fine subangular blocky; friable, sticky and plastic when wet, soft when dry; abundant fine and medium roots; common fine vesicular pores; 2% shaly gravel; gradual, wavy boundary; 12.5-37.5 cm thick; extremely acid (pH 4.1).
Bmgj	17.5-47.5	Yellowish red (5YR 4/6 m), reddish brown (5YR 5/3 d) clay loam; common medium, distinct dark brown (7.5YR 4/4 m) mottles; fine granular to weak, fine subangular blocky; very friable, slightly plastic when wet, slightly hard when dry; plentiful fine roots; few fine interstitial pores; 5% shaly gravel and stones; gradual, wavy boundary; 17.5-37.5 cm thick; extremely acid (pH 4.4).
BCgj	47.5-65	Dark reddish brown (5YR 3/4 m), dark brown (7.5YR 4/2 d) loam; few fine, prominent yellowish brown (10YR 5/8 m) mottles; amorphous; weakly to moderately cemented; few fine and very fine roots; 25% shaly gravel and stones; diffuse, wavy boundary; 12.5-37.5 cm thick; very strongly acid (pH 4.6).
C	65+	Dark reddish brown (5YR 3/4 m), brown (7.5YR 5/4

Chemical and physical analysis of Branch Clay soil

Horizon	Depth,	pH		Loss on igni-tion,	Oxa-late Fe,	Dithi-onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
Bm	1-17.5	4.1	3.8	12.5	0.7	2.7	12.4	1.7	13.7	vl	vl	35.8	16.8	2	24	43	33
Bmgj	17.5-47.5	4.4	3.9	10.5	0.4	2.2	11.4	1.9	16.6	vl	vl	23.5	23.5	5	22	48	30
BCgj	47.5-65	4.6	4.2	9.0	0.3	1.5	6.2	1.1	19.3	vl	4.5	80.6	28.0	25	47	37	16
C	65+	4.7	4.2	7.0	0.1	0.9	4.4	0.7	15.9	4.5	4.5	44.8	33.6	50	67	25	8

d) gravelly sandy loam; amorphous; firm, hard when dry; with manganese concretions 0.14–0.62 cm in diameter; 50% shaly stones and gravel, mainly red shales; very strongly acid (pH 4.7).

Butterpot soil 4711 ha

Orthic Humo-Ferric Podzol (very shallow lithic)

The profile described below was located on a 7% slope with northern exposure, 0.4 km northwest of the junction of the Foxtrap access road and the Trans-Canada highway, 152 m above sea level.

The parent material is a thin glacial till derived mainly from granodiorite, granite, and quartz diorite of the Holyrood plutonic series of Hadrynian age.

The vegetation is mainly sheep-laurel, blueberry, and mosses such as *Pleurozium* and *Polytrichum* spp.

Horizon	Depth, cm	Description
F–H	1–0	Dark reddish brown (5YR 2/2 m), dark brown (7.5YR 4/2 d) partly decomposed organic matter; 0.6–1.25 cm thick; abrupt, smooth boundary.
Ae	1–7.5	White (10YR 8/1 m and d) sandy loam; amorphous; few fine pores; 30% stones; clear, wavy boundary; 7.5–12.5 cm thick; extremely acid (pH 4.1).
Bf	7.5–25	Reddish yellow (7.5YR 7/6 m, 8/6 d) gravelly sandy loam; amorphous; friable; few fine vesicular pores; 50% stones; gradual, wavy boundary; 12.5–22.5 cm thick; extremely acid (pH 4.4).
BC	25–40	Light brownish gray (10YR 6/2 m), very pale brown (10YR 7/3 d) gravelly sandy loam; amorphous; 80% stones; abrupt, wavy boundary; 12.5–30 cm thick; very strongly acid (pH 4.5).
R	40+	Granitic rock.

Carbonear soil 14 488 ha

Gleyed Humo-Ferric Podzol

The profile described below is located on a 6% slope with easterly exposure, west of a large borrow pit, 3.2 km west of Victoria, and south of the road to Heart's Content, at an elevation of 137 m. The parent material is glacial till (ground moraine) 1.5–6 m thick, derived from siltstone, arkose, conglomerate, slate, and acid volcanic rocks of Hadrynian age.

The vegetation consists of heath barrens and scattered open stands of balsam fir, with a ground cover of sheep-laurel, foxberry, Labrador-tea, common club-moss, three-toothed cinquefoil, black crowberry, reindeer moss, aster, goldenrod, ground juniper, and the mosses *Rhacomitrium lanuginosum, Pleurozium schreberi, Hypnum crista-castrensis, Hylocomium splendens.*

Horizon	Depth, cm	Description
L–H	7.5–0	Very dark grayish brown (10YR 3/2 m), dark yellowish brown (10YR 3/4 d) fibrous organic debris of leaves, twigs, and mosses; felty; clear, smooth to wavy boundary; extremely acid (pH 4.0); fiber content 80%.
Ae	0–7.5	Very pale brown (10YR 7/4 m), pinkish white (5YR 8/2 d) silty clay loam; few large, prominent yellowish red (5YR 5/8 m) spots, probably part of B horizon rather than mottles; weak, very fine granular to weak, very fine platy; slightly sticky when wet; friable, soft when dry; abundant, fine and very fine roots; few fine vesicular pores; some angular gravel; clear, wavy boundary; 2.5–10 cm thick; extremely acid (pH 4.3).
Bfgj	7.5–25	Yellowish red (5YR 4/8 m, 5/6 d) loam; few medium to coarse, prominent yellowish brown (10YR 5/6 m) mottles; weak, fine granular; friable, slightly sticky when wet, soft when dry; plentiful fine and very fine roots; few fine vesicular pores; 7% angular gravel; clear, wavy boundary; 15–25 cm thick; very strongly acid (pH 4.6).
BCg	25–32.5	Light olive brown (2.5Y 5/4 m), pale brown (10YR 6/3 d) sandy loam; common fine to coarse, prominent dark reddish gray (5YR 4/2 m) mottles; weak, subangular blocky; firm, not sticky when wet, hard when dry; few fine roots; very few fine vesicular pores; 20% gravel and cobbles with silt caps; gradual, wavy boundary; 5–12.5 cm thick; very strongly acid (pH 4.8).

Chemical and physical analysis of Carbonear soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on igni-tion, %	Oxa-late Fe, %	Dithi-onite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae	0-7.5	4.3	3.7	5.5	0.5	0.6	27.9	0.3	1.1	26.8	1.1	8.9	vl	2	18	52	30
Bfgj	7.5-25	4.6	4.2	10.5	1.7	2.1	21.2	0	0	62.6	3.4	21.4	vl	7	39	48	13
BCg	25-32.5	4.8	4.5	2.6	0.2	0.3	10.3	0	0	22.4	1.1	4.5	vl	20	66	27	7
BCcg	32.5-100	4.8	4.5	1.1	0.1	0.3	7.2	0.2	3.2	149.0	11.2	75.0	vl	70	49	31	20
C	100+	4.8	4.5	1.4	0.1	0.3	8.1	0	0	31.3	4.8	17.9	vl	80	51	30	19

BCcg	32.5-100	Pale olive (5Y 6/4 m), pale yellow (5Y 7/3 d) very gravelly loam; common fine to coarse, prominent dark reddish gray (5YR 4/2 m) mottles; amorphous; moderately to strongly cemented; 70% gravel and cobbles with silt caps on cobbles; diffuse, irregular boundary; 30-75 cm thick; very strongly acid (pH 4.8).
C	100+	Olive (5Y 5/4 m), light gray (5Y 7/2 d) very gravelly cobbly loam; amorphous; firm; 80% gravel and cobbles; very strongly acid (pH 4.8).

Chapel Arm soil 2734 ha

Shallow lithic Eluviated Dystric Brunisol

The profile described below occurs on a 15% slope with southern exposure, 4.8 km east of Chapel Arm, on the north side of the old road to Whitbourne, at 106 m above sea level.

The parent material is glacial till ground moraine derived from red and some green shales with some limestone, conglomerates, siltstone, and sandstone with manganese beds of Cambrian age.

The vegetation is mainly balsam fir with some birch, white spruce, black spruce, and a few tamarack, and an undergrowth of sheep-laurel, blueberry, bunchberry, serviceberry, and a scattered growth of goldenrod, fireweed, yarrow, broad-leaved meadowsweet, and ground juniper.

Horizon	Depth, cm	Description
L	6-5	Dark yellowish brown (10YR 4/4 m), litter of needles and leaves, in places somewhat moldy; discontinuous, abrupt, broken boundary; 0-1.25 cm thick.
F	5-0	Very dusky red (2.5YR 2/2 m) loose, slightly decomposed, fibrous organic debris of needles, leaves, twigs, and some moss; plentiful medium and fine roots; 2.5-7.5 cm thick; abrupt, smooth boundary; extremely acid (pH 3.5); fiber content 80%.
Ae	0-7.5	Pinkish white (5YR 8/2 m and d) clay loam; weak, fine granular; firm, sticky when wet, slightly hard when dry; plentiful, medium to very fine roots; common fine vesicular pores; 2% angular to shaly white, gray, or red gravel; clear, wavy boundary; 5-12.5 cm thick; extremely acid (pH 3.9).
ABgj	7.5-15	Weak red (10R 4/3 m), pale red (10R 6/4 d) clay loam; small (5-15 mm) patches of pinkish white (5YR 8/2 m and d) and few, medium, prominent light brownish gray (10YR 6/3 m) and prominent yellowish red (5YR 5/8 m) mottles; weak, fine, subangular blocky; firm, sticky when wet, slightly hard when dry; plentiful fine and very fine roots; very few fine vesicular pores; 5% gravel; abrupt, irregular boundary; 2.5-12.5 cm thick; extremely acid (pH 4.0).
Bfc1	15-15.2	Reddish black (10R 2/1 m), dusky red (10R 3/2 d) strongly cemented upper

Chemical and physical analysis of Chapel Arm soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae	0-7.5	3.9	3.4	3.4	0.03	0.7	10.8			22.4	1.1	4.5	26.8	2	22	40	38
ABgj	7.5-15	4.0	3.6	3.2	0.1	1.7	12.4			17.9	1.1	vl	8.9	5	17	38	45
Bm	15.5-32.5	4.8	4.1	6.1	2.2	3.1	8.5	0.3	3.3	31.2	17.9	vl	17.9	30	38	28	34
BC	32.5-57.5	5.1	4.4	4.4	2.0	2.6	5.0	0.4	7.4	52.6	3.4	14.5	30.2	90	63	17	20

part of two horizons of a thin iron pan, in places overlain with a thick net of very fine roots; small gravel included in the pan; abrupt, wavy boundary; 0.15-0.30 cm thick.

Bfc2 15.2-15.5 Red (2.5YR 4/6 m - 5/6 d) moderately cemented lower horizon of thin iron pan; abrupt, wavy boundary; 0.15-0.47 cm thick. This pan, consisting of Bfc1 and Bfc2, may split into two pans each with a Bfc1 and Bfc2; a Bfc2 horizon may also be present above the Bfc1.

Bm 15.5-32.5 Dark red (2.5YR 3/6 m), red (2.5YR 4/6 d) gravelly sandy clay loam; weak, fine subangular blocky; firm, hard when dry; few fine vesicular pores; 30% shaly gravel mainly of red shale and some red sandstone; gradual, wavy boundary; 15-25 cm thick, very strongly acid (pH 4.8).

BC 32.5-57.5 Dark reddish brown (2.5YR 3/4 m), reddish brown (2.5YR 4/4 d) very gravelly sandy clay loam; amorphous; friable, hard when dry; 90% red shaly gravel; abrupt, irregular boundary; 12.5-25 cm thick; strongly acid (pH 5.1).

R 57.5+ Bedrock of red to purplish shale with small pockets of limestone.

Cochrane soil 168 146 ha

Orthic Humo-Ferric Podzol

The profile described below is located on a slope of 4% with northwesterly exposure on the south side of the road from St. John's to St. Phillips, northeast of the radio towers, at 183 m above sea level.

The parent material is glacial till from 1.5-6 m thick, mainly ground moraine derived from slate, siltstone, greywacke, and some volcanic rocks of the Conception Bay group of Hadrynian age.

Plate 1. Profile of an Orthic Humo-Ferric Podzol, Cochrane series.

The vegetation consists of balsam fir with some white spruce, black spruce, tamarack, thinleaf alder, trembling aspen, maple, wild cherry, dogberry, blueberry, bunchberry, goldenrod, sheep-laurel, serviceberry, foxberry, broad-leaved meadowsweet, false Solomon's-seal, raspberry, and other shrubs.

Horizon	Depth, cm	Description
L	7.5–5	Dark brown (10YR 3/3 m), brown (10YR 5/3 d) mixture of balsam fir needles, blueberry leaves, spruce needles, twigs, and other unidentified organic material; clear, smooth to wavy boundary; 0.6–3.1 cm thick.
F	5–1	Very dark brown (10YR 2/2 m), dark grayish brown (10YR 4/2 d) semidecomposed organic debris of needles, twigs, and leaves with many voids; clear, smooth to wavy boundary; 1–5 cm thick.
H	1–0	Very dark gray (10YR 3/1 m), dark gray (10YR 4/1 d) somewhat fibrous, slightly matted organic material; fiber content 20%. The poorer the growth of plants and the deeper the Ae, the more matlike this low horizon appears to be. It also appears to be greasier under these conditions. On good growing sites, fine granular; abrupt, smooth boundary; 0.6–2.5 cm thick, extremely acid (pH 3.8).
Ae	0–5	Light gray (7.5YR 7/2 m), pinkish white (7.5YR 8/2 d) silty clay loam; weak, fine platy; friable, slightly sticky and plastic when wet, slightly hard when dry; abundant fine to medium roots; common fine interstitial to vesicular random pores; 20% white, rather soft angular siltstone gravel; clear, wavy boundary; 0.6–7.5 cm thick; extremely acid (pH 4.0).
Bf1	5–17.5	Light yellowish brown (10YR 6/4 m), very pale brown (10YR 8/4 d) gravelly loam; weak, fine to medium platy; friable, nonsticky when wet, soft when dry; plentiful fine and medium roots; few fine vesicular pores; 30% angular and slaty gravel and stones; clear, wavy boundary; 7.5–17.5 cm thick; extremely acid (pH 4.2).
Bf2	17.5–35	Strong brown (7.5YR 5/8 m), brownish yellow (10YR 6/6 d) gravelly sandy loam to loam; weak, fine to medium subangular blocky; friable, slightly sticky when wet, soft when dry; plentiful fine roots; few fine vesicular pores; 40% angular and slaty gravel and stones; clear, wavy boundary; 15–30 cm thick; very strongly acid (pH 4.5).
BC	35–50	Olive gray (5Y 5/2 m), light gray (5Y 7/2 d) very gravelly sandy loam;

Chemical and physical analysis of Cochrane soil

Horizon	Depth,	pH		Loss on ignition,	Oxalate Fe,	Dithionite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
Ae	0–5	4.0	3.3	3.8	0.4	0.4	16.6	0	0	3.4	vl	12.2	vl	20	18	52	30
Bf1	5–17.5	4.2	3.5	5.6	1.3	1.9	16.1	0	0	5.5	1.1	23.5	vl	30	26	48	26
Bf2	17.5–35	4.5	4.1	3.5	1.5	2.7	12.8	0.1	0.8	2.2	vl	15.6	vl	40	52	34	18
BC	35–50	4.8	4.8	4.0	0.4	0.5	1.8	0	0	6.7	1.1	47.0	22.4	60	52	39	9
C	50+	4.9	4.6	2.6	0.4	0.3	2.2	0.6	21.4	4.5	1.1	31.2	vl	70	75	19	6

		amorphous; moderately cemented; very few fine roots; occasional dark reddish brown (5YR 2/2 m) manganese concretions of various sizes up to 12.5 cm in diameter; 60% angular and slaty gravel and stones; diffuse, wavy boundary; 15–25 cm thick; very strongly acid (pH 4.8). The stones in this horizon are generally covered with light gray (10YR 7/2 d) silt caps 0.15–0.6 cm thick.
C	50+	Dark olive gray (5Y 3/2 m), olive gray (5Y 5/2 d) very gravelly loamy sand; amorphous; very firm, hard when dry; 60–80% slates, angular siltstones, and gravel; very strongly acid (pH 4.9). Within the C or BC horizon, channels are sometimes present where the rocks are covered with a dark brown (5YR 2/2 m) film of silt high in organic matter and manganese, and a net of very fine roots.

Cuslett soil 12 921 ha

Very shallow lithic Gleyed Humo-Ferric Podzol

This profile is located on a 6% slope with easterly exposure, on the east side of the road 3.2 km north of Cuslett, near the southwestern coast of the Peninsula, at 76 m above sea level.

The parent material is very stony glacial till derived from slate, sandstone, siltstone, and shale of Cambrian age.

The vegetation consists of patches of very stunted balsam fir and black spruce with occasionally ground juniper, speckled or gray alder, and thinleaf alder in the heath barrens, with Labrador-tea, sheep-laurel, bunchberry, black crowberry, blueberry, teaberry, cloudberry, three-toothed cinquefoil, ground-fir, sedges, and the following mosses: *Dicranum fuscescens, D. majus, D. undulatum, Polytrichum commune, Rhacomitrium lanuginosum,* and also the lichens *Cladonia alpestris* and *C. rangiferina* (reindeer moss).

A description of an undisturbed profile is given below.

Horizon	Depth, cm	Description
F–H	5–0	Dusky red (2.5YR 3/2 m), dark reddish gray (5YR 4/2 d) fibrous, mottled organic material consisting of moss, twigs, roots, and needle and leaf remains; fiber content 90%; abrupt, smooth boundary; 2.5–12.5 cm thick.
Ae	0–0.5	Weak red (10R 5/3 m), reddish gray (10R 6/1 d) gravelly silty clay loam; weak, medium crumb, in places medium fine platy, in other spots, fine, subangular blocky; friable, plastic, sticky when wet, hard when dry; abundant fine and very fine roots; common fine and medium vesicular and tubular random pores; 50% pink shaly gravel; clear, wavy boundary; 0.6–25 cm thick; extremely acid (pH 4.3).
ABgj	0.5–5.5	Weak red (2.5YR 4/2 m), reddish brown (5YR 5/4 d) very gravelly clay loam; common, coarse, distinct dusky red (2.5YR 3/2 m) mottles; amorphous; friable, sticky when wet, slightly hard when dry; plentiful fine and very fine roots; common medium tubular random pores; 80% gravel and shaly stones, mainly pinkish shale, also sandstone and siltstone; clear, wavy boundary; 2.5–10 cm thick; very strongly acid (pH 4.8).
Bfg	5.5–35	Very dusky red (2.5YR 2/2 m), dark reddish brown (5YR 3/4 d) very gravelly loam; many large, prominent weak red (2.5YR 5/2 m) mottles; amorphous; firm, hard when dry; few very fine roots; 90% imbricated red and some greenish shaly and slaty stones and flags; diffuse, wavy boundary; 20–40 cm thick; strongly acid (pH 5.4).
BC	35+	Imbricated red, gray, and some greenish sandstones, siltstones, and slates coated with a reddish black (10R 2/1 m) film rich in organic material and manganese.

Chemical and physical analysis of Cuslett soil

Horizon	Depth, cm	pH H$_2$O	pH CaCl$_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ac	0-0.5	4.3	3.8											50			
ABgj	0.5-5.5	4.8	4.3	8.9	0.2	0.6	7.5	1.1	14.6	3.4	vl	25.8	vl	80	25	46	29
Bfg	5.5-35	5.4	4.9	12.9	1.6	2.7	6.3	1.2	19.0	24.6	vl	143.5	44.8	90	37	40	23
BC	35+													99			

Fair Haven soil 18 363 ha

Placic Humo-Ferric Podzol

The profile described below is located on a 9% slope with southwesterly exposure, on the east side of the road 4.8 km north of Fair Haven opposite Duck Pond, at 60 m above sea level.

The parent material is stony glacial till derived from gray slate, gray and green siltstone, argillite, red sandstone, and granitic rocks mainly of Hadrynian age.

The vegetation consists generally of low shrubs, herbaceous plants, and mosses (barrens), with some tree cover in scattered stands. The trees are balsam fir, black spruce, some white spruce, occasional tamarack, and thinleaf alder. The shrubs include sheep-laurel, blueberry, Labrador-tea, black crowberry, and the following lichens: *Cladonia alpestris, C. rangiferina* (reindeer moss). The mosses present include *Dicranum fuscescens, D. undulatum, Hypnum crista-castrensis, Pleurozium schreberi,* common club-moss, and the grass browntop.

Horizon	Depth, cm	Description
L	8.7-7.5	Brown (7.5YR 5/4 m) litter mainly from ericaceous shrubs, some moss and twigs; loose with many voids; abrupt, broken boundary; 0-1.8 cm thick.
F	7.5-0	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/2 d) organic debris; fibrous (fiber content 90%); somewhat mottled; slightly greasy when wet; abundant medium and fine roots; many fine vesicular pores; abrupt, wavy boundary; 2.5-15 cm thick; extremely acid (pH 3.9).
Aegj	0-10	Light gray (5YR 6/1 m), white (5YR 8/1 d) loam; few medium and coarse, distinct light reddish brown (5YR 6/3 m) mottles; weak, fine subangular blocky; friable, plastic when wet, hard when dry; abundant medium and fine roots; common fine pores; 15% angular gravel and small stones, mainly gray, some green argillite, some red sandstone and quartzite; clear, wavy boundary; 5-15 cm thick; extremely acid (pH 4.2).
Bfgj1	10-20	Dark reddish brown (5YR 3/2 m), brown (7.5YR 4/2 d) gravelly sandy loam; few medium, prominent dark red (2.5YR 3/6 m) mottles; amorphous to weak, fine platy; friable, sticky when wet, soft when dry; abundant fine and very fine roots; few fine vesicular pores; 25% gravel and stones; abrupt, wavy boundary; 7.5-15 cm thick; very strongly acid (pH 4.5).
Bfc	20-21	Dark red (2.5YR 3/6 m), yellowish red (5YR 5/8 d) moderately cemented, with thin (0.08 cm) reddish black (10R 2/2 m and d) glossy, hard, cemented horizons, which join each other or separate into many other similar horizons; very few fine roots; 40% gravel; abrupt, wavy boundary; 0.6-2.5 cm thick; very strongly acid (pH 5.0).

Chemical and physical analysis of Fair Haven soil

Horizon	Depth, cm	pH H$_2$O	pH CaCl$_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Aegj	0-10	4.2	3.6	2.9	0.2	0.6	15.3	0.24	1.5	5.6	vl	6.7	5.6	15	28	49	23
Bfgj1	10-20	4.5	4.0	6.9	0.2	0.6	15.5	0	0	5.6	vl	3.4	5.6	25	59	34	7
Bfc	20-21	5.0															
Bfgj2	21-30	4.9	4.2	6.2	0.2	0.6	10.1	0	0	3.9	vl	3.4	vl	40	63	32	5
BCgj	30-52.5	4.6	4.3	1.1	0.1	0.6	9.2	0	0	3.9	vl	2.2	vl	40	63	32	5
C	52.5+	4.6	4.4	0.8	0.1	0.6	9.0	0	0	3.9	vl	1.1	vl	70	60	34	6

Bfgj2	21-30	Dark brown (7.5YR 4/2 m), yellowish brown (10YR 5/4 d) gravelly sandy loam; common fine, prominent red (2.5YR 4/8 m) mottles; weak, fine granular; friable, hard when dry; plentiful fine roots; few fine vesicular pores; 40% gravel with pinkish gray (5YR 5/2 m) silt coating on top; gradual, wavy boundary; 2.5-12.5 cm thick; very strongly acid (pH 4.9).
BCgj	30-52.5	Dark reddish gray (5YR 4/2 m), dark gray (10YR 4/1 d) gravelly sandy loam; common fine, prominent red (2.5YR 4/8 m) mottles; weak, coarse platy; firm, hard when dry; few fine roots; few very fine vesicular pores; 40% gravel and stones covered with pinkish gray (5YR 5/3 m), light gray (5YR 6/1 d) silt coating on top of the stones and gravel; diffuse, wavy boundary; 15-30 cm thick; very strongly acid (pH 4.6).
C	52.5+	Dark reddish brown (5YR 3/3 m), dark reddish gray (5YR 4/2 d) very gravelly sandy loam; amorphous; very friable, hard when dry; 70% angular gravel and stones, mainly gray and greenish siltstone, slate, argillite, and some red sandstone, red conglomerate, and quartzite.

Foxtrap soil 9705 ha

Gleyed Ortstein Humo-Ferric Podzol (taxadjunct)

The profile described below is located on an 8% slope with northeasterly exposure, 1.6 km south of Foxtrap, on the west side of the Foxtrap access road, at an elevation of 76 m.

The parent material is coarse textured glacial till 0.9-6 m thick, derived from granite, granodiorite, quartz monzonite, and quartz diorite of the Holyrood batholith.

These soils are rapidly to well drained at the surface, but hardpans at the lower end of slopes make drainage imperfect in the lower part of the profile. A hard, coarse platy structure (ortstein) such as that found in the Bfcgj horizon occurs mainly in coastal areas and it is this taxadjunct soil that is described below. An impervious layer (fragipan) associated with wet conditions is sometimes found in the lower part of the profile.

Plate 2. Profile of a Gleyed Humo-Ferric Podzol, Foxtrap series.

The vegetation consists of white spruce, black spruce, occasional tamarack, balsam fir, thinleaf alder, sheep-laurel, blueberry, goldenrod, stitchwort, and others.

Horizon	Depth, cm	Description
L	10.5–10	Litter of needles, leaves; very loose with large voids; discontinuous, abrupt, broken boundary; 25–0.6 cm thick.
F	10–0	Dark reddish brown (5YR 2/2 m), dark brown (7.5YR 4/2 d) slightly felty organic debris of needles, leaves, twigs, roots, and moss; fiber content 80%; abrupt, smooth boundary; 5–12.5 cm thick.
Ae	0–12.5	White (10YR 8/2 m), pinkish gray (7.5YR 7/2 d) gravelly sandy loam; very weak, fine platy; friable, slightly hard when dry; plentiful very fine and fine roots; few fine vesicular pores; 20% gravel; clear, wavy boundary; 7.5–20 cm thick; extremely acid (pH 4.5).
Bf1	12.5–20	Dark reddish brown (5YR 3/2 m), dark brown (10YR 4/3 d) gravelly sandy loam; amorphous to weak, fine granular; friable, slightly hard when dry; common very fine and fine roots; few fine vesicular pores; 30% angular gravel and cobbles; clear, wavy boundary; 5–12.5 cm thick; very strongly acid (pH 4.6).
Bf2	20–22.5	Yellowish red (5YR 5/8 m), light reddish brown (5YR 6/4 d) gravelly sandy loam; amorphous; firm, hard when dry; in places, medium platy with fine (0.15 cm) reddish brown (5YR 2/2 m) bands; common very fine and fine roots; few fine vesicular pores; 40% cobbles; clear, wavy boundary; 0–7.5 cm thick; strongly acid (pH 5.3).
Bfcgj	22.5–35	Light yellowish brown (10YR 6/4 m), very pale brown (10YR 7/4 d) cobbly sandy loam; common medium, prominent brownish yellow (10YR 6/8 m) mottles; strong, coarse platy; peds externally dark reddish brown (5YR 3/2 m); strongly to moderately cemented; few fine roots; 40% cobbles; gradual, wavy boundary; 12.4–20 cm thick; strongly acid (pH 5.3).
BC	35–45	Pale yellow (2.5Y 7/4 m), very pale brown (10YR 7/3 d) very cobbly sandy loam; common fine and medium, prominent brownish yellow (10YR 6/8 m) mottles; amorphous; moderately to strongly cemented; 60% cobbles; gradual, wavy boundary; 10–25 cm thick; strongly acid (pH 5.3).
C	45+	Light olive gray (5Y 6/2 m), light gray (5Y 7/1 d) very cobbly sandy loam; amorphous; firm, hard when dry; 60% cobbles and stones of granite, granodiorite, and quartz diorite; strongly acid (pH 5.4).

Chemical and physical analysis of Foxtrap soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae	0–12.5	4.5	3.4	1.2	0.2	0.6	7.2	0.1	4.4	3.4	1.1	19.1	vl		65	31	4
Bf1	12.5–20	4.6	3.8	8.9	0.8	1.5	15.6	0.2	1.3	2.2	vl	11.2	vl		66	30	4
Bf2	20–22.5	5.3	4.4														
Bfcgj	22.5–35	5.3	4.4	5.3	1.5	2.0	4.6	0	0	4.5	1.1	22.4	vl		70	26	4
BC	35–45	5.3	4.4	2.0	0.8	1.5	2.0	0	0	4.5	1.1	26.9	vl		75	22	3
C	45+	5.4	4.7	1.0	0.1	0.3	0.4	0	0	4.5	1.1	31.2	vl		83	15	2

Gull Cove soil 1333 ha

Orthic Gleysol

The profile described below is on a 5% slope with easterly exposure, 3.2 km west of Branch on the east side of the road just past the old cemetery, at 106 m above sea level.

The parent material is glacial till derived mainly from red and some green shales with limestone, conglomerate, siltstone, sandstone, and manganese beds of Cambrian age.

The vegetation consists of balsam fir forest with some spruce, birch, and speckled or gray alder, and a ground cover of blueberry, sheep-laurel, raspberry, heath-cypress or ground-fir, and the mosses *Sphagnum imbricatum, S. molluscum, S. cuspidatum, Polytrichum commune, Hypnum crista-castrensis,* and others.

Horizon	Depth, cm	Description
F–H	20–0	Black (5YR 2/1 m), dark reddish brown (5YR 3/2 d) mainly sphagnum moss; fiber content 50%; saturated with water most of the year; abrupt, smooth boundary; 20–45 cm thick; extremely acid (pH 3.2).
Bg1	0–10	Light brownish gray (10YR 6/2 m), very pale brown (10YR 8/3 d) silty clay loam; many medium, prominent red (2.5YR 5/6 m) mottles; weak, fine subangular blocky; friable, sticky and plastic when wet, slightly hard when dry; plentiful fine roots, 15% gray to white, porous shaly gravel; clear, wavy boundary; 5–15 cm thick; extremely acid (pH 4.4).
Bg2	10–20	Reddish brown (2.5YR 4/4 m), light reddish brown (2.5YR 6/4 d) gravelly loam; many medium to large, prominent brownish yellow (10YR 6/6 m) mottles; moderate, fine to medium subangular blocky; firm, sticky and plastic when wet, slightly hard when dry; plentiful fine roots; 30% shaly gravel and stones; clear, wavy boundary; 7.5–15 cm thick; extremely acid (pH 4.4).
Bg3	20–42.5	Dark reddish brown (5YR 3/3 m), dark reddish gray (5YR 4/2 d) gravelly sandy loam; many small, prominent brownish yellow (10YR 6/6 m) mottles; amorphous; weakly cemented; very few fine roots; 50% shaly gravel and stones of green and red shale; gradual, wavy boundary; 15–37.5 cm thick; very strongly acid (pH 5.0). Small patches of a discontinuous yellowish red (5YR 4/8 m) iron pan 0.15–0.45 cm thick may be present within this horizon.
BCg	42.5+	Dark brown (10YR 3/2 m), brown (10YR 4/2 d) gravelly sandy loam; few fine, prominent yellowish red (5YR 5/6 m) mottles; amorphous; firm, not plastic or sticky when wet, slightly hard when dry; 50% shaly gravel and stones, mainly red, but some green shale; strongly acid (pH 5.2).

Chemical and physical analysis of Gull Cove soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
F–H	20–0	3.2	3.1														
Bg1	0–10	4.4	3.7	7.1	0.1	0.7	12.4	1.7	13.7	16.8	vl	39.2	vl	15	15	45	40
Bg2	10–20	4.4	3.9	7.6	0.6	1.7	11.4	1.9	16.6	13.2	vl	23.6	22.4	30	39	37	24
Bg3	20–42.5	5.0	4.4	5.5	0.5	1.5	6.2	1.1	19.3	11.2	vl	80.8	22.4	50	64	32	4
BCg	42.5+	5.2	4.5	3.7	0.3	1.3	4.4	0.7	15.9	11.2	vl	44.9	27.2	50	67	29	4

Heart's Content soil 14 493 ha

Gleyed Humo-Ferric Podzol

The profile described below occurs on a 3% slope with northern exposure, on the east side of the road from Heart's Content to Heart's Desire and 1.2 km south of the junction with the new road, at 76 m above sea level.

The parent material is loamy glacial till ground moraine, 0.9-6 m thick containing many stones derived from slate, siltstone, arkose, and acid volcanic rocks of Cambrian age.

Horizon	Depth, cm	Description
L	18-17.5	Dark reddish brown (5YR 2/2 m) litter of leaves, needles, moss, and twigs; loose with many voids; abrupt, broken boundary; 0-0.6 cm thick.
F	17.5-0	Black (5YR 2/1 m), dark reddish brown (5YR 3/3 d) fibrous, slightly felty, porous, decomposing moss, twigs, and leaves; many fine vesicular pores; abrupt, smooth boundary; 15-25 cm thick; extremely acid (pH 3.6).
Aegj	0-15	Pale brown (10YR 6/3 m), white (10YR 8/2 d) silty clay loam; few fine prominent yellowish red (5YR 5/8 m) mottles; moderate, medium subangular blocky; friable, sticky and plastic when wet, soft when dry; abundant fine roots; common very fine pores; 20% white gravel; clear wavy boundary; 10-20 cm thick; extremely acid (pH 4.2).
Bfgj1	15-20	Dark brown (7.5YR 3/2 m), gray (10YR 5/1 d) loam; few fine, prominent yellowish red (5YR 5/8 m) mottles; weak, fine platy; friable, sticky when wet, soft when dry; abundant fine roots; common very fine pores; 15% light gray (10YR 7/1 d) gravel, mainly siltstone and slate; abrupt, wavy boundary; 2.5-7.5 cm thick; extremely acid (pH 4.5).
Bf	20-21	Dark red (2.5YR 3/6 m), yellowish red (5YR 5/6 d) loam; weak, fine granular to weak, fine subangular blocky; firm, hard when dry; plentiful fine roots; few medium and fine interstitial pores; 20% angular gravel; clear, wavy boundary; 1.25-5 cm thick; very strongly acid (pH 4.8). This horizon narrows in places to 1.25 or 0.6 cm thick; dark red (2.5YR 3/6 m), red (2.5YR 4/8 d) weakly cemented iron pan, but without the dark upper part evident in other iron pans.
Bfgj2	21-32.5	Yellowish red (5YR 5/6 m), strong brown (7.5YR 5/6 d) loam; common medium, distinct, pale brown (10YR 6/3 m) mottles; weak, fine granular; friable, hard when dry; plentiful fine roots; few

Chemical and physical analysis of Heart's Content soil

Horizon	Depth,	pH		Loss on igni- tion,	Oxa- late Fe,	Dithi- onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F	17.5-0	3.6	2.8														
Aegj	0-15	4.2	3.7	5.0	0.1	0.4	17.1	0.28	1.6	31.2	17.9	vl	17.9	20	15	48	31
Bfgj1	15-20	4.5	3.9	6.0	0.3	1.1	12.2	0	0	12.2	1.1	vl	5.6	15	36	40	24
Bf	20-21	4.8	4.2	6.5	2.3	2.9	9.2	0.11	1.2	3.4	0	vl	1.1	20	48	40	12
Bfgj2	21-32.5	4.5	4.1	3.5	0.7	2.0	5.0	0	0	23.5	1.1	vl	13.4	20	51	37	12
BCgj	32.5-47.5	4.5	4.2	1.7	0.2	0.9	2.9	0	0	44.8	2.2	vl	17.9	30	47	41	12
C	47.5+	4.5	4.2	0.9	0.1	0.6	1.6	0	0	31.2	2.2	vl	17.9	40	47	37	16

		fine vesicular pores; 20% angular gravel and stones; diffuse, wavy boundary; 10–25 cm thick; very strongly acid (pH 4.5).
BCgj	32.5–47.5	Light brownish gray (2.5YR 6/2 m), light gray (2.5Y 7/2 d) gravelly loam; few small prominent strong brown (7.5YR 5/8 m) mottles; amorphous; moderately cemented; 30% gray (2.5Y 6/0 d) gravel and slaty stones; diffuse, irregular boundary; 10–20 cm thick; very strongly acid (pH 4.5).
C	47.5+	Pale olive (5Y 6/4 m), white (5Y 8/1 d) gravelly loam; amorphous; firm, hard when dry; 40% angular gravel and slaty stones, mainly gray and greenish argillite and shale; very strongly acid (pH 4.5).

Holyrood soil 10 810 ha

Orthic Humo-Ferric Podzol

The profile described below is located on a 10% slope with western exposure, on the south side of the Trans-Canada highway about 0.8 km southwest of the junction with the Foxtrap access road, at 180 m above sea level.

The parent material is stony and bouldery glacial till ground moraine derived from granodiorite, quartz monzonite, granite, and quartz diorite of the Holyrood plutonic series.

The vegetation is mainly blueberry, sheep-laurel, ground juniper, goldenrod, common hairgrass, with some serviceberry, creeping snowberry, and scattered stands of white spruce, black spruce, balsam fir, thinleaf alder, tamarack, wild cherry, mountain-ash, and paper birch. The following mosses were also identified: *Hypnum crista-castrensis, Pleurozium schreberi, Polytrichum commune,* and *P. juniperinum.*

Horizon	Depth, cm	Description
L	4–2.5	Needle litter with some leaves mainly of sheep-laurel; very loose, open; 0–1.25 cm; abrupt, broken boundary.
F-H	2.5–0	Dark reddish brown (5YR 2/2 m), dark brown (7.5YR 4/2 d) semidecomposed, slightly felty organic debris, mainly of needles, with some leaves and moss; 1–5 cm thick; abrupt, smooth boundary.
Ae	0–15	White (10YR 8/1 m and d) sandy loam to loam; weak, fine granular to weak, fine platy; very friable, slightly sticky and nonplastic when wet, slightly hard when dry; abundant, fine and medium roots; common very fine and fine vesicular pores; 20% stones, white on outside; clear, wavy boundary; 7.5–20 cm thick; extremely acid (pH 4.5).
Bhf	15–20	Dark reddish brown (5YR 3/2 m), reddish brown (5YR 4/4 d) cobbly loam; weak, fine granular; friable, soft when dry; plentiful fine roots; common very fine and fine vesicular pores; 40% cobbles and gravel; clear, wavy boundary; 1.25–7.5 cm thick; very strongly acid (pH 4.8).

Chemical and physical analysis of Holyrood soil

Horizon	Depth,	pH		Loss on ignition,	Oxalate Fe,	Dithionite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
Ae	0–15	4.5	3.5	0.9	0.03	0.1	2.6	0.1	3.7	4.5	2.2	35.9	vl	20	52	37	11
Bhf	15–20	4.8	3.9	12.0	0.1	1.5	10.7	0.1	0.9	2.2	vl	10.0	vl	40	50	35	12
Bf	20–40	5.2	4.5	6.0	0.6	1.4	7.1	0	0	5.6	vl	30.2	vl	40	49	33	18
BC	40–50	5.3	4.8	2.0	0.1	0.3	0.5	0	0	5.6	1.1	30.2	vl	60	60	30	10
C	50+	5.3	4.8	0.5	0.1	0.2	0.3	0	0	8.9	1.1	31.2	vl	90	62	31	7

Bf	20–40	Yellowish red (5YR 5/6 m), reddish yellow (7.5YR 6/6 d) cobbly sandy loam; moderate, fine subangular blocky to moderate, fine granular; friable, slightly sticky and nonplastic when wet, slightly hard when dry; plentiful very fine and fine roots; few very fine and fine pores; 40% cobbles and gravel; gradual, wavy boundary; 15–30 cm thick; strongly acid (pH 5.2).
BC	40–50	Grayish brown (10YR 5/2 m), light gray (2.5Y 7/2 d) cobbly sandy loam; amorphous; weakly cemented; very few fine roots; very few fine pores; few fine, prominent brownish yellow (10YR 6/8 m) mottles; 60% cobbles and stones; gradual, wavy boundary; 10–20 cm thick; strongly acid (pH 5.3). The cobbles and stones in this horizon have light brownish gray (10YR 6/2 d), white (10YR 8/1 m) silt caps, 0.8–0.3 cm thick.
C	50+	Light gray (5Y 7/2 m), (2.5Y 7/2 d) very gravelly and cobbly sandy loam; amorphous; firm, hard when dry; 90% gravel, cobbles, and stones; strongly acid (pH 5.3).

Indian Pond soil

Placic Humic Podzol

The profile described below is located on a 2% slope with northern exposure, at the southwest corner of a large gravel pit near the railroad track at Lance Cove Head, Conception Bay, adjacent to the Seal Cove profile described elsewhere.

The parent material is similar to that of the Seal Cove soils, very gravelly glaciofluvial deposits mainly derived from granitic and other acid volcanic rocks. Some areas of Indian Pond soils are too small to show on the soil map.

This profile occurs in poorly drained locations, usually under 25–60 cm of sphagnum and other wetland vegetation. Besides an overburden of organic material and poor drainage, the profile has a thick humus-enriched Bhfg horizon and an iron-manganese pan occurring at various depths.

The vegetation consists of occasional tamarack, speckled or gray alder, and in sheltered locations, a closed stand of black spruce over sphagnum mosses, sedges, cloudberry, sheep-laurel, Labrador-tea, bog-laurel, tall meadow rue, and others.

Horizon	Depth, cm	Description
L	50.5–50	Very pale brown (10YR 7/3 m) litter of leaves, needles, and moss; abrupt, wavy boundary; 0–0.6 cm thick.
Of	50–0.5	Pinkish gray (7.5YR 7/2 m to 5YR 7/2 m) fibric layer, mainly sphagnum mosses with plentiful fine roots for sedges and woody plants; fiber content 80%; slightly less fibrous at the lower depth and also slightly darker; clear, wavy boundary; 25–72.5 cm thick.
Oh	0.5–0	Black (5YR 2/1 m) humic organic material; fiber content 10%; sticky, soft, greasy; 0.6–2.5 cm thick; abrupt, smooth boundary; extremely acid (pH 3.5).
Aeg	0–15	Pale brown (10YR 6/3 m), light gray (10YR 7/2 d) gravelly sandy loam; weak, fine platy; friable, slightly sticky when wet, slightly hard when dry; plentiful very fine to fine roots; 10–20 cm thick; extremely acid (pH 4.1).
Bhg	15–40	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/3 d) very gravelly loamy sand; few medium to large, prominent dark red (2.5YR 3/6 m) and brown (7.5YR 5/4 m) mottles; weak, fine granular to weak, fine platy; friable, hard when dry; very few fine and very fine roots; 60% rounded gravel and stones; abrupt, irregular boundary; 5–50 cm thick; extremely acid (pH 4.1).
Bfc1	40–40.5	Dark red (2.5YR 3/6 m), reddish brown (2.5YR 4/4 d) amorphous; strongly cemented upper layer of iron–manganese pan with 70% small gravel; abrupt, irregular boundary; 0.3–0.6 cm thick.
Bfc2	40.5–42.5	Black (5YR 2/1 m and d), lustrous; amorphous; strongly cemented lower layer of iron–manganese pan; this horizon contains

Chemical and physical analysis of Indian Pond soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Oh	0.5–0	3.5															
Aeg	0–15	4.1	3.7	2.3	0.1	0.2	9.2	0.5	5.2	20.1	2.2	vl	17.9	20	60	35	5
Bhg	15–40	4.1	4.0	11.2	0.3	0.6	19.2	0.5	2.6	33.6	1.1	vl	22.4	60	80	15	5
BCg	42.5–57.5	4.7	4.5	2.0	0.3	0.4	6.7	0.24	3.5	11.2	1.1	vl	11.2	90	85	11	4
C	57.5+	4.5	3.9	1.2	0.2	0.4	6.8	0	0	11.2	1.1	vl	11.2	90	92	3	3

		streaks of dark reddish brown (5YR 3/3 m) material and reacts violently with 30% hydrogen peroxide; abrupt, irregular boundary; 0.6–3.1 cm thick. Another horizon similar to the Bfc1 may underlie, in places, the Bfc2. The combined thickness of Bfc1 and Bfc2 decreases over a distance of about 120 cm from the iron pan in the Seal Cove profile into the Bfc thin iron pan of the Seal Cove profile.
BCg	42.5–57.5	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/3 d) very gravelly loamy sand; many medium to coarse, prominent brown (10YR 5/3 m) mottles; amorphous; firm, hard when dry; 90% rounded gravel and stones; gradual, wavy boundary; 10–20 cm thick; very stongly acid (pH 4.7).
C	57.5+	Grayish brown (2.5Y 5/2 m), pinkish gray (7.5YR 6/2 d) very gravelly sand; amorphous; firm, slightly hard when dry; 90% rounded granitic gravel and stones; very strongly acid (pH 4.5).

Kelligrews soil 23 852 ha

Gleyed Humo-Ferric Podzol

The profile described below occurs on a 3% slope with southerly exposure, on the north side of the Witless Bay Line about 0.8 km east of the junction with the Trans-Canada highway, at 228 m above sea level.

The parent material is glacial till ground moraine derived from granite, quartz diorite, and granodiorite of the Holyrood plutonic series. This coarse, stony, and bouldery gravelly material is from 0.6 to 6 m deep. The stoniness increases rapidly below 45 cm. Rock outcrops are common.

A heath-type vegetation is common, with occasional open stands of black spruce, tamarack, balsam fir, and occasionally white birch and speckled or gray and thinleaf alder. The heath vegetation around the profile consists of sheep-laurel, blueberry, burnet, bugleweed, bunchberry, tall meadow rue, small cranberry, and others, with the mosses *Pleurozium schreberi, Dicranum majus, Polytrichum commune, Hypnum crista-castrensis,* and others.

Horizon	Depth, cm	Description
L	15.5–15	Litter of leaves and twigs of varied color; very loose; absent to 1.25 cm thick; abrupt, wavy boundary.
F	15–0	Black (5YR 2/1 m), dark reddish brown (5YR 3/2 d) semidecomposed organic debris of leaves, twigs, and roots; slightly felty and mottled; many fine and medium vesicular pores; fiber content 80%; abrupt, smooth boundary; 7.5–20 cm thick.
Ae	0–7.5	Pinkish gray (7.5YR 7/2 m), light gray (10YR 7/2 d) gravelly loam; weak, fine platy to weak, fine granular; friable, sticky when wet, slightly hard when dry; plentiful fine and medium roots; very few fine vesicular pores; 30% angular gravel and stones; clear, smooth boundary; 5–10 cm thick; extremely acid (pH 3.9).

ABgj1 7.5–15 Brown (10YR 5/3 m), light brownish gray (10YR 6/2 d) gravelly sandy loam; few fine, prominent yellowish red (5YR 5/8 m) mottles; weak, fine platy; friable, sticky when wet, slightly hard when dry; plentiful fine and medium roots; very few fine vesicular pores; 30% gravel and stones; clear, wavy boundary; 5–10 cm thick; extremely acid (pH 4.2).

ABgj2 15–20 Brown (7.5YR 5/2 m), pinkish gray (7.5YR 6/2 d) gravelly sandy loam; few, fine to medium, prominent yellowish red (5YR 5/8 m) mottles; weak, medium granular to amorphous; friable, slightly sticky when wet, soft when dry; plentiful fine and medium roots; very few fine vesicular pores; 30% gravel and stones; clear, wavy boundary; 2.5–7.5 cm thick; very strongly acid (pH 4.8).

Bhfgj 20–27.5 Very dusky red (2.5YR 2/2 m), reddish gray (5YR 5/2 d) cobbly gravelly sandy loam; few fine to medium, prominent yellowish red (5YR 5/8 m) mottles; weak, fine platy; firm, slightly hard when dry; few medium and fine roots; very few fine interstitial pores; 30% cobbles, stones, and gravel; abrupt, wavy boundary; 7.5–10 cm thick; extremely acid (pH 4.3).

Bfc 27.5–28 Yellowish red (5YR 5/8 m), reddish yellow (5YR 6/8 d) gravelly sandy loam; moderate, fine platy; very firm, in places moderately to strongly cemented; 50% gravel and stones; abrupt, wavy boundary; absent to 1.25 cm thick; very strongly acid (pH 4.9).

Bfgj 28–40 Yellowish red (5YR 4/8 m), reddish brown (5YR 5/4 d) cobbly gravelly loamy sand; many medium, faint, yellowish red (5YR 5/8 m) mottles; amorphous; weakly to moderately cemented; 50% cobbles and gravel; gradual, wavy boundary; 10–20 cm thick; very strongly acid (pH 4.8).

BC 40–52.5 Light yellowish brown (10YR 6/4 m), very pale brown (10YR 7/3 d) cobbly gravelly loamy sand; common medium, distinct light gray (10YR 7/1 m) mottles; amorphous; moderately cemented; 50% cobbles and gravel; gradual, wavy boundary; 10–20 cm thick; very strongly acid (pH 4.8).

C 52.5+ Pale olive (5Y 6/3 m), light gray (10YR 7/2 d) very gravelly loamy sand; amorphous; firm; 60% granitic cobbles; very strongly acid (pH 4.8).

Chemical and physical analysis of Kelligrews soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae	0–7.5	3.9	3.1	2.3	0.1	0.7	6.0	0	0	4.5	vl	17.9	8.9	30	52	39	9
ABgj1	7.5–15	4.2	3.3	2.0	0.2	0.5	5.8	0	0	4.5	vl	17.9	8.9	30	66	27	7
ABgj2	15–20	4.3	3.3	2.1	0.4	0.7	7.3	0	0	3.4	vl	12.2	5.6	30	66	27	7
Bhfgj	20–27.5	4.3	3.4	11.1	0.8	1.3	10.4	0	0	4.5	vl	15.6	8.9	30	74	22	4
Bfc	27.5–28	4.9												50			
Bfgj	28–40	4.8	4.3	3.0	0.4	0.4	4.8	0.1	2.0	3.4	1.1	25.8	vl	50	81	16	3
BC	40–52.5	4.8	4.5	1.7	0.1	0.3	2.6	0	0	7.8	1.1	25.8	vl	50	73	25	2
C	52.5+	4.8	4.7	0.9	0.1	0.2	1.5	0	0	4.5	1.1	31.2	vl	60	76	22	2

Low Point soil 1327 ha

Placic Humic Podzol

The parent material is stony till, probably modified and eroded by water action. The till is derived from slate, greywacke, and siltstone of Hadrynian age. The extremely stony surface, with a much less stony subsoil, seems to have been subjected to the erosive action of shallow water. This action left a stone pavement with the spaces between the stones subsequently partly filled with organic material and partly covered with peat. Drainage is very poor, but appears to improve with depth.

Tree vegetation is nearly absent except for an occasional stunted fir tree. The branches near the ground are sprawling and about a metre long and the tree is seldom more than 60 cm high. The heath and moss barrens support sheep-laurel, bog-laurel, baked-apple, Labrador-tea, bugleweed, tall meadow rue, black crowberry, common club-moss, cassandra, and the mosses *Pohlia nutans, Polytrichum commune, Rhacomitrium lanuginosum, S. imbricatum, S. fuscum, S. flavicomans, and S. cuspidatum.*

Horizon	Depth, cm	Description
F	20–0	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/2 d) fibrous peat; fiber content 70%; abundant medium and fine roots; many medium pores; very wet; 90% stones; abrupt, wavy boundary; 15–45 cm thick; extremely acid (pH 3.8).
Aeg	0–20	Light gray (10YR 6/1 m), white (10YR 8/1 d) very stony and gravelly clay loam; amorphous to weak, fine platy; friable, sticky when wet, plastic when moist, soft when dry; abundant medium roots; many medium vesicular pores; 98% externally white siltstone, greywacke, and slaty stones; abrupt, wavy boundary; 20–30 cm thick; extremely acid (pH 4.1).
ABgj	20–30	Very dark grayish brown (10YR 3/2 m) very gravelly and stony silt loam; common medium, prominent red (2.5YR 4/6 m) mottles; weak, fine subangular blocky; very friable, sticky when wet, soft when dry; abundant medium and fine roots; common fine interstitial pores; 80% stones and gravel, mainly slate, siltstone, and greywacke; clear, wavy boundary; 5–15 cm thick; extremely acid (pH 4.1).
Bhgj	30–50	Black (5YR 2/1 m), dark reddish brown (5YR 3/2 d) gravelly and stony sandy loam; weak, coarse platy; very friable, sticky when wet, slightly hard when dry; abundant fine roots; few fine interstitial pores; 50% gravel and stones; clear, wavy boundary; 15–30 cm thick; extremely acid (pH 4.1).
Bg1	50–60	Light brownish gray (10YR 6/2 m), white (2.5Y 8/2 d) gravelly loam; common large, prominent strong brown (7.5YR 5/6 m) mottles; amorphous; firm, nonsticky when wet, hard when dry; few fine roots; 30% gravel; abrupt, irregular boundary; 2.5–60 cm thick; very strongly acid (pH 4.5).
Bfc1	50–51.2	Red (2.5YR 4/6 m); moderately cemented; 30% gravel and rock fragments; abrupt, irregular boundary; 0.6–2.5 cm thick; very strongly acid (pH 4.7).
Bfc2	51.2–65	Reddish yellow (5YR 6/8 m); weakly to moderately cemented; 30% gravel and rock fragments; abrupt, irregular boundary; 2.5–5 cm thick; very strongly acid (pH 4.7). Bfc1 and Bfc2 together form a brightly colored iron pan. This pan may split into two pans, which, further on, join again into one pan, enclosing light brownish gray (10YR 6/2 m) material similar to that in the Bg horizon, or the pan may fold back and at greater depth continue again.
Bg2	65–92.5	Light brownish gray (10YR 6/2 m), white (2.5YR 5/2 m) gravelly loam; few medium, distinct, brown (7.5YR 5/2 m) mottles; amorphous; firm, nonsticky when wet, hard when dry;

Chemical and physical analysis of Low Point soil

Horizon	Depth,	pH		Loss on igni-tion,	Oxa-late Fe,	Dithi-onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F	20–0	3.8	3.2														
Aeg	0–20	4.1	3.7	8.5	0.5	1.1	15.5	0.7	4.3	23.5	1.1	41.5	vl	98	33	40	27
ABgj	20–30	4.1	3.7	14.1	0.9	1.5	2.1	0.6	2.9	12.2	1.1	23.5	vl	80	24	53	23
Bhgj	30–50	4.1	3.7	21.4	0.4	1.0	12.4	0.3	2.4	5.6	2.2	41.5	vl	50	75	14	11
Bg1	50–60	4.5	4.2	2.0	0.1	0.4	4.0	0.2	4.8	2.2	1.1	15.7	vl	30	49	29	22
Bfc1&2	50–65	4.7	4.4	3.0	1.0	1.2	4.2	0.02	0.5	3.4	vl	7.8	vl	30	41	34	25
Bg2	65–92.5	5.0	4.6	3.0	0.2	1.0	2.0	0.02	1.0	5.6	1.1	41.5	vl	30	49	27	24
Cg	92.5+	5.0	4.6	1.4	0.2	0.8	1.8	0.3	14.2	4.5	2.2	22.4	vl	30	55	22	23

30% gravel; gradual, wavy boundary; 25–37.5 cm thick; very strongly acid (pH 5.0).

Cg — 92.5+ — Light olive gray (5Y 6/2 m), white (5Y 8/2 d) gravelly sandy clay loam; amorphous; very firm, hard when dry; 30% gravel and stones, mainly siltstone, slate, and greywacke; very strongly acid (pH 5.0).

Manuels soil 920 ha

Eluviated Dystric Brunisol

The profile described below occurs on an 8% slope with eastern exposure, on the west side of the coastal road from Point Lance to The Beach on Bell Island, 0.4 km south of the junction with the conveyor right-of-way, at 106 m above sea level.

The parent material is glacial till derived mainly from shales and slates, with some siltstone and sandstone of Ordovician age. This material has, in many places, been eroded away or covered with the till from the Cochrane, Pouch Cove, Torbay catena. In other areas, it is mixed with this coarser and stonier till. The till from which the Manuels series is developed is much finer and considerably less stony.

The vegetation consists of a closed balsam fir forest with white birch and wild cherry. Ground cover includes bunchberry, tall meadow rue, blueberry, serviceberry, foxberry, three-toothed cinquefoil, and the mosses *Pleurozium schreberi, Hypnum crista-castrensis, Dicranum fuscescens, D. undulatum, D. majus, Hylocomium splendens,* and others.

Horizon	Depth, cm	Description
L	6–5	Dark brown (10YR 4/3 m), brown (10YR 5/3 d) needle litter with some twigs, leaves, and moss; loose with many voids; clear, wavy boundary; 0–2.5 cm thick.
F	5–2.5	Very dark grayish brown (10YR 3/2 m), dark grayish brown (10YR 4/2 d) semidecomposed litter of needles, twigs, and leaves; many fine roots; many medium pores; fiber content 60%; clear, wavy boundary; 1.35–2.5 cm thick.
H	2.5–0	Black (10YR 2/1 m), very dark grayish brown (10YR 3/2 d) well decomposed organic matter; moderate, fine granular; abundant small roots; abrupt, smooth boundary; 1.25–5 cm thick; extremely acid (pH 4.2).
Ae	0–5	Very pale brown (10YR 7/3 m, 8/3 d) clay; moderate, fine subangular blocky; very friable, sticky and plastic when wet, soft when dry; abundant medium and coarse roots; common fine vesicular pores; 3% angular gravel; clear, wavy boundary; 1.25–5 cm thick; extremely acid (pH 4.3).
Bm	5–30	Strong brown (7.5YR 5/6 m), brownish yellow (10YR 6/6 d) clay; moderate, fine subangular blocky; very friable, plastic when wet, slightly hard when dry; abundant medium and fine roots; common very fine and fine random tubular and vesicular pores; 2% gravel; gradual, wavy

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil: Exchg. acidity	meq/100 g soil: Exchg. bases	Base sat., %	Available nutrients, kg/ha: N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ap	0–15	4.4	3.7	8.5	1.3	4.5	14.3	1.4	8.8	31.2	2.2	35.8	35.8	5	21	36	43
Ae	0–5	4.3	3.7	7.1	0.4	2.7	16.2	0	0	4.5	vl	5.6	5.6	3	20	27	53
Bm	5–30	4.7	3.9	6.1	2.0	5.5	10.2	0	0	36.9	3.4	44.8	59.4	2	25	32	43
BCgj	30–50	4.8	4.1	4.6	1.5	4.9	7.3	0	0	30.5	2.2	59.4	95.3	10	28	40	32
C	50+	4.7	3.9	4.6	0.5	3.0	11.1	0.2	1.5	25.9	2.2	17.9	53.6	50	29	46	25

Horizon	Depth, cm	Description
		boundary; 20–40 cm thick; very strongly acid (pH 4.7).
BCgj	30–50	Dark yellowish brown (10YR 4/4 m), yellowish brown (10YR 5/4 d) clay loam; few fine, prominent strong brown (7.5YR 5/8 m) mottles; moderate, medium subangular blocky; firm, plastic when wet, hard when dry; common fine roots; few fine vesicular and random tubular pores; 10% shaly gravel and stones; gradual, wavy boundary; 15–37.5 cm thick; very strongly acid (pH 4.8).
C	50+	Very dark grayish brown (2.5Y 3/2 m), grayish brown (2.5Y 5/2 d) shaly clay loam; moderate, medium subangular blocky; firm, plastic when wet, hard when dry; 50% soft shale, mainly very dark gray stones, with occasional granitic gravel; very strongly acid (pH 4.7).

The following description of a plowed or Ap horizon is from an adjacent field.

Horizon	Depth, cm	Description
Ap	0–15	Dark brown (10YR 4/3 m), pale brown (10YR 6/3 d) clay; moderate, fine granular; very friable, sticky and plastic when wet, soft when dry; common fine vesicular pores; 5% angular gravel; clear, smooth boundary; extremely acid (pH 4.4).

Markland soil 7665 ha

Orthic Humo-Ferric Podzol

The profile described below is located on an 8% slope with southern exposure, on the west side of the road from Whitbourne to Markland, just north of the road to the hospital, at 61 m above sea level.

The parent material is glacial till end moraine derived mainly from slate, siltstone, arkose, conglomerate, and some acid volcanic rocks. This material is nearly stone-free at the surface, but stoniness increases with depth, becoming very stony at 90 cm or deeper. Some sorting of the surface material also seems to have taken place.

The vegetation is more vigorous on the north to northeast slopes where the soils are shallower. The southwesterly slopes, possibly under the influence of the prevailing strong winds, support a less vigorous native vegetation with nearly no white birch, which is more common on the northern slopes. The Markland soils occur in association with the Pouch Cove, Torbay, and organic soils. The Markland soils are almost free of stones, but the Pouch Cove and Torbay soils are gravelly to very stony. The diagram (Fig. 15) shows the relation between these soils.

The vegetation on the Markland soils has a greater variety than on the other soils in the Peninsula. A close cover of balsam fir with white birch, white spruce, and occasional tamarack, wild cherry, and mountain-ash form the upper story. Ground vegetation consists of serviceberry, raspberry, bunchberry, sheep-laurel, blueberry, twinflower, small cranberry, foxberry, wintergreen, and others, and the mosses *Hypnum crista-castrensis, Hylocomium splendens, Rhacomitrium lanuginosum, Pleurozium schreberi, Pohlia nutans,* and *Dicranum* spp.

Horizon	Depth, cm	Description
L	2.5–1	Needle and leaf litter; very loose with large voids; composition varies widely from place to place; abrupt, broken boundary; 0–2.5 cm thick.

F	1-0	Black (5YR 2/1 m), dark reddish brown (5YR 2/2 d) semidecomposed organic debris; fiber content 50%; weak, fine granular; friable, slightly sticky when wet, slightly hard when dry; abundant fine roots; abrupt, smooth boundary; 1.25-3.7 cm thick; extremely acid (pH 3.8).
Ae	0-1	Light gray (10YR 7/2 m), white (10YR 8/1 d) silt loam with flecks of yellow (10YR 7/6 m), very pale brown (10YR 8/3 d), 0.15-0.75 cm in diameter, probably the remains of a B horizon; weak, fine subangular blocky; very friable, plastic when wet, soft when dry; abundant medium roots; common very fine vesicular pores; less than 2% gravel; clear, wavy boundary; 0-2.5 cm thick; extremely acid (pH 4.0).
Bf	1-45	Strong brown (7.5YR 5/6 m), reddish yellow (7.5YR 6/8 d) silt loam; weak, fine subangular blocky; very friable, sticky when wet, plastic, soft when dry; abundant fine and medium roots; common very fine pores; 5% angular gravel; gradual, wavy boundary; 37.5-55 cm thick; very strongly acid (pH 4.6).
Bfgj	45-60	Yellowish brown (10YR 5/4 m), very pale brown (10YR 7/4 d) gravelly loam; common medium to large, prominent brownish yellow (10YR 6/8 m) mottles; moderate, fine subangular blocky; friable, slightly plastic when wet, soft when dry; plentiful fine roots; common very fine vesicular pores; 50% angular gravel and stones, mainly of gray and green siltstone, argillite, and slate; gradual, wavy boundary; 15-30 cm thick; very strongly acid (pH 4.7).
BCgj	60-80	Dark grayish brown (10YR 4/2 m), pale olive (5Y 6/3 d) very gravelly loam; few small, prominent yellowish brown (5YR 5/8 m) mottles; amorphous; very firm, hard when dry; very few fine roots; very few fine pores; 60% angular gravel and stones with a thin coating on top of yellowish brown (10YR 4/4 m), very pale brown (10YR 7/3 d) silt; diffuse, wavy boundary; 12.5-30 cm thick; very strongly acid (pH 4.7).
C	80+	Dark grayish brown (2.5Y 4/2 m), pale olive (5Y 6/3 d) very gravelly sandy loam; amorphous; 70% gray and greenish siltstone, argillite, and slate; very strongly acid (pH 4.6).

Chemical and physical analysis of Markland soil

Horizon	Depth, cm	pH		Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil		Base sat., %	Available nutrients, kg/ha				Gravel, %	Sand, %	Silt, %	Clay, %
		H_2O	$CaCl_2$				Exchg. acidity	Exchg. bases		N	P	K	Ca				
Ae	0-1	4.0	3.4	5.2	0.2	1.6	18.8	2.0	9.8	2.2	vl	1.1	1.1	1	10	66	24
Bf	1-45	4.6	4.0	11.0	2.0	3.1	14.2	0.3	1.9	88.5	5.6	50.4	50.4	5	12	63	25
Bfgj	45-60	4.7	4.3	5.6	0.8	1.9	15.1	0	0	44.8	2.2	8.9	17.9	50	40	44	16
BCgj	60-80	4.7	4.4	2.6	0.3	1.5	2.3	0.3	12.9	35.8	2.2	vl	35.8	60	48	39	13
C	80+	4.8	4.4	2.6	0.3	1.5	1.9	0	0	26.9	2.2	13.2	17.9	70	59	31	10

Mutton soil 59 ha

Orthic Regosol

The profile described below is located on a 3% southerly slope on the north side of the highway, 0.8 km west of Portugal Cove South, at 7.5 m above sea level.

The parent material is aeolian sand blown from the adjacent beach.

The only vegetation is a sparse cover of beach grass.

Horizon	Depth, cm	Description
C	0–75	Light yellowish brown (2.5Y 6/4 m), pale yellow (2.5Y 8/4 d) medium to fine sand; single grain; loose; very few fine roots; strongly acid (pH 5.5).

North Harbour soil 23 706 ha

Placic Humo-Ferric Podzol

The profile described below occurs on an 8% southeasterly slope, about 0.4 km south of the intersection of the Colinet to Placentia road and the road to North Harbour, at 61 m above sea level.

The parent material is a stony glacial till derived from slate, siltstone, arkose, conglomerate, and some acid volcanic rocks of Hadrynian age.

The climate and the vegetation create an almost year-round moist surface condition and there are signs of reducing conditions throughout the profile. Sites on the tops of the hills do not have mottling in the profile, a thick organic cover, or an iron pan.

The vegetation consists of a forest canopy of mainly black spruce with balsam fir and some tamarack. Ground cover includes sheep-laurel, serviceberry, blueberry, partridgeberry, black crowberry, fireweed, cassandra, and a variety of mosses.

Horizon	Depth, cm	Description
F1	25–5	Dusky red (10YR 3/2 m, 2.5YR 3/2 d) partly decomposed organic material, mainly sphagnum mosses, roots, and twigs; fiber content 60%; clear, to gradual, smooth boundary; 12.5–37.5 cm thick.
F2	5–0	Reddish black (10R 2/1 m), very dusky red (10R 2/2 d) greasy, decomposed peat; fiber content 30%; abrupt, smooth boundary; 5–17.5 cm thick.
Aeg	0–10	Pinkish gray (7.5YR 6/2 m), light gray (7.5YR 7/1 d) gravelly clay loam; common medium, prominent strong brown (7.5YR 5/8 m) mottles; very weak, fine platy; friable, sticky when wet, slightly hard when dry; plentiful fine roots; few fine vesicular pores; 35% porous angular gravel of low specific gravity; abrupt, wavy boundary; 7.5–12.5 cm thick; extremely acid (pH 3.9).
Bhfg	10–17.5	Very dusky red (2.5YR 2/2 m), dusky red (2.5YR 3/2 d) gravelly loam; common medium, prominent dark red (2.5YR 3/6 m) mottles; weak, fine granular; friable, sticky when wet, slightly hard when dry; few fine roots; few fine and medium vesicular pores; 40% angular gravel of siltstone and slate; abrupt, irregular boundary; 2.5–10 cm thick; extremely acid (pH 3.9).
Bfc	17.5–18.5	Dark red (2.5YR 3/6 m), red (2.5YR 4/8 d) weak to moderately cemented pan with common, fine (0.08 cm) streaks or bands of dark reddish brown (2.5YR 3/4 m) in upper part of horizon; up to 60% fine gravel. This pan may appear close to the top of the Bhfg or any other place within that horizon; a small concentration of fine roots was detected just above this pan. The pan may be broken or intermittent and vary from place to place in thickness and cementation. A more cemented and thicker pan is usually present under a thick Ae and also under a thick Bhfg. Some of the small stones within the pan have a thin reddish black (10R 2/1 m) greasy coating of organic material high in manganese content; abrupt, irregular boundary; 0.62–1.87 cm thick.
Bfg	18.5–35	Reddish brown (5YR 4/4 m), yellowish red (5YR 5/6 d) very gravelly sandy loam; common medium to large, prominent yellowish red (5YR 4/8 m) mottles; amorphous to weak, fine

Chemical and physical analysis of North Harbour soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
F–H		3.4	2.8														
Aeg	0–10	3.9	3.3	4.3	0.2	0.3	16.0	0.6	3.7	12.2	vl	41.5	4.5	35	25	48	27
Bhfg	10–17.5	3.9	3.5	19.4	1.5	2.2	31.6	0.1	3.1	11.2	vl	26.9	vl	40	49	37	14
Bfc	17.5–18.5													60			
Bfg	18.5–35	4.3	4.1	13.6	2.2	2.9	13.3	0.3	2.2	21.3	vl	72.6	vl	60	55	41	4
BCgj	35–50	4.7	4.4	4.3	1.0	1.6	4.9	0.1	2.0	22.4	vl	53.8	vl	60	58	37	5
Cg	50+	4.9	4.4	2.6	0.8	1.1	2.8	0.5	17.8	22.4	vl	44.8	vl	70	56	41	3

granular; friable, slightly sticky when wet, slightly hard when dry; few fine vesicular pores; 60% greenish angular gravel and stones, mainly siltstone and shale, covered with a thin, reddish black (10R 2/1 m) greasy coating of organic material high in manganese; gradual, wavy boundary; 10–25 cm thick, extremely acid (pH 4.3).

BCgj 35–50 Yellowish brown (10YR 5/4 m), light yellowish brown (10YR 6/4 d) very gravelly sandy loam; many coarse, distinct strong brown (7.5YR 5/6 m) mottles; amorphous to weak, fine granular; moderately cemented; 60% greenish angular gravel, shale, and siltstone covered with a thin reddish black (10R 3/1 m) greasy coating of organic material high in manganese content; gradual, wavy boundary; 10–20 cm thick; very strongly acid (pH 4.7).

Cg 50+ Dark grayish brown (2.5Y 4/2 m), light olive brown (2.5Y 5/4 d) very gravelly sandy loam; many medium, prominent yellowish brown (10YR 5/8 m) mottles; amorphous; moderately cemented; 70% greenish angular gravel, shale, and siltstone covered with a thin reddish black (10R 2/1 d) greasy coating of organic material with a high manganese content; very strongly acid (pH 4.9). The cementation of this horizon decreases with depth.

Old Perlican soil 3165 ha

Orthic Humic Podzol

The profile described below is located on a 5% slope with southwesterly exposure, on the west side of the road to Bay de Verde 0.8 km south of the junction with the road to Grates Cove, at 137 m above sea level.

The parent material is bouldery, glacial till derived from red arkosic sandstone with thin beds of argillite, siltstone, slate, conglomerate, and quartzitic sandstone of lower Cambrian age.

The tree vegetation consists of a few scattered tamarack with some speckled or gray and thinleaf alder. The ground cover includes sheep-laurel, bog-laurel, ground juniper, burnet, blueberry, foxberry, small cranberry, bunchberry, cloudberry, tall meadow rue, and others.

Patterned soil caused by frost occurs in some areas. In these areas, patches of stony soil with a cover of low shrubs are interspersed among bare patches that are very stony on the surface, but have less stone in the profile. The profile described occurs under a cover of small shrubs.

Horizon	Depth, cm	Description
F–H	3.5–0	Black (10YR 2/1 m), very dark grayish brown (10YR 3/2 d) organic debris of leaves, twigs, and roots; somewhat matlike; fiber content 70%; abrupt, smooth boundary; 2.5–15 cm thick.

Ae1 | 0–10 | Pinkish gray (7.5YR 7/2 m), white (10YR 8/2 d) gravelly loam; weak, fine granular; loose, soft when dry; plentiful fine roots; common very fine and fine vesicular pores; 40% gravel and cobbles mainly of red and gray slate and red sandstone; clear, wavy boundary; 7.5–12.5 cm thick; extremely acid (pH 4.4).

Ae2 | 10–17.5 | Light reddish brown (5YR 6/3 m), pinkish gray (5YR 6/2 d) gravelly loam; weak, fine platy; friable, loose when dry; plentiful fine roots; few fine and very fine vesicular pores; 50% gravel and cobbles; clear, wavy boundary; 5–12.5 cm thick; extremely acid (pH 4.4).

ABgj | 17.5–27.5 | Dark reddish brown (5YR 3/4 m), brown (7.5YR 5/4 d) gravelly sandy loam; few medium to coarse, distinct dark reddish brown (5YR 2/2 m) mottles; weak, fine subangular blocky to amorphous; firm, hard when dry; few fine roots; 50% gravel and cobbles; clear, wavy boundary; 5–12.5 cm thick; very strongly acid (pH 4.7).

Bhcgj | 27.5–42.5 | Dark reddish brown (2.5YR 2/4 m), dark reddish gray (5YR 4/2 d) very gravelly sandy loam; common coarse, distinct very dusky red (2.5YR 2/2 m) mottles; weak, coarse platy to amorphous; moderately cemented; few fine roots; 80% gravel and cobbles; diffuse, irregular boundary; 10–20 cm thick; very strongly acid (pH 4.6).

BCgj1 | 42.5–92.5 | Light reddish brown (5YR 6/3 m), pinkish gray (7.5YR 7/2 d) very gravelly sandy loam; common medium, prominent yellowish red (5YR 4/8 m) mottles; amorphous; weak to moderately cemented; 80% gravel, cobbles, and stones; clear, wavy boundary; 37.5–62.5 cm thick; very strongly acid (pH 4.5).

BCgj2 | 92.5–93.5 | Pinkish gray (7.5YR 6/4 m), light gray (10YR 7/1 d) silty clay; common fine, prominent reddish yellow (5YR 6/8 m) mottles; amorphous; firm, hard when dry; clear, wavy boundary; 0–2.5 cm thick; very strongly acid (pH 4.6). This horizon is found particularly on top of cobbles and stones.

C | 93.5+ | Pinkish gray (5YR 6/2 m), white (5YR 8/1 d) very gravelly sandy loam; amorphous; very firm, hard when dry; 90% cobbles and stones of red sandstone, red and gray siltstone, and slate; very strongly acid (pH 4.6).

Chemical and physical analysis of Old Perlican soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae1	0–10	4.4	3.9	0.6	0.1	0.4	1.3	0.3	17.6	23.5	2.2	vl	12.2	40	47	39	14
Ae2	10–17.5	4.4	3.9	0.9	0.1	0.4	1.4	0	0	13.4	1.1	vl	8.9	50	49	39	12
ABgj	17.5–27.5	4.7	4.0	2.0	0.6	0.7	9.9	0	0	17.9	1.1	vl	35.8	50	59	35	6
Bhcgj	27.5–42.5	4.6	4.1	11.0	0.2	0.7	4.7	0.1	2.3	21.3	1.1	5.6	12.2	80	62	33	5
BCgj1	42.5–92.5	4.5	4.3	7.2	0.2	0.5	1.5	0	0	104.8	3.4	vl	59.4	80	61	31	8
BCgj2	92.5–93.5	4.6															
C	93.5+	4.6	4.3	0	0.1	0.2	0.4	0	0	22.4	2.2	44.8	143.3	90	71	23	6

Organic soils 112 127 ha

Organic soils are developed from organic deposits that are saturated for most of the year and contain 30% or more organic material to certain depths.

Organic soils are classified according to the *Canadian system of soil classification.* The classification of organic soils, which was initiated after the commencement of the soil survey of the Avalon Peninsula, is explained in this system (1). A comparison of the terminology used for the identification of organic soils on the Avalon Peninsula with that of the Canadian system follows.

Names used on the Avalon Peninsula	Classification in *The Canadian system of soil classification*
O_1	Typic Fibrisol
O_2	Typic Fibrisol
O_3	Typic Fibrisol
O_4	Typic Fibrisol
O_5	Mesic Fibrisol
O_6	Mesic Fibrisol
O_7	Mesic Fibrisol
O_8	Mesic Fibrisol
O_9	Humic Fibrisol
O_{10}	Humic Fibrisol
M_1	Fibric Mesisol
M_2	Fibric Mesisol
M_3	Fibric Mesisol
M_4	Fibric Mesisol
M_5	Typic Mesisol
M_6	Typic Mesisol
M_7	Typic Mesisol
M_8	Typic Mesisol
M_9	Humic Mesisol
M_{10}	Humic Mesisol

Note: Organic deposits less than 160 cm deep over unconsolidated mineral material have the prefix Typic replaced by Terric.

Patrick's Cove soil 18 019 ha

Placic Ferro-Humic Podzol, peaty phase

The profile described below occurs on a western-facing slope of 10%, 3.2 km north of Patrick's Cove on the east side of the road, at 61 m above sea level.

The parent material is glacial till stony ground moraine 0.9–6 m thick, derived from red and greenish sandstone, gray siltstone, conglomerate, and acid volcanic rocks of Hadrynian age.

A forest vegetation mainly of fir and black spruce with some speckled alder is common. Along the coast, growth is stunted by exposure to strong winds, but further inland the growth of the very dense stands is slow. Ground cover consists of bunchberry, sheep-laurel, Labrador-tea, reindeer moss, and ground-fir or heath-cypress and the mosses *Dicranum undulatum, D. majus, Hypnum crista-castrensis, Sphagnum imbricatum, S. cuspidatum,* and others.

Horizon	Depth, cm	Description
F–H	20–0	Black (5YR 2/1 m), dark reddish brown (5YR 3/2 d) partly decomposed organic debris of mosses, needles, twigs, leaves, and roots; fiber content 40%; rather porous with common medium and fine pores filled with water; somewhat greasy; abrupt, smooth boundary; 15–50 cm thick; extremely acid (pH 3.6).
Aegj	0–20	Brown (7.5YR 5/2 m), light gray (10YR 7/2) gravelly loam; few fine, prominent yellowish brown (7.5YR 5/8 m) mottles and common coarse, prominent dark brown (7.5YR 3/2 m) blotches; weak, fine subangular blocky to weak, fine platy; very friable, sticky when wet, slightly hard when dry; plentiful fine and medium roots; few fine pores; 30% gravel and stones, porous and of low specific gravity, mainly gray siltstone and sandstone and slate; gradual, wavy boundary; 10–25 cm thick; extremely acid (pH 3.8).
Bhfg	20–45	Very dark brown (10YR 2/2 m), dark brown (7.5YR 3/2 d) very gravelly sandy loam; common coarse, faint dark reddish gray (5YR 4/2 m) mottles; amorphous; weakly cemented; few fine roots; few fine interstitial pores; 60% gravel and stones of gray and greenish gray siltstone, sandstone, and slate, all coated very dark brown to black; abrupt, irregular boundary; 15–30 cm thick; extremely acid (pH 4.2).
Bfc1	45–45.5	Black (10YR 2/1 m and d) lustrous, strongly cemented gravel and coarse sand; 0.15–0.6 cm thick; abrupt, irregular boundary; very strongly acid (pH 4.5).
Bfc2	45.5–46.5	Red (2.5YR 4/6 m) moderately cemented gravel and coarse sand; 0.6–1.8 cm thick; abrupt, irregular boundary; very strongly

Chemical and physical analysis of Patrick's Cove soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
F–H	20–0	3.6	3.1														
Acgj	0–20	3.8	3.4	5.4	0.1	0.3	9.3	0.6	6.4	35.8	vl	77.3	23.6	30	26	49	25
Bhfg	20–45	4.2	3.7	11.3	0.9	1.3	11.9	0.4	3.3	52.6	vl	97.5	vl	60	71	25	4
Bfc1&2	45–46.5	4.5	4.1	9.6	2.3	2.6	10.4	0.2	1.9	2.2	vl	4.5	vl	60	61	35	4
Bfg	46.5–60	4.6	4.1	4.1	2.0	2.5	5.8	0.06	1.0	22.4	vl	44.8	vl	60	63	33	4
BCg	60+	4.9	4.3	2.9	0.2	0.9	2.8	1.1	3.9	22.4	vl	35.8	vl	80	70	24	6

		acid (pH 4.5). Bfc1 and Bfc2 together form a thin iron pan that may branch into two or three generally thinner pans. These horizons join again to a single pan enclosing red (2.5YR 4/6 m) weakly cemented amorphous material.
Bfg	46.5–60	Dark reddish gray (5YR 4/2 m), brown (7.5YR 5/4 d) very gravelly sandy loam; common medium, prominent yellowish red (5YR 4/6 m) mottles; weak, fine granular to amorphous; firm, nonsticky when wet, hard when dry; very few very fine roots; 60% gravel and stones, mainly greenish siltstone, slate, and red sandstone; diffuse, irregular boundary; 10–30 cm thick; very strongly acid (pH 4.6).
BCg	60+	Dark brown (7.5YR 4/2 m), brown (10YR 4/3 d) very gravelly sandy loam; few fine, prominent yellowish red (5YR 4/6 m) mottles; amorphous; moderately to strongly cemented, cementing decreasing with depth but still present at 75 cm; 80% greenish siltstone, slate, and gravel, with red siltstone and sandstone; very strongly acid (pH 4.9).

Peter's River soil 7432 ha

Orthic Humo-Ferric Podzol

The profile described below occurs on an 8% slope with southerly exposure, 0.4 km north of the village of Peter's River and 61 m east of the road to St. Stephen, at about 61 m above sea level.

The parent material is glacial till 3–15 m thick, derived from slate, siltstone, greywacke, conglomerate, and some acid volcanic rocks of late Hadrynian age.

The tree cover is balsam fir with some white spruce. Prevailing strong southwesterly winds cause very stunted growth on exposed locations. The growth in sheltered sites is fair. Ground cover includes sheep-laurel, blueberry, raspberry, Labrador-tea, bunchberry, burnet, false Solomon's-seal, tall meadow rue, and northern twinflower and the mosses *Dicranum* spp., *Hypnum crista-castrensis, Pleurozium schreberi, Polytrichum juniperinum,* and *Rhacomitrium lanuginosum.*

Horizon	Depth, cm	Description
L	11–10	Leaf and needle litter of blueberry and other heathlike plants, with balsam fir needles; loose; irregular composition and thickness; abrupt, wavy boundary; 0–1.9 cm thick.
F–H	10–0	Reddish black (10YR 2/1 m), dark reddish brown (5YR 3/3 d) partly decomposed organic material of leaves, needles, and moss; fiber content 30%; weak, angular blocky; abundant fine roots; many medium and fine vesicular and random tubular pores; abrupt, smooth boundary; 7.5–20 cm thick; extremely acid (pH 3.7).

Ae	0-7.5	Reddish gray (5YR 5/2 m), white (5YR 8/1 d) silty clay; moderate, fine subangular blocky; loose, very plastic when wet, soft when dry; plentiful fine and medium roots; few fine vesicular pores; 15% white or gray, porous, soft angular gravel; clear, wavy boundary; 5-15 cm thick; extremely acid (pH 3.9).
Bhf	7.5-8.5	Black (5YR 2/1 m), dark reddish brown (5YR 3/2 d) gravelly loam; amorphous to weak, fine subangular blocky; friable, very sticky when wet, soft when dry; abundant fine and medium roots; common fine vesicular pores; 40% angular gravel, mainly gray argillite, siltstone, and slate; clear, wavy boundary; 0-5 cm thick; extremely acid (pH 4.4).
Bf	8.5-25	Dark reddish brown (5YR 3/2 m), reddish brown (5YR 4/4 d) gravelly sandy loam; moderate, fine granular; friable, slightly sticky when wet, firm when dry; abundant fine roots; few fine interstitial pores; 40% angular gravel, siltstone, and slate; gradual, wavy boundary; 15-25 cm thick; very strongly acid (pH 4.5).
BCgj	25-50	Dark brown (10YR 4/3 m), light olive brown (2.5Y 5/4 d) very gravelly sandy loam; few fine, prominent yellowish red (5YR 5/6 m) mottles; weak, fine granular; firm, nonsticky when wet, hard when dry; plentiful fine roots; few fine interstitial pores; 60% greenish gray gravel, siltstone, and slate; gradual, wavy boundary; 17.5-37.5 cm thick; very strongly acid (pH 4.7). Traces of a thin iron pan 1.25 cm thick; 0.3 cm very dusky red (10YR 2/2 m) moderately cemented over 0.9 cm dark red (2.5YR 3/6 m) weakly cemented iron pans occur under bigger stones in this BC horizon.
BC	50-75	Dark olive gray (5Y 3/2 m), pale olive (5Y 6/4 d) very gravelly sandy loam; amorphous; firm, hard when dry; 60% imbricated gray and greenish slaty and shaly stones covered with 0.15-0.45 cm of olive (5Y 5/3 m) or pale olive (5Y 6/3 d) silt capping; gradual, wavy boundary; 25-50 cm thick; very strongly acid (pH 4.7).
C	75+	Olive (5Y 4/3 m), pale olive (5Y 6/3 d) very gravelly sandy loam; amorphous; firm, hard when dry; 80% gray and greenish siltstone, slate, and occasional quartzite stones; very strongly acid (pH 5.0).

Chemical and physical analysis of Peter's River soil

Horizon	Depth,	pH		Loss on igni- tion,	Oxa- late Fe,	Dithi- onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F-H	10-0	3.7															
Ae	0-7.5	3.9	3.5	5.8	0.02	0.03	14.6	1.4	8.8	4.5	1.1	15.8	8.9	15	16	42	42
Bhf	7.5-8.5	4.4	4.0											40			
Bf	8.5-25	4.5	4.1	8.3	1.3	1.6	16.5	0.6	3.5	4.5	1.1	22.4	vl	40	65	17	10
BCgj	25-50	4.7	4.4	3.2	1.1	1.3	5.8	0.2	3.3	14.5	1.1	44.8	vl	60	68	22	10
BC	50-75	4.7	4.4	2.0	0.7	0.8	2.6	0.2	7.1	17.9	1.1	52.6	vl	60	60	29	11
C	75+	5.0	4.7	0.8	0.2	0.6	1.3	0.3	18.7	4.5	vl	31.2	vl	80	66	21	13

Placentia Junction soil 2587 ha

Orthic Humo-Ferric Podzol

The profile described below is on a 2% slope with southwesterly exposure, near the junction of the Placentia access road and the road to Placentia Junction, a railroad switch station, 137 m above sea level.

The parent material is glacial till derived mainly from shales with some limestone, conglomerate, siltstone, sandstone, and occasional manganese beds of Cambrian age.

The tree vegetation is balsam fir forest with birch, white spruce, and speckled or gray alder. Ground cover includes raspberry, gooseberry, bunchberry, wintergreen, foxberry, blueberry, fireweed, and small cranberry and the mosses *Dicranum undulatum, D. fuscescens, Hypnum crista-castrensis, Polytrichum juniperinum,* and others.

Horizon	Depth, cm	Description
L	3.5–2.5	Dark brown (10YR 4/3 m), brown (10YR 5/3 d) needle and leaf litter; loose, with many voids; abrupt, wavy boundary; 0.15–1.87 cm thick.
F–H	2.5–0	Very dusky red (2.5YR 2/2 m), reddish brown (2.5YR 4/4 d) decomposing organic material with twigs, roots, some mold; loose, soft; fiber content 60%; abrupt, wavy boundary; 1–7.5 cm thick; extremely acid (pH 3.5).
Aej	0–1	Weak red (10R 4/3 m), pale red (10R 5/4 d) clay; moderate, fine angular blocky; friable, very plastic and sticky when wet, slightly hard when dry; abundant coarse, medium, and fine roots; common fine interstitial pores; 10% gravel, mainly red shale, some gray and red siltstone, and some quartzite; abrupt, wavy boundary; 0–2.5 cm thick with occasional pockets up to 12.5 cm thick; extremely acid (pH 3.5).
Bf	1–50	Dark red (2.5YR 3/6 m), red (2.5YR 4/6 d) loam to clay loam; weak, fine granular to weak, fine subangular blocky; friable, sticky and plastic when wet, slightly hard when dry; abundant fine and very fine roots; common fine interstitial pores; 10% angular gravel and slaty stones, mainly red slate, red siltstone, and some gray siltstone; gradual, wavy boundary; 50–70 cm thick; extremely acid (pH 4.4).
BC	50–70	Dark reddish brown (2.5YR 3/4 m), dusky red (10YR 3/3 d) gravelly loam; few faint, dark reddish brown (5YR 3/4 m) mottles; weak, fine subangular blocky; friable, nonsticky, slightly plastic when wet, hard when dry; few fine and very fine roots; few interstitial pores; 50% angular gravel; gradual irregular boundary; 10–30 cm thick; extremely acid (pH 4.4).
BCg	70+	Dark reddish brown (5YR 3/3 m), weak red (2.5YR 4/2 d) gravelly loam; many coarse, distinct grayish brown (10YR 4/2 m) mottles; amorphous; firm,

Chemical and physical analysis of Placentia Junction soil

Horizon	Depth,	pH		Loss on igni- tion,	Oxa- late Fe,	Dithi- onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F–H	2.5–0	3.0	2.8														
Aej	0–1	3.5	3.3	6.4	0.7	2.6	24.3	0.5	2.0	3.4	0	3.4	3.4	10	19	36	45
Bf	1–50	4.4	4.4	9.9	1.7	3.2	17.3	0	0	268.4	8.9	119.8	vl	10	34	39	27
BC	50–70	4.4	4.3	3.8	0.3	1.5	9.2	0	0	59.5	3.4	23.5	vl	50	45	40	15
BCg	70+	4.5	4.5	1.7	0.1	0.9	5.8	0.24	3.9	35.8	3.4	35.8	vl	50	49	43	8

hard when dry; very few micro roots; 50% angular gravel and stones, mainly red slate, shale, and some gray siltstone, all coated with a thin coating of weak red (10R 4/2 m) silt, high in organic matter and manganese; very strongly acid (pH 4.5).

Point Lance soil 7313 ha

Placic Humic Podzol

The profile described below occurs on a 4% south-facing slope on the south side of the road, 0.8 km northeast of Point Lance, at an elevation of 30 m above sea level.

The parent material is shallow, very stony glacial till derived mainly from slate, siltstone, argillite, shale, and acid volcanic rocks of late Hadrynian and Cambrian age.

Stunted fir forests occur in sheltered valleys protected from southwesterly winds. Generally a heath-type vegetation is common, with scattered, very stunted fir trees and a ground cover of sheep-laurel, Labrador-tea, baked-apple, bunchberry, black crowberry, reindeer moss, cassandra, bog-laurel, and sedges, with ground-fir or heath-cypress and occasionally speckled alder and several sphagnum moss species.

Horizon	Depth, cm	Description
F	20–0	Black (5YR 2/1 m), very dusky red (2.5YR 2/2 d) partly decomposed organic debris of mosses, twigs, roots, and leaves; fiber content 50%; plentiful fine roots; abundant fine pores; somewhat felty; abrupt, wavy boundary; 20–60 cm thick; extremely acid (pH 3.2).
Aeg	0–7.5	Gray (5YR 5/1 m), light gray (5YR 7/1 d) very gravelly clay loam; common coarse, prominent yellowish red (5YR 5/6 m) mottles; amorphous to weak, fine subangular blocky; friable, slightly sticky and plastic when wet, soft when dry; plentiful fine roots; few fine pores; 80% angular gravel and stones, some soft, gray siltstone; clear, wavy boundary; 2.5–10 cm thick; extremely acid (pH 3.8).
Bhg	7.5–42.5	Black (2.5YR 2/0 m), very dark grayish brown (10YR 3/2 d) very gravelly sandy loam; few small, prominent yellowish red (5YR 5/6 m) mottles; amorphous; firm, sticky when wet, slightly hard when dry; few fine roots; very few fine vesicular pores; 80% stones; clear, wavy boundary; 30–50 cm thick; extremely acid (pH 4.2).
Bfg	42.5–57.5	Dark reddish brown (5YR 3/3 m), dark brown (10YR 3/3 d) very gravelly sandy loam; few small, prominent yellowish red (5YR 5/6 m) mottles; amorphous; friable, nonsticky and nonplastic when wet, slightly hard when dry; few very fine and micro roots; very few fine vesicular pores; 80% angular to slaty gravel and stones; gradual, irregular boundary; 10–25 cm thick; very strongly acid (pH 5.6).

Chemical and physical analysis of Point Lance soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
F	20–0	3.2															
Aeg	0–7.5	3.8	3.3	8.5	0.1	0.3	15.5	0.7	4.3	13.4	vl	15.4	vl	80	31	40	29
Bhg	7.5–42.5	4.2	3.6	16.3	0.2	0.4	20.1	0.6	2.9	21.2	vl	53.6	vl	80	60	21	19
Bfg	42.5–57.5	4.6	4.0	3.2	2.7	2.9	12.4	0.3	2.4	7.8	1.1	30.2	vl	80	65	21	14
Bg	57.5–70	4.8	4.3	2.8	0.5	1.5	4.2	0.2	4.5	6.7	1.1	33.6	22.4	90	60	30	10
Bfcg	70–70.5	4.9	4.4														
Cg	70.5+	4.9	4.5	2.0	0.2	0.8	2.6	0.2	7.1	4.5	1.1	31.2	33.4	98	78	10	12

Bg	57.5-70	Very dark grayish brown (2.5Y 3/2 m), gray (10YR 5/1 d) very gravelly sandy loam; amorphous; firm, hard when dry; 90% stones; abrupt, irregular boundary; 5-25 cm thick; very strongly acid (pH 4.8). The stones in this horizon have a very thin brown (7.5YR 4/2 m) coating.
Bfcg	70-70.5	Yellowish red (5YR 4/6 m) moderately to strongly cemented iron pan; amorphous; abrupt, irregular boundary; 0.6-1.87 cm thick; very strongly acid (pH 4.9).
Cg	70.5+	Dark grayish brown (2.5Y 4/2 m), light olive gray (5Y 6/2 d) very gravelly sandy loam; amorphous; 98% stones, mainly gray siltstone, argillite, and some sandstone and slate; very strongly acid (pH 4.9).

Pouch Cove soil 87 400 ha

Gleyed Humo-Ferric Podzol

The profile described below is on a 5% north-facing slope on the south side of the road from St. John's to Portugal Cove, 360 m east of the junction with the road to St. Phillips.

The parent material is glacial till derived from slate, siltstone, and greywacke from the Conception Bay group of Hadrynian age.

In the north and east of the Peninsula, the forested areas consist of balsam fir, black spruce, some white spruce, tamarack, serviceberry, choke cherry, and alder. In the south, central, and western parts of the Peninsula, a heath vegetation is common with sheep-laurel, Labrador-tea, black crowberry, bunchberry, small cranberry, foxberry, false Solomon's-seal, sheep sorrel, sweet gale, common club-moss, tall meadow rue, the lichens *Cladonia* spp. and the mosses *Pleurozium* spp., *Pohlia nutans, Polytrichum commune, Sphagnum molluscum, S. magellanicum,* and others.

Horizon	Depth, cm	Description
L	21-20	Very dark grayish brown (10YR 3/2 m), dark grayish brown (10YR 4/2 d) needle and leaf litter; loose, with many voids; somewhat moldy; clear, wavy boundary; 0-5 cm thick.
F	20-1	Very dark brown (10YR 2/2 m), very dark gray (10YR 3/1 d) slightly greasy organic debris of moss, needles, twigs, and roots; somewhat matted; fiber content 50%. This horizon appears to be more felty in locations less favorable to plant growth; clear, wavy boundary; 12.5-40 cm thick; extremely acid (pH 4.4).
H	1-0	Black (10YR 2/1 m), very dark brown (10YR 3/1 d) greasy, soft organic material with plentiful medium and fine roots; common fine and medium vesicular pores; fiber content 20%; abrupt, wavy boundary; 0.15-0.2 cm thick; extremely acid (pH 3.9).
Ae	0-7.5	Very pale brown (10YR 7/3 m), light gray (10YR 7/1 d) silty clay loam to clay loam; weak, fine platy to moderate, fine subangular blocky; friable, sticky and plastic when wet, slightly hard when dry; plentiful fine roots; few very fine and fine interstitial pores; 20% white, rather soft siltstone, slaty gravel, and stones; clear, wavy boundary; 3.7-12.5 cm thick; extremely acid (pH 4.1 to 4.5).
ABg	7.5-12.5	Light yellowish brown (10YR 6/4 m), light gray (2.5Y 7/2 d) gravelly clay loam; few fine to medium, prominent dark reddish brown (2.5YR 3/2 m) mottles; weak, subangular blocky; friable, slightly sticky when wet, slightly hard when dry; plentiful fine roots; very few fine vesicular pores; 40% angular siltstone, gravel, and slate; clear, wavy boundary; 2.5-10 cm thick; very strongly acid (pH 4.8).
Bfg	12.5-37.5	Brown (7.5YR 5/4 m), light yellowish brown (10YR 6/4 d) gravelly sandy loam; many medium to coarse, prominent dusky red (2.5YR 3/2 m) mottles; amorphous to weak, fine granular; very friable, hard when dry; few fine and very fine roots; very few fine

Chemical and physical analysis of Pouch Cove soil

Horizon	Depth, cm	pH H$_2$O	pH CaCl$_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
F	20-1	4.4															
H	1-0	3.9															
Ae	0-7.5	4.5	3.9	9.3	0.3	0.7	9.3	1.0	9.7	11.2	vl	22.4	44.8	20	20	47	33
ABg	7.5-12.5	4.8	4.0	3.5	0.6	0.8	7.2	0.5	6.5	4.5	vl	17.9	53.6	40	32	36	32
Bfg	12.5-37.5	4.9	4.4	3.0	1.0	1.8	5.7	0.3	5.0	14.5	1.1	59.3	30.2	40	53	37	10
BCgj	37.5-50	5.1	4.5	2.7	0.3	0.3	1.5	0.1	6.3	7.8	1.1	36.9	59.3	60	54	33	13
C	50+	5.2	4.5	1.7	0.1	0.2	1.5	0.1	6.3	6.7	1.1	39.2	67.2	90	62	35	3

Horizon	Depth, cm	Description
		vesicular pores; 40% angular gravel and slate; gradual, very wavy boundary; 20-30 cm thick; very strongly acid (pH 4.9).
BCgj	37.5-50	Olive (5Y 4/3 m), light gray (5Y 7/2 d) gravelly sandy loam; few fine, prominent yellowish red (5YR 4/8 m) mottles; amorphous; firm, nonsticky when wet, hard when dry; 60% angular stones and slate; diffuse, irregular boundary; 10-37.5 cm thick; extremely acid (pH 5.1).
C	50+	Dark olive (5Y 3/2 m), olive gray (5Y 5/2 d) very gravelly sandy loam; amorphous; firm, hard when dry; 90% angular gravel, siltstone, and slate; very strongly acid (pH 5.2).

Rabbit soil 1181 ha

Gleyed Dystric Brunisol

The profile described below is located on a 15% slope with northeasterly exposure, about 1.6 km south of Branch, near the southeast corner of the new cemetery, at 106 m above sea level.

The parent material is a till ground moraine derived mainly from red and some green shales with limestone, conglomerate, siltstone, and thin manganese beds of Cambrian age.

The vegetation is a fairly open stand of rather stunted balsam fir, with ground juniper, thinleaf alder, blueberry, sheep-laurel, Labrador-tea, burnet, and occasional raspberry, and a great variety of mosses including *Dicranum* spp., *Pleurozium* spp., *Hypnum* spp., and *Hylocomium* spp.

Horizon	Depth, cm	Description
F-H	7.5-0	Very dusky red (2.5YR 2/2 m), dark reddish brown (5YR 3/2 d) partly decomposed moss, needles, and twigs; fiber content 60%; slightly matted; abundant fine and very fine roots; abrupt, smooth boundary; 5-15 cm thick; extremely acid (pH 3.8).
Bm	0-10	Light reddish brown (5YR 6/3 m), pinkish gray (5YR 6/2 d) clay; few fine, prominent yellowish red (5YR 4/6 m) mottles; moderate, medium granular; friable, sticky and very plastic when wet, slightly hard when dry; abundant fine and very fine roots; few very fine pores; 2% gray, soft, porous gravel of shale or sandstone; abrupt, wavy boundary; 7.5-15 cm thick; extremely acid (pH 4.1).
Bmgj1	10-15	Dark reddish brown (5YR 3/2 m), dark gray (5YR 4/2 d) sandy loam; common medium, distinct reddish brown (5YR 5/4 m) mottles; moderate, fine blocky; friable, slightly sticky when wet, soft when dry; abundant fine and very fine roots; few fine vesicular pores; 5% shaly gravel; abrupt, wavy boundary; 5-20 cm thick; very strongly acid (pH 4.5).

Bfc1 15–15.2 Dark red (2.5YR 3/6 m) to yellowish red (5YR 5/8 d) strongly cemented, enclosing gravel and coarse sand fragments; abrupt, wavy boundary; 0.15–0.3 cm thick; very strongly acid (pH 4.8).

Bfc2 15.2–15.5 Black (5YR 2/1 m and d) lustrous, weakly cemented, enclosing small gravel fragments; abrupt, wavy boundary; 0.15–0.45 cm thick; very strongly acid (pH 4.9). Bfc1 and Bfc2 together form a thin iron pan that may split into two pans enclosing yellowish red (5YR 5/6 m) pockets. No root mat is evident on top of the pan.

Bmgj2 15.5–25 Brown (7.5YR 4/4 m, 5/4 d) sandy loam; few medium, prominent yellowish red (5YR 4/8 m) mottles; weak, fine subangular blocky; hard, plentiful very fine roots; 10% shaly gravel; gradual, wavy boundary; 7.5–10 cm thick, very strongly acid (pH 4.9).

BCgj 25–40 Dark reddish brown (5YR 3/4 m), reddish brown (5YR 4/4 d) gravelly sandy loam; few medium, distinct yellowish red (5YR 4/6 m) mottles; amorphous; weakly cemented, decreasing cementation with depth; very few fine roots; 20% angular gravel and stones; gradual, smooth boundary; 12.5–32.5 cm thick; very strongly acid (pH 4.9). In places this horizon changes gradually into a very dusky red (10R 2/2 m) manganese horizon 0.3 cm thick.

C 40+ Very dark grayish brown (10YR 3/2 m), dark brown (10YR 4/3 d) gravelly loamy sand; amorphous; firm, slightly hard when dry; 30% red shaly gravel and stones, some green shale; stones covered with reddish brown (5YR 4/4 m) silt caps; very strongly acid (pH 5.0).

Ap 10 Brown (7.5YR 5/4 m), light brown (7.5YR 6/4 d) silty clay loam; weak, fine subangular blocky; friable; abundant fine roots; 5% gravel consisting partly of porous white gravel with some red and, occasionally, green shale or sandstone; abrupt, smooth boundary; 10–15 cm thick, very strongly acid (pH 4.5).

Chemical and physical analysis of Rabbit soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ap		4.5	3.9	9.5	0.4	1.0	20.3	2.2	10.8	17.9	vl	71.6	vl	5	22	38	39
Bm	0–10	4.2	3.3	7.8	0.3	0.9	17.9	0.5	2.7	14.5	vl	48.2	vl	2	15	36	49
Bmgj1	10–15	4.5	4.1	8.6	0.6	1.3	9.3	0.5	5.3	7.8	vl	23.5	35.8	5	48	34	18
Bfc1&2	15–15.5	4.8	4.2	10.4	2.7	5.5	9.6	0.3	3.1	1.1	vl	6.7	vl	10	56	28	16
Bmgj2	15.5–25	4.9	4.4	6.4	0.4	1.0	5.6	0.1	1.7	12.3	vl	48.2	vl	10	66	23	11
BCgj	25–40	4.9	4.4	4.9	0.3	1.0	4.1			12.3	vl	48.2	vl	20	70	15	15
C	40+	5.0	4.5	1.7	0.1	1.2	2.1			17.9	vl	71.6	vl	30	73	18	9

Red Cove soil 14 667 ha

Very shallow lithic Gleyed Ferro-Humic Podzol

The profile described below is located on a slope of 22% with western exposure, on the east side of the road, 270 m southwest of the gate to the Red Cliff Military Base, at about 122 m above sea level.

The parent material is a thin, coarse, very stony glacial till derived mainly from red conglomerate, gray and green sandstone of the Signal Hill formation of Palaezoic age.

The vegetation consists of white spruce, black spruce, and balsam fir forest with a ground cover of sheep-laurel, crowberry, bunchberry, serviceberry, *Dicranum* mosses, foxberry, goldenrod, and others.

Horizon	Depth, cm	Description
F-H	15-0	Black (5YR 2/1 m), dark reddish brown (5YR 3/3 d) partly decomposed organic material, consisting mainly of needles, moss, roots, and some twig remains; fiber content 50%; very porous and somewhat matlike in places and greasy in other locations; abrupt, smooth boundary; 10-20 cm thick; extremely acid (pH 3.8).
Aegj	0-7.5	Pale red (2.5YR 6/2 m), pinkish gray (5YR 7/2 d) very gravelly loam; few fine, prominent reddish yellow (5YR 6/6 m) mottles; amorphous; very friable, slightly sticky when wet, slightly hard when dry; plentiful coarse and medium roots; few fine vesicular pores; 60% gravel and stones; clear, irregular boundary; 2.5-12.5 cm thick; extremely acid (pH 3.8).
Bhfgj	7.5-20	Very dark gray (10YR 3/1 m), dark brown (10YR 3/3 d) very gravelly sandy loam; common medium, faint very dark grayish brown (10YR 3/2 m) mottles; amorphous; friable, sticky when wet, hard when dry; plentiful fine and medium roots; few vesicular pores; 80% gravel and stones; abrupt, irregular boundary; 10-20 cm thick; extremely acid (pH 4.0).
Bfc	20-20.5	Black (10YR 2/1 m and d) lustrous, strongly cemented, thin iron pan with fine gravel; penetrates some stones; in places underlain by a thin red (2.5YR 4/6 m) cemented layer, which is not always present; abrupt, wavy boundary; 0.6-12.5 cm thick.
Bfgj	20.5-30	Weak red (2.5YR 4/2 m; 5/2 d) very gravelly sandy loam; common medium, distinct reddish brown (5YR 5/4 m) mottles; amorphous; firm, nonsticky when wet, hard when dry; very few fine roots; 90% stones and gravel; gradual, irregular boundary; 7.5-20 cm thick; extremely acid (pH 4.2).
BCgj	30-45	Reddish gray (5YR 5/2 m), light reddish brown (5YR 6/3 d) very gravelly sandy loam; few fine, distinct reddish brown (5YR 5/4 m) mottles; amorphous; very firm, hard when dry; 95% stones and gravel; gradual, broken boundary; 10-20 cm thick; extremely acid (pH 4.2).
R	45+	Interbedded stones and rock, mainly red sandstone.

Seal Cove soil 582 ha

Placic Humo-Ferric Podzol

The profile described below is located on a north-facing 5% slope at the southwest corner of a large gravel pit near the railroad track at Lance Cove Head, Conception Bay, at 15 m above sea level.

The parent material is a very gravelly glaciofluvial deposit, mainly derived from granitic and acid volcanic rocks.

The vegetation consists of a somewhat open stand of black and some white spruce with occasional balsam fir, tamarack, and choke cherry, and a ground cover of sheep-laurel, blueberry, Labrador-tea, white lettuce, cassandra, dwarf elder, sheep sorrel, mouse-eared hawkweed, fall dandelion, reindeer moss, ragwort, serviceberry, aster, bunchberry, and browntop. In poorly drained locations, more sphagnum and other wetland vegetation develops and also a different profile, classified as a Placic Humic Podzol, called the Indian Pond series. This series has not been indicated on the maps because of its small area.

Horizon	Depth, cm	Description
L	16-15	Dark yellowish brown (10YR 3/4 m) litter, mainly sheep-laurel and blueberry

		leaves, spruce needles, moss, and lichens; loose; clear, irregular boundary; 0.6–1.25 cm thick, or sometimes absent.
F	15–0.5	Dark red (2.5YR 2/4 m) fibrous, semidecomposed organic debris of twigs, roots, leaves, and moss; somewhat matted; fiber content 50%; many fine and medium, vesicular and horizontal tubular pores; abrupt, smooth boundary; 10–20 cm thick.
H	0.5–0	Reddish black (10R 2/1 m) decomposed organic debris; fiber content 5%; soft, hard when dry; angular blocky; abrupt, wavy boundary; 0.3–0.6 cm thick; extremely acid (pH 3.8).
Ae	0–15	Pale brown (10YR 6/3 m), pinkish gray (5YR 6/2 d) gravelly sandy loam; weak, fine platy; friable, not sticky when wet, soft when dry; plentiful fine and medium roots; few fine interstitial pores; 20% rounded gravel and stones; clear, wavy boundary; 10–20 cm thick; extremely acid (pH 4.2).
Bfgj1	15–40	Dark red (2.5YR 3/6 m), yellowish red (5YR 5/8 d) very gravelly sandy loam; few fine to medium, distinct red (2.5YR 4/8 m) mottles; weak, fine granular; friable, soft when dry, sticky when wet; plentiful fine roots, few iron concretions 0.6–1.25 cm in diameter; 60% gravel and stones; abrupt, irregular boundary; 7.5–40 cm thick; very strongly acid (pH 4.6).
Bfc1	40–40.3	Red (2.5YR 4/8 m), light red (2.5YR 6/8 d) moderately to strongly cemented upper layer of thin iron pan; amorphous; fine gravel in the pan; very few fine roots in cracks; abrupt, irregular boundary; 0.15–0.45 cm thick.
Bfc2	40.3–40.5	Black (2.5YR 2/0 m and d) lustrous, moderately to strongly cemented iron pan; very few fine roots; abrupt, irregular boundary; 0.15–0.45 cm thick; very strongly acid (pH 4.8). Bfc1 and Bfc2 together form a thin iron pan that may branch into two or three similar pans, or the Bfc1 and Bfc2 may separate around a 1.25–3.7 cm thickness of Bfgj material.
Bfgj2	40.5–65	Yellowish red (5YR 4/8 m), reddish yellow (5YR 5/8 d) very gravelly loamy sand; common medium to large, prominent light brownish gray (10YR 6/2 m) mottles; amorphous; firm, hard when dry; 70% rounded gravel and stones; few fine roots; gradual, wavy boundary; 7.5–40 cm thick; very strongly acid (pH 5.0).
BCgj	65–75	Light yellowish brown (10YR 6/4 m), very pale brown (10YR 7/3 d) very gravelly sand; few medium, prominent red (2.5YR 4/8

Chemical and physical analysis of Seal Cove soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil: Exchg. acidity	meq/100 g soil: Exchg. bases	Base sat., %	Available nutrients, kg/ha: N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
H	0.5–0	3.8															
Ae	0–15	4.2	3.5	0.5	0.03	0.4	2.2	0.17	7.2	26.8	2.2	vl	17.9	20	60	35	5
Bfgj1	15–40	4.6	3.9	7.7	0.8	1.5	19.4	0.8	3.9	44.8	1.1	22.4	30.2	60	58	25	17
Bfgj2	40.5–65	5.0	4.8	2.9	0.7	1.3	2.2	0	0	22.4	1.1	vl	59.3	70	81	17	2
BCgj	65–75	5.1	4.7	0.9	0.2	0.9	0.5	0	0	12.3	1.1	vl	12.3	70	92	4	4
C	75+	5.0	4.6	0	0.1	0.6	0.8	0	0	26.8	3.4	vl	195.4	90	96	3	1

		m) mottles; amorphous with lenses of fine or coarse sand or fine gravel; firm, slightly hard when dry; few black (2.5YR 2/0 m) manganese concretions from 0.6 to sometimes 12.5 cm in diameter; 70% rounded granitic stones and gravel; diffuse, wavy boundary; 15-25 cm thick; strongly acid (pH 5.1).
C	75+	Light brownish gray (2.5Y 6/2 m), light gray (2.5Y 7/2 d) very gravelly sand; amorphous; firm, slightly hard when dry; 90% rounded granitic gravel and stones; strongly acid (pH 5.1).

Shearstown soil 1161 ha

Orthic Humo-Ferric Podzol

The profile described below is located on a south-facing slope of 8%, 180 m north of the entrance to the Country Road community pasture, at 61 m above sea level.

The parent material is glacial till derived from slate, siltstone, shale, and acid to intermediate volcanic rocks of the Hodgewater group of late Hadrynian age.

The natural vegetation is balsam fir, white spruce, paper birch, thinleaf alder, blueberry, sheep-laurel, ground juniper, bunchberry, teaberry, goldenrod, broad-leaved meadowsweet, aster, and others.

Horizon	Depth, cm	Description
L	6-5	Dark reddish brown (5YR 3/3 m) needle and leaf litter; loose; abrupt, broken boundary; 0-1.25 cm thick.
F	5-0.5	Very dusky red (2.5YR 2/2 m), dark reddish brown (5YR 3/3 d) semidecomposed organic debris; fiber content 50%; loose, soft when dry; abundant medium and fine roots; many fine and medium pores; abrupt, smooth boundary; 1.25-7.5 cm thick; extremely acid (pH 3.4).
H	0.5-0	Black (5YR 2/1 m and d) well-decomposed organic material; moderate, fine granular; very friable, sticky when wet, soft when dry, abundant fine roots; abrupt, smooth boundary; 0-0.6 cm thick; extremely acid (pH 3.4).
Ae	0-6	Pinkish gray (7.5YR 7/2 m), pinkish white (7.5YR 8/2 d) silt loam; moderate, fine granular; friable, plastic when wet, soft when dry; abundant medium and fine roots; common very fine vesicular pores; 15% gravel and stones, mainly gray to greenish siltstone, argillite, and slate, hard and white on the outside; abrupt, irregular boundary; 1.25-7.5 cm thick; extremely acid (pH 3.9).
Bhf	6-10	Dark reddish brown (2.5YR 2/4 m, 5YR 3/4 d) sandy loam; moderate, fine granular; friable, sticky when wet, soft when dry; abundant fine and medium roots; common fine vesicular pores; 20% gravel and stones; clear, wavy boundary; 2.5-7.5 cm thick; very strongly acid (pH 4.6).
Bf	10-35	Yellowish red (5YR 5/8 m), reddish yellow (7.5YR 7/8 d) gravelly loam; moderate, fine granular; friable, slightly sticky when wet, slightly hard when dry; plentiful fine roots; 30% gravel and stones; clear, wavy boundary; 15-40 cm thick; strongly acid (pH 5.2).
BCc	35-40	Dark grayish brown (2.5Y 4/2 m), light olive brown (2.5Y 5/4 d) very gravelly loamy sand; weak, fine granular to amorphous; moderately cemented; few fine pores; few dark reddish brown (5YR 3/3 m) concretions 0.15-0.6 cm in diameter, some soft, others hard, all rich in manganese; 60% gravel and stones; gradual, wavy boundary; 5-10 cm thick; strongly acid (pH 5.2).
BCgj	40-60	Olive gray (5Y 5/2 m), light yellowish brown (2.5Y 6/4 d) very gravelly sandy loam; common medium, prominent yellowish red (5YR 5/8 m) mottles; amorphous; very firm, hard when dry; few dark reddish brown (5YR 3/3 m) soft concretions rich in

Chemical and physical analysis of Shearstown soil

Horizon	Depth,	pH		Loss on igni- tion,	Oxa- late Fe,	Dithi- onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F	5–0.5	3.4															
H	0.5–0	3.4															
Ae	0–6	3.9	3.2	4.9	0.2	1.7	14.2	0.5	3.4	11.1	1.1	5.6	7.8	15	23	56	21
Bhf	6–10	4.6	3.7	12.9	3.4	6.0	20.3	0.4	1.9	5.6	vl	4.5	4.5	20	53	41	6
Bf	10–35	5.2	4.4	5.2	2.4	5.5	15.1	0.1	0.7	44.8	3.4	44.8	89.6	30	48	41	11
BCc	35–40	5.2	4.4	4.9	1.0	2.0	2.8	0	0	10.1	1.1	3.4	5.6	60	83	15	2
BCgj	40–60	5.2	4.4	2.9	0.8	1.5	2.5	0	0	22.4	1.1	vl	23.5	60	71	26	3
C	60+	5.0	4.3	2.4	0.7	1.1	2.2	0	0	22.4	2.2	vl	17.9	80	80	17	3

manganese; 60% gravel and stones capped with a thin (0.15 cm) cover of light yellowish brown (5Y 6/4 m) silt; diffuse, wavy boundary; 15–40 cm thick; strongly acid (pH 5.2).

C 60+ Olive gray (5Y 4/2 m), olive (5Y 5/3 d) very gravelly loamy sand; amorphous; very firm, hard when dry; 80% gravel and stones, mainly greenish siltstone, slate, and argillite; strongly acid (pH 5.0).

St. Stephen soil 12 841 ha

Placic Ferro-Humic Podzol

The profile described below is located on a 7% slope with westerly exposure, just north of the school grounds of St. Stephen elementary school, at 30 m above sea level.

The parent material is glacial till derived from slate, siltstone, greywacke, conglomerate, and minor volcanic rocks of Hadrynian age.

The vegetation consists of very stunted balsam fir and some black spruce, with a ground cover of sheep-laurel, Labrador-tea, partridgeberry, small cranberry, bunchberry, and some browntop, with an abundance of sphagnum and hypnum mosses.

Horizon Depth, cm Description

F-H 15–0 Very dusky red (2.5YR 2/2 m), dusky red (2.5YR 3/2 d) somewhat felty, fairly friable, partly decomposed organic material, mainly mosses, also twigs, roots, and a few leaves; fiber content 50%; abundant roots; abrupt, smooth boundary; 12.5–25 cm thick; extremely acid (pH 4.1).

Ae 0–3.5 Pinkish gray (5YR 6/2 m), white (5YR 8/1 d) silty clay loam; moderate, medium platy; friable, sticky when wet, slightly hard when dry; plentiful fine roots; few fine interstitial pores; 15% white (7.5YR 8/0 m) gravel and some stones; clear wavy boundary; 3.7–7.5 cm thick; extremely acid (pH 4.3).

AB 3.5–7.5 Reddish gray and dark reddish gray (5YR 5/2–4/2 m), pinkish gray (7.5YR 7/2–6/2 d) gravelly silt loam; moderate, fine subangular blocky; friable, plentiful fine roots; few vesicular pores; 50% gravel and stones; clear, wavy boundary; 2.5–6.2 cm thick; extremely acid (pH 4.4).

Bhf 7.5–20 Reddish black (10R 2/1 m), very dark gray (5YR 3/1 d) gravelly loam; moderate, fine subangular blocky; friable, sticky when wet, soft when dry; plentiful fine roots; few fine vesicular pores; 60% gravel and stones; abrupt, wavy boundary; 12.5–20 cm thick; very strongly acid (pH 4.7).

Bhfc1 20–20.2 Black (5YR 2/1 m and d) lustrous, strongly cemented, thin iron pan; dense,

Chemical and physical analysis of St. Stephen soil

Horizon	Depth,	pH		Loss on igni-tion,	Oxa-late Fe,	Dithi-onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F–H	15–0	4.1	3.4	83.0													
Ac	0–3.5	4.3	3.4	9.3	0.1	0.2	13.3	2.5	15.8	3.4	vl	7.8	7.8	15	7	65	28
AB	3.5–7.5	4.4	3.8	6.3	0.4	0.5	12.4	2.0	1.4	3.4	vl	6.7	vl	50	14	60	26
Bhf	7.5–20	4.7	4.0	19.4	1.7	1.8	30.0	2.5	7.6	11.2	vl	25.8	vl	60	37	36	27
Bhfc1	20–20.2			15.0										60			
Bhfc2	20.2–20.4			19.0										60			
Bhfcj	20.4–32.5	4.9	4.1	11.2	1.4	1.5	30.0	2.5	7.6	11.2	vl	25.8	vl	70	89	6	5
Bf	32.5–47.5	5.0	4.3	8.6	0.5	0.6	19.8	1.2	7.5	1.1	vl	3.4	vl	70	92	6	2
BC	47.5–55	5.0	4.5	2.5	0.3	0.4	8.3	0.6	6.7	4.5	vl	31.3	vl	70	67	30	3
C	55+	5.0	4.6	2.2	0.3	0.4	0.8	0.5	36.4	4.5	vl	31.3	vl	80	90	7	3

amorphous; 60% gravel; abrupt, wavy boundary; 0.15–0.45 cm thick. In some places this black horizon divides into two or three horizons separated by brown (7.5YR 4/4 m) less strongly cemented material. In various parts of the profile this horizon occurs at depths of 10–50 cm.

Bhfc2 20.2–20.4 Dark red (2.5YR 3/6 m), yellowish red (5YR 5/8 d) amorphous material; moderately cemented; 60% gravel; more porous than Bhfc1; abrupt, wavy boundary; 0.15–0.62 cm thick. The Bhfc1 and Bhfc2 horizons constitute a thin iron pan; no root mat was evident at its surface.

Bhfcj 20.4–32.5 Dark red (2.5YR 2/4 m), brown (7.5YR 4/4 d) very gravelly sand; amorphous; weakly cemented; few fine roots; few fine vesicular pores; 70% stones and gravel; clear, wavy boundary; 10–20 cm thick; very strongly acid (pH 4.9).

Bf 32.5–47.5 Dark brown (7.5YR 3/2 m) to dark reddish brown (2.5YR 3/4 m), yellowish brown (10YR 5/4 d) very gravelly sand; amorphous; very firm, hard when dry; very few fine roots; 70% stones and gravel; clear, wavy boundary; 12.5–20 cm thick; very strongly acid (pH 5.0).

BC 47.5–55 Dark brown (10YR 4/3 m), pale brown (10YR 6/3 d) very gravelly sandy loam; amorphous; firm, hard when dry; 70% stones and gravel; clear, wavy boundary; 7.5–12.5 cm thick; very strongly acid (pH 5.0).

C 55+ Olive gray (5Y 4/2 m), light olive gray (5Y 6/2 d) very gravelly sand; amorphous; firm, slightly hard when dry; 80% stones and gravel, derived mainly from green and gray siltstone and argillite; very strongly acid (pH 5.0).

Torbay soil 60 194 ha

Rego Gleysol

The parent material is gravelly and stony glacial till ground moraine derived from slate, siltstone, greywacke, and some volcanic rocks from the Conception Bay group of Hadrynian age.

This gleysolic soil usually occurs under an organic cover 15 cm or more thick. The gleyed character of the soil under an organic mantle decreases with depth, and little evidence of reduced conditions is encountered in the C horizon.

The tree vegetation generally consists of black spruce and tamarack. The ground cover is mainly swamp birch, sheep-laurel, bog-laurel, sedges, Labrador-tea, cassandra, partridgeberry, sphagnum mosses, tall meadow rue, cloudberry or baked-apple, and other small shrubs.

Chemical and physical analysis of Torbay soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
F–H	17.5–0	3.5															
Ahg	0–0.5	4.1	3.6	8.6	0.6	0.9	12.4	2.3	15.7	1.1	0	2.2	2.2	15	32	41	27
BCg1	0.5–15	4.3	3.4	3.5	0.5	0.5	5.0	0.9	15.2	8.9	2.2	34.7	11.2	40	62	29	9
BCg2	15–50	4.7	4.2	3.5	0.3	0.6	4.2	0.8	16.0	21.2	2.2	84.0	56.0	60	59	32	9
Cg	50+	4.7	4.2	3.5	0.2	0.3	3.4	0.4	10.5	8.9	1.1	35.8	28.0	70	54	37	9

A description of an undisturbed profile is given below.

Horizon	Depth, cm	Description
L	18–17.5	Brown (10YR 5/3 m) very loose needle and leaf litter; abrupt, broken boundary; usually 0–1.25 cm thick.
F–H	17.5–0	Very dark brown (10YR 2/2 m), very dark grayish brown (10YR 3/2 d) semidecomposed, greasy organic debris of mainly moss and also twigs and roots; fiber content 50%; abrupt, smooth boundary; 10–45 cm thick; extremely acid (pH 3.5).
Ahg	0–0.5	Dark brown (7.5YR 4/2 m), pinkish gray (7.5YR 6/2 d) loam to clay loam; amorphous; firm, sticky, and plastic when wet, slightly hard when dry; plentiful very fine and fine roots; very few fine or very fine vesicular pores; 15% white (7.5YR 8/0 m) gravel, some very soft and easy to break by hand; clear, wavy boundary; 0–1.25 cm thick; extremely acid (pH 4.1).
BCg1	0.5–15	Light gray (10YR 7/2 m and d) gravelly sandy loam; few fine to medium, prominent brownish yellow (10YR 6/8 m) mottles; amorphous; friable, slightly sticky when wet, hard when dry; few very fine and fine roots; 40% gravel; clear, wavy boundary; 10–20 cm thick; extremely acid (pH 4.3).
BCg2	15–50	Olive (5Y 5/3 m), light gray (5Y 7/2 d) very gravelly sandy loam; few fine to medium, prominent brownish yellow (10YR 6/8 m) mottles; amorphous; firm nonsticky when wet, hard when dry; 60% gravel and slaty and shaly stones; gradual, wavy boundary; 25–50 cm thick; very strongly acid (pH 4.7).
Cg	50+	Olive (5Y 4/3 m), pale olive (5Y 6/3 d) very gravelly sandy loam; amorphous; firm, nonsticky when wet, hard when dry; 70% stones and gravel, mainly gray siltstone, argillite, and slate; very strongly acid (pH 4.7).

Trepassey soil 2886 ha
Placic Humo-Ferric Podzol

The profile described below occurs on a southwesterly 3% slope, 90 m northeast of the powerhouse of the Loran station, northeast of Portugal Cove South, at 122 m above sea level.

The parent material is till ground moraine derived from slate, greywacke, siltstone, and argillite of Hadrynian age. This material appears to have been modified (eroded) by marine or other shallow water, leaving an extremely stony surface (stone pavement), with the spaces between the stones later partly filled with organic material. Stoniness decreases abruptly with depth.

The tree cover consists of an occasional stunted balsam fir, less than a metre high, in somewhat sheltered locations. The ground vegetation includes sheep-laurel, Labrador-tea, cassandra, blueberry, cloudberry or baked-apple, black crowberry, common clubmoss, sedges, bunchberry, and a variety of sphagnum and other mosses.

Horizon	Depth, cm	Description
F–H	45–0	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/2 d) partly decomposed organic matter of moss, twigs, roots, and some leaves; fiber content 70%; slightly matted; abundant medium and fine roots, many coarse and medium pores; 80% stones and boulders; abrupt, wavy boundary; 30–60 cm thick; extremely acid (pH 4.0).
Ae	0–5	Light gray (10YR 6/1 m), white (10YR 8/1 d) gravelly sandy loam; amorphous; very friable, sticky when wet, soft when dry; abundant medium roots; common medium vesicular pores; 90% gravel, mainly siltstone, slate, and greywacke, white on the outside; fine gravel, white throughout; abrupt, wavy boundary; 0–15 cm thick; extremely acid (pH 4.1).
Bhfgj	5–10	Reddish black (10YR 2/1 m), reddish brown (5YR 4/3 d) very gravelly sandy loam; few fine, prominent dark red (2.5YR 3/6 m) mottles; moderate, medium to coarse platy; very friable, sticky when wet, soft when dry; abundant medium and fine roots; very few fine pores; 60% stones and gravel; clear, wavy boundary; 10–15 cm thick; very strongly acid (pH 4.7).
Bfg	10–20	Dark reddish brown (5YR 3/3 m), brown (10YR 5/3 d) gravelly sandy loam; many coarse, prominent olive (5Y 4/3 m) mottles; weak, fine subangular blocky; very friable, slightly sticky when wet, slightly hard when dry; plentiful fine roots; few fine interstitial pores; 40% angular stones and gravel; clear, wavy boundary; 7.5–17.5 cm thick; strongly acid (pH 5.1).
BCg1	20–27.5	Olive (5Y 4/3 m, 5/3 d) gravelly sandy loam; few medium to large, prominent yellowish brown (10YR 5/6 m) mottles; amorphous; firm, hard when dry; 40% angular stones and gravel; clear, wavy boundary; 0–12.5 cm thick; strongly acid (pH 5.1).
BCg2	27.5–37.5	Light olive gray (5Y 6/2 m), white (5Y 8/2 d) gravelly loam; common large, prominent yellowish brown (10YR 5/6 m) mottles; firm, slightly sticky when wet, hard when dry; 40% stones and gravel; abrupt, irregular boundary; 10–20 cm thick; strongly acid (pH 5.2).
Bfc1	37.5–40	Red (2.5YR 4/8 m, 5/6 d) gravelly sandy loam; moderately cemented; 40% gravel and angular gravel; abrupt, irregular boundary; 1.25–2.5 cm thick; strongly acid (pH 5.1).
Bfc2	40–42.5	Strong brown (7.5YR 5/6 m), reddish yellow (7.5YR 7/6 d) gravelly sandy loam; weakly cemented; 40% gravel and angular gravel; abrupt, irregular boundary; 2.5–5 cm thick; strongly acid (pH 5.1). Bfc1 and Bfc2 together form a brightly colored iron pan that may have another Bfc2-like horizon overlying the Bfc1 horizon, or the pan may split into two horizons, each containing a Bfc1 and Bfc2, which join again into one pan at various distances, from 10 to 150 cm, or the pan may double back for a number of centimetres and continue at greater depth.
BCg3	42.5–62.5	Light olive gray (2.5Y 6/2 m), white (2.5Y 8/2 d) gravelly sandy loam; amorphous, firm, hard when dry; 30% angular stones and gravel; gradual, wavy boundary; 15–25 cm thick; strongly acid (pH 5.5).
C	62.5+	Light olive gray (5Y 6/2 m), white (5Y 8/2 d) gravelly sandy clay loam; amorphous; firm, slightly hard when dry; 20% gravel and stones, mainly gray siltstone, slate, and argillite; strongly acid (pH 5.5).

Chemical and physical analysis of Trepassey soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil: Exchg. acidity	meq/100 g soil: Exchg. bases	Base sat., %	Available nutrients, kg/ha: N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ae	0–5	4.7	4.1	23.4	0.2	0.4	23.1	0.6	2.6	10.1	vl	12.2	vl	90	60	27	13
Bhfgj	5–10	4.7	4.3	11.6	0.8	1.1	10.4	0	0	4.5	vl	12.2	vl	60	77	11	12
Bfg	10–20	5.1	4.5	5.5	0.5	1.6	6.0	0.02	0.3	3.4	2.2	21.2	vl	40	77	14	9
BCg1	20–27.5	5.1	4.7	2.6	0.3	1.3	3.3	0.2	5.7	2.2	0	15.6	vl	40	74	16	10
BCg2	27.5–37.5	5.2	4.7	2.0	0.2	1.1	2.5	0.02	0.8	5.6	1.1	23.5	vl	40	43	35	22
Bfc1&2	37.5–42.5	5.1	4.8	2.6	1.5	1.7	3.6	0.1	2.7	0.5	vl	5.6	vl	40	73	17	10
BCg3	42.5–62.5	5.5	4.8	1.6	0.1	1.1	1.8	0.2	10.0	12.2	1.1	41.4	vl	30	49	27	24
C	62.5+	5.5	5.0	1.4	0.1	0.8	1.7	0.2	10.5	8.9	vl	31.3	vl	20	55	22	23

Turk's Cove soil 36 940 ha

Orthic Ferro-Humic Podzol

The profile described below is located on a 20% slope with westerly exposure, on the east side of the highroad near the southern edge of Turk's Cove, at 45 m above sea level.

The parent material of these soils is glacial till derived from slate, siltstone, arkose, conglomerate, and some acid volcanic rocks.

The vegetation is generally balsam fir, white spruce, black spruce, thinleaf alder, pin cherry, raspberry, blueberry, blackberry, rose, aster, bunchberry, false Solomon's-seal, creeping snowberry, yarrow, and pleurozium mosses.

These soils, with a cemented B horizon, are located near the eastern shore of Placentia Bay, north of Placentia, but occur more generally near the eastern shores of Trinity Bay, north of Heart's Content, and to a lesser extent, near the western shore of Conception Bay. Topography, stoniness, and location appear to influence their occurrence. The soils are usually found on moderate to steep slopes with development more pronounced near the bottom of these slopes. In very stony areas, the ortstein-like layers of the B horizon may narrow to a thin iron pan (placic horizon) within a single pedon. In other locations, sections of placic horizons may also occur below stones and boulders.

Horizon	Depth, cm	Description
L	8–7.5	Litter of needles, leaves, and some moss; loose, varying from place to place in composition; abrupt, broken boundary; 0–1.25 cm thick.
F	7.5–0	Dark reddish brown (2.5YR 2/4 m), dusky red (2.5YR 3/2 d) somewhat felty, partly decomposed organic material; fiber content 20%; sticky when wet; very weak, fine granular in spots; abrupt, wavy boundary; 5–15 cm thick.
Ae	0–12.5	Light brown (7.5YR 6/4 m), pinkish white (5YR 8/2 d) clay loam; weak, fine subangular blocky to weak, fine platy; friable, plastic when wet, slightly hard when dry; plentiful fine roots; common fine vesicular pores; 20% angular gravel; clear, irregular boundary; 10–20 cm thick; extremely acid (pH 3.8).
Bhf	12.5–22.5	Dark reddish brown (5YR 3/4 m), brown (7.5YR 5/4 d) gravelly loam; weak, fine granular to weak, fine platy; friable, sticky when wet, hard when dry; plentiful fine roots; common vesicular pores; 30% angular gravel and stones; clear, wavy boundary; 7.5–17.5 cm thick; extremely acid (pH 4.3).
Bfcgj	22.5–35	Reddish brown (5YR 4/4 m), yellowish red (5YR 5/6 d) cobbly loam; common medium, prominent yellowish red (5YR 4/8 m) mottles; strong, very coarse platy; peds externally dark reddish brown (2.5YR 3/4 m); firm, very hard when dry; common fine,

Chemical and physical analysis of Turk's Cove soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
Ac	0-12.5	3.8	3.1	5.2	0.2	0.8	13.4	0.23	1.7	25.8	1.1	vl	14.5	20	23	47	30
Bhf	12.5-22.5	4.3	3.7	12.4	3.0	3.5	17.3	0.17	1.0	23.5	1.1	8.9	12.2	30	38	48	14
Bfcgj	22.5-35	4.8	4.1	11.7	2.0	2.0	12.6	0.06	0.5	30.2	1.1	7.8	14.5	40	51	41	8
BCgj1	35-50	5.0	4.2	6.1	0.8	1.7	6.3	0	0	35.8	2.2	vl	17.9	70	52	38	10
BCgj2	50.5-75	5.2	4.4	3.7	0.5	1.0	3.2	0	0	44.8	3.3	vl	30.2	70	54	40	6
C	75+	4.9	4.3	0.6	0.4	0.5	1.0	0	0	31.3	2.2	vl	17.9	90	70	24	6

horizontal exped roots; few fine, exped tubular horizontal pores; 40% angular gravel and stones; gradual, irregular boundary; 10-27.5 cm thick; very strongly acid (pH 4.8).

BCgj1 35-50 Yellowish brown (10YR 5/4 m), very pale brown (10YR 7/3 d) very gravelly sandy loam; common fine to medium, prominent yellowish red (5YR 5/8 m) mottles; amorphous; weakly cemented; very few fine vesicular pores; 70% angular stones; abrupt, broken boundary; 12.5-37.5 cm thick; very strongly acid (pH 5.0).

Bfc1 50-50.2 Reddish black (10R 2/1 m), dusky red (10R 3/2 m) upper layer of thin iron pan; strongly cemented, including fine gravel fragments; abrupt, irregular boundary; 0.07-0.45 cm thick.

Bfc2 50.2-50.5 Yellowish red (5YR 4/6 m), reddish yellow (5YR 6/8 d) lower layer of thin iron pan; moderately cemented, including fine gravel fragments; abrupt, irregular boundary; 0.3-0.6 cm thick. Bfc1 and Bfc2 together form a thin iron pan that in places divides into two or three similar pans separated by less cemented reddish brown (5YR 4/4 m) material; its depth varies considerably and in this area the pan only exists under large boulders and is absent in most other places. The thin iron pan may also occur closer to the surface and become less cemented or diffuse into a Bfhcgj or ortstein horizon.

BCgj2 50.5-75 Light olive brown (2.5Y 5/4 m), pale brown (2.5Y 7/2 d) very gravelly sandy loam; common medium to fine, prominent strong brown (7.5YR 5/8 m) mottles; amorphous; moderately cemented; 70% angular stones covered with up to 0.6 cm of pale brown (10YR 6/3 d) to white (10YR 8/2 m) silt caps; diffuse, irregular boundary; 10-40 cm thick; strongly acid (pH 5.2).

C 75+ Olive gray (5Y 5/2 m), light gray (10YR 7/1 d) very gravelly sandy loam; amorphous; 90% angular stones; very strongly acid (pH 4.9).

Upper Gullies soil 2129 ha

Orthic Gleysol

The profile described below occurs on a 2% westerly slope 0.4 km north of the northern approach to Seal Cove on the east side of the Conception Bay highway, about 90 m above sea level.

The parent material is a coarse glacial till with many large and small stones mainly of granite, granodiorite, quartz, and diorite of the Holyrood plutonic series of Hadrynian age.

Plate 3. Profile of an Orthic Gleysol with a peaty surface.

The vegetation consists of stunted black spruce, tamarack, speckled or gray alder, sheep-laurel, Labrador-tea, and a large variety of mainly sphagnum mosses and sedges.

Horizon	Depth, cm	Description
F-H	10-0	Very dark grayish brown (10YR 3/2 m), dark grayish brown (10YR 4/2 d) organic material, mainly decomposing sphagnum mosses, roots, twigs, and some leaves and needles; fiber content 60%; full of water with many medium and coarse pores; greasy; abrupt, smooth boundary; 20-60 cm thick.
Aeg	0-7.5	Light gray (10YR 7/2 m), pinkish white (7.5YR 8/2 d) sandy loam; amorphous to weak, fine subangular blocky; firm, sticky when wet, hard when dry; plentiful fine roots; very few fine pores; 20% gravel and stones, white externally; clear, wavy boundary; 2.5-10 cm thick; extremely acid (pH 4.4).
ABg	7.5-15	Pinkish gray (7.5YR 6/2 m, 7/2 d) gravelly sandy loam; few fine to medium, prominent strong brown (7.5YR 5/8 m) mottles; amorphous; firm, slightly sticky when wet, hard when dry; plentiful fine roots; 40% gravel and stones; clear, wavy boundary; 2.5-10 cm thick; very strongly acid (pH 4.5).
Bg1	15-20	Brown (7.5YR 5/2 m), pale brown (10YR 6/3 d) gravelly sandy loam; few fine to medium, prominent strong brown (7.5YR 5/8 m) mottles; amorphous; firm, slightly sticky when wet, hard when dry; few fine roots; 50% gravel and stones; clear, wavy boundary; 2.5-10 cm thick; very strongly acid (pH 5.0).
Bgj	20-27.5	Pale brown (10YR 6/3 m), very pale brown (10YR 7/3 d) very gravelly sandy loam; few fine to medium, prominent brownish yellow (10YR 6/6 m) mottles; amorphous; firm, hard when dry; 60% stones; gradual, wavy boundary; 5-12.5 cm thick; strongly acid (pH 5.3).

Chemical and physical analysis of Upper Gullies soil

Horizon	Depth,	pH		Loss on igni-tion,	Oxa-late Fe,	Dithi-onite Fe,	meq/100 g soil		Base sat.,	Available nutrients, kg/ha				Gravel,	Sand,	Silt,	Clay,
	cm	H_2O	$CaCl_2$	%	%	%	Exchg. acidity	Exchg. bases	%	N	P	K	Ca	%	%	%	%
F-H	10-0	4.4	3.5														
Aeg	0-7.5	4.4	3.6	1.1	0.03	0.03	2.7	0.1	3.6	15.6	vl	15.6	8.9	20	62	31	7
ABg	7.5-15	4.5	3.6	1.5	0.1	0.1	3.6	0.2	5.3	15.6	vl	17.9	17.9	40	65	27	8
Bg1	15-20	5.0	3.9	3.4	0.1	0.1	5.7	0.3	5.0	1.1	vl	10.1	vl	50	74	21	5
Bg2	20-27.5	5.3	4.3	1.5	0.1	0.1	3.0	0.1	3.2	2.2	vl	15.6	vl	60	66	30	4
BCg	27.5-40	5.3	4.5	0.5	0.05	0.1	0.7	0	0	3.3	vl	25.8	vl	60	65	33	2
Cg	40+	5.3	4.9	0.3	0.05	0.1	0.3	0	0	3.3	1.1	30.2	vl	70	66	33	1

BCg	27.5–40	Very pale brown (10YR 7/3 m, 8/3 d) very gravelly sandy loam; few fine, prominent reddish yellow (5YR 6/8 m) mottles; amorphous; firm, hard when dry; 60% stones; gradual, wavy boundary; 7.5–12.5 cm thick; strongly acid (pH 5.3).
Cg	40+	Light gray (2.5Y 7/2 m), white (10YR 9/1 d) very gravelly sandy loam; amorphous; firm, hard when dry; 70% stones; strongly acid (pH 5.3).

Victoria Pond soil 12 011 ha

Gleyed Humo-Ferric Podzol

The profile described below is located on a 2% slope with southwesterly exposure, near the microwave tower at the height of land southeast of Heart's Content, at 166 m above sea level.

The parent material is till ground moraine, 0.6–6 m thick, derived from siltstone, arkose, argillite, slate, conglomerate, sandstone, and acid volcanic rock.

A heath vegetation is common with sheep-laurel, blueberry, black crowberry, foxberry, three-toothed cinquefoil, partridgeberry, reindeer moss, ground juniper, goldenrod, common and bristly club-moss, aster, Labrador-tea, thinleaf alder, and open stands of balsam fir, tamarack, and spruce.

On almost level land at the tops of hills and on exposed locations, usually with a southern exposure, small areas without vegetation are common. At these locations a cover of angular gravel occupies the surface and the soil profile differs considerably from those soils having a vegetative cover. Frost action appears to be the cause of this difference. This is discussed in the description of the Vivian soil profile.

Horizon	Depth, cm	Description
L	16–15	Leaf litter, twigs, and some needles; many voids; abrupt, broken boundary; 0–1.87 cm thick.
F	15–5	Very dusky red (2.5YR 2/2 m), dark reddish brown (2.5YR 3/4 d) horizon of decomposing leaves, twigs, and needles; fiber content 50%; slightly matted; loose; plentiful roots; many fine and medium tubular horizontal pores; clear, smooth boundary; 7.5–15 cm thick; extremely acid (pH 3.8).
H	5–0	Reddish black (10R 2/1 m), dark reddish brown (5YR 2/2 d) fairly well decomposed organic material; weak, fine platy; greasy; fiber content 10%; abundant fine roots; abrupt, smooth boundary; 2.5–5 cm thick; extremely acid (pH 3.6).
Ae	0–25	Light brown (7.5YR 6/4 m) very gravelly silty clay loam; amorphous to weak, fine granular; very friable, sticky when wet, slightly hard when dry; plentiful fine roots; common fine vesicular pores; 80% angular gravel and some stones; clear, wavy boundary; 22.5–35 cm thick; extremely acid (pH 3.9).

Chemical and physical analysis of Victoria Pond soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on ignition, %	Oxalate Fe, %	Dithionite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
L	16–15																
F	15–5	3.8															
H	5–0	3.6															
Ae	0–25	3.9	3.5	5.8	0.4	0.8	29.9	0.3	1.0	59.3	4.5	89.6	vl	80	19	43	38
Bhf	25–32.5	4.2	3.9	14.1	1.9	2.3	34.6	0.6	1.7	17.9	1.1	17.9	vl	70	54	35	11
Bfg	32.5–42.5	4.3	4.3	6.6	1.8	1.9	15.5	0	0	30.2	2.2	5.6	vl	70	47	42	11
BCg	42.5–87.5	4.6	4.5	0.6	0.3	0.4	7.6	0	0	94.0	5.6	26.8	vl	60	38	46	16
C	87.5+	4.6	4.6	0.6	0.1	0.2	6.1	0	0	31.3	2.2	8.9	vl	80	39	46	15

Bhf	25–32.5	Very dusky red (10YR 2/2 m), dark reddish brown (5YR 3/3 d) very gravelly sandy loam; weak, fine subangular blocky; friable, sticky when wet, slightly hard when dry; plentiful fine roots; common fine vesicular pores; 70% angular gravel and some stones; clear, wavy boundary; 7.5–10 cm thick; extremely acid (pH 4.2).
Bfg	32.5–42.5	Strong brown (7.5YR 5/6 m), light brown (7.5YR 6/4 d) very gravelly loam; common fine, distinct yellowish red (5YR 5/8 m) mottles; moderate, fine subangular blocky; firm, slightly sticky when wet, hard when dry; few fine roots; few small iron concretions 0.3–0.9 cm in diameter; 70% angular gravel and some stones; gradual wavy boundary; 5–10 cm thick; extremely acid (pH 4.3).
BCg	42.5–87.5	Light yellowish brown (2.5Y 6/4 m), very pale brown (10YR 8/3 d) very gravelly loam; common medium to coarse, prominent yellowish red (5YR 4/8 m) mottles; amorphous; friable, not sticky when wet, hard when dry; 60% angular gravel and stones covered with silt caps 0.15–0.3 cm thick; gradual, wavy boundary; 30–45 cm thick; very strongly acid (pH 4.6).
C	87.5+	Pale yellow (5Y 7/3 m), white (5Y 8/2 d) gravelly loam; amorphous; very firm, hard when dry; 80% angular stones and gravel, mainly gray siltstone, slate, and argillite; very strongly acid (pH 4.6).

Vivian soil

Gleyed Humo-Ferric Podzol

The profile described below is on a 2% southwesterly slope near the microwave tower at the height of land southeast of Heart's Content, at 166 m above sea level.

This soil is found in small patches on the tops of hills or exposed southerly slopes in association with the Victoria Pond soils. Similar patches are found in the areas occupied by Old Perlican soils, the Smallwood association, and the Shearstown soils. The general differences from the surrounding soils are little or no vegetation, few or no stones in the profile to 50 cm deep, less distinct boundaries between horizons, and more stone at the surface. Areas of Vivian soil are too small to be shown on the soil map.

Distinct stone patterns or frost polygons occur in the same areas. Active frost heaving occurs nearly every winter in these soils, but there is little or no frost penetration or heaving in the Victoria Pond soils. Figure 32 shows the relationship between the Victoria Pond and Vivian soils.

Horizon	Depth, cm	Description
A1	0–5	Angular gravel, 0.6–5 cm in diameter, mainly gray siltstone, gray shale, and gray and some red sandstone, with occasionally a larger stone up to 90 cm in diameter; abrupt, wavy boundary; 5–10 cm thick. Large stones in nearby locations may be numerous and aligned in streaks or polygons; flat stones are aligned edgewise with their longest dimension in the direction of the alignment and their smallest dimension nearly horizontal.
Ae	5–15	Pale brown (10YR 6/3 m), white (5YR 8/1 d) loam; weak, fine platy to weak, fine granular; friable, sticky when wet, slightly hard when dry; very few fine roots; common fine vesicular pores; less than 2% angular gravel; clear, wavy boundary; 5–15 cm thick; extremely acid (pH 4.2).
Bf	15–22.5	Dark brown (7.5YR 3/2 m), reddish gray (5YR 5/2 d) loam; weak to moderate, fine granular; friable, sticky when wet, soft when dry; very few very fine horizontal roots that appear to originate from the adjacent Victoria Pond soil area; few fine vesicular pores; few small (0.3–0.9 cm) iron concretions; 4% angular gravel; clear, wavy boundary; 7.5–10 cm thick; extremely acid (pH 4.3).

Chemical and physical analysis of Vivian soil

Horizon	Depth, cm	pH H_2O	pH $CaCl_2$	Loss on igni-tion, %	Oxa-late Fe, %	Dithi-onite Fe, %	meq/100 g soil Exchg. acidity	meq/100 g soil Exchg. bases	Base sat., %	Available nutrients, kg/ha N	P	K	Ca	Gravel, %	Sand, %	Silt, %	Clay, %
AI	0-5													100			
Ae	5-15	4.2	3.8	3.4	0.2	0.4	16.9	0	0	23.5	2.2	5.6	vl	2	29	48	23
Bf	15-22.5	4.3	4.0	6.7	1.2	1.4	18.5	0	0	22.4	2.2	4.5	vl	4	42	43	15
Bfgj	22.5-37.5	4.8	4.4	4.1	1.6	1.9	13.9	0	0	26.8	2.2	17.9	vl	4	49	42	9
BCgj1	37.5-50	4.7	4.4	2.3	0.5	1.0	8.8	0.24	2.7	25.8	1.1	7.8	vl	7	53	36	11
BCgj2	50-87.5	4.7	4.5	2.0	0.5	0.8	7.7	0	0	67.2	4.5	22.4	vl	60	53	36	11
C	87.5+	4.6	4.4	1.4	0.3	0.5	6.3	0	0	31.3	2.2	8.9	vl	80	57	34	9

Bfgj 22.5-37.5 Dark red (2.5YR 3/6 m), yellowish brown (10YR 5/6 d) loam; few small to medium, distinct yellowish red (5YR 4/8 m) mottles; moderate, fine subangular blocky; friable, slightly sticky when wet, hard when dry; few fine horizontal or oblique roots emanating from adjacent Victoria Pond profile; very few small iron concretions; 4% angular gravel; gradual, wavy boundary; 10-17.5 cm thick; very strongly acid (pH 4.8).

BCgj1 37.5-50 Light yellowish brown (2.5Y 6/4 m), very pale brown (10YR 8/4 d) sandy loam; few medium to coarse, prominent yellowish red (5YR 4/8 m) mottles; amorphous; friable, not sticky when wet, hard when dry; very few fine horizontal roots; 7% angular gravel with silt caps up to 0.6 cm thick; gradual, wavy boundary; 10-15 cm thick; very strongly acid (pH 4.7).

BCgj2 50-87.5 Description identical with the previous horizon, but very gravelly (60% angular gravel) with thin silt caps; gradual, wavy boundary; 30-42.5 cm thick; very strongly acid (pH 4.7).

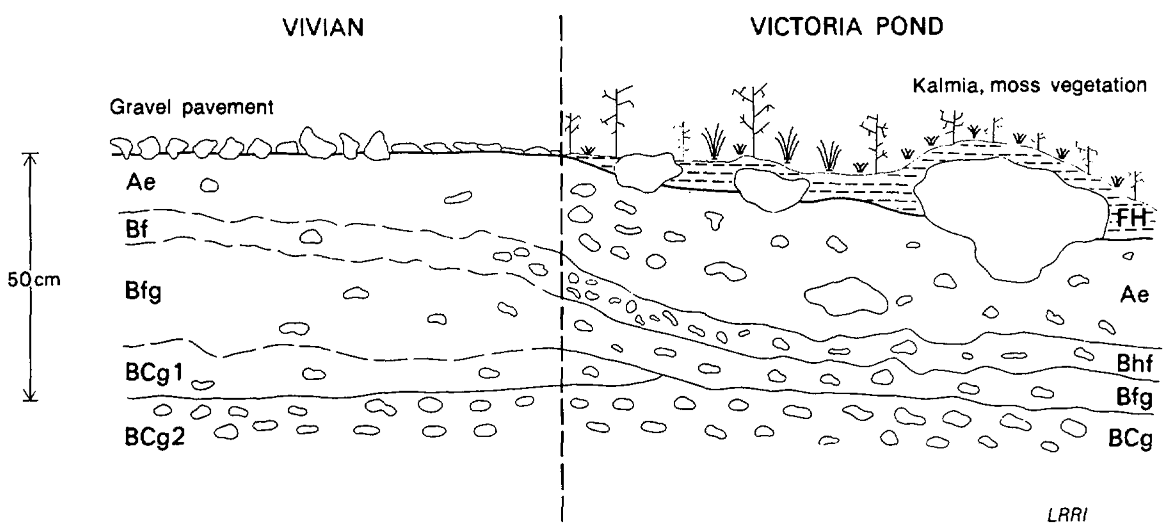

Fig. 32. Relationship between Victoria Pond and Vivian soils.

C	87.5+	Pale yellow (5Y 7/3 m), white (5Y 8/2 d) gravelly sandy loam; amorphous; very firm, hard when dry; 80% angular gravel and stones, mainly gray siltstone, argillite, and gray slate, and some red sandstone; very strongly acid (pH 4.6).

Waterford soil 563 ha

Rego Gleysol

The profile described below is located on an easterly 2% slope on the south side of an island in the Branch River, just north of the western edge of the village of Branch, at less than 15 m above sea level.

The parent material is alluvial sand and gravel, mainly derived from siltstone, slate, and argillite.

The vegetation consists of a variety of mosses, sedge, sheep-laurel, cassandra, sweet gale, bog-laurel, and small crowberry. Balsam fir forest with black spruce, some white spruce, blueberry, dwarf elder, cassandra, black crowberry, burnet, tall meadow rue, and foxberry are also common.

Horizon	Depth, cm	Description
L-F	15-0	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/2 d) mesic organic material; fiber content 30%; abundant medium and fine roots; many medium pores; very wet; abrupt, smooth boundary; 5-40 cm thick.
Ah	0-0.5	Reddish black (10R 2/1 m), dark reddish brown (5YR 3/2 d) sandy loam; amorphous, friable; some fine gravel; abrupt, wavy boundary; 0-0.6 cm thick.
Cg	0.5+	Light olive gray (5Y 6/2 m) sandy loam, sand, and gravel in layers of various thicknesses.

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COMMON AND BOTANICAL NAMES OF PLANTS

Common name	Botanical name
baked-apple or cloudberry	*Rubus chamaemorus* L.
balsam fir	*Abies balsamea* (L.) Mill.
beachgrass, American	*Ammophila breviligulata* Fern.
bentgrass	*Agrostis geminata* Trin.
black crowberry	*Empetrum nigrum* L.
black spruce	*Picea mariana* (Mill.) B.S.P.
blueberry	*Vaccinium angustifolium* Ait.
bog-laurel	*Kalmia polifolia* Wang.
bristly club-moss	*Lycopodium annotinum* L.
bristly sarsaparilla or dwarf elder	*Aralia hispida* Vent.
browntop or colonial bentgrass	*Agrostis tenuis* Sibth.
bugleweed or tuberous water-horehound	*Lycopus uniflorus* Michx.
bulrush	*Scirpus cespitosus* L.
bunchberry	*Cornus canadensis* L.
burnet, Canadian	*Sanguisorba canadensis* L.
cassandra	*Chamaedaphne calyculata* (L.) Moench var. *angustifolia* (Ait.) Rehd.
choke cherry	*Prunus virginiana* L.
common club-moss	*Lycopodium clavatum* L.
common hairgrass	*Deschampsia flexuosa* (L.) Trin.
cotton-grass, russet	*Eriophorum chamissonis* C. A. Mey.
creeping snowberry	*Gaultheria hispidula* (L.) Muhl.
eastern white pine	*Pinus strobus* L.
European or showy mountain-ash	*Sorbus decora* (Sarg.) Schneid.
fall dandelion or fall hawkbit	*Leontodon autumnalis* L.
false Solomon's-seal	*Smilacina stellata* (L.) Desf.
ferns	*Dryopteris* spp.
fireweed	*Epilobium angustifolium* L.
foxberry	*Vaccinium vitis-idaea* L.
goldenrod	*Solidago uliginosa* Nutt.
gooseberry	*Ribes hirtellum* Michx.
ground-fir or heath-cypress	*Lycopodium sabinaefolium* Willd.
ground juniper	*Juniperus communis* L. var. *depressa* Pursh
horned bladderwort	*Utricularia cornuta* Michx.
Labrador-tea	*Ledum groenlandicum* Oeder
lamb-kill or sheep-laurel	*Kalmia angustifolia* L.
marsh bellflower	*Campanula uliginosa* Rydb.
meadowsweet, broad-leaved	*Spiraea latifolia* (Ait.) Borkh.
mountain fly-honeysuckle	*Lonicera villosa* (Michx.) R. & S.
mountain maple	*Acer spicatum* Lam.
mouse-eared hawkweed	*Hieracium pilosella* L.
Newfoundland dwarf birch	*Betula michauxii* Spach
northern twinflower	*Linnaea borealis* L.
partridgeberry	*Mitchella repens* L.
pin cherry	*Prunus pensylvanica* L. f.
plume moss	*Hypnum crista-castrensis* Headw.
ragwort of the woods	*Senecio sylvaticus* L.
raspberry	*Rubus idaeus* L.
red choke cherry	*Prunus virginiana* L.
red maple	*Acer rubrum* L.
red-stemmed aster	*Aster puniceus* L.
reindeer moss	*Cladonia* spp.
rhododendron, Canadian	*Rhododendron canadense* (L.) Torr.
round-leaved sundew	*Drosera rotundifolia* L.
rose	*Rosa* spp.
sedge	*Carex* spp.
serviceberry, running	*Amelanchier stolonifera* Wieg.
sheep sorrel	*Rumex acetosella* L.
small cranberry	*Vaccinium oxycoccus* L.
speckled or gray alder	*Alnus rugosa* (Du Roi) Spreng. var. *americana* (Regel) Fern.
sphagnum moss	*Sphagnum* spp.
stitchwort	*Stellaria graminea* L.
swamp birch	*Betula pumila* L. var. *glandulifera* Regel
sweet gale	*Myrica gale* L.
tall meadow rue	*Thalictrum polygamum* Muhl.
tamarack	*Larix laricina* (Du Roi) K. Koch
teaberry	*Gaultheria procumbens* L.
thinleaf alder	*Alnus tenuifolia* Nutt.
three-toothed cinquefoil	*Potentilla tridentata* Ait.
twinflower	*Linnaea borealis* L.
trembling aspen	*Populus tremuloides* Michx.
white birch	*Betula papyrifera* Marsh.
white lettuce	*Prenanthes alba* L.
white spruce	*Picea glauca* (Moench) Voss
wintergreen	*Pyrola rotundifolia* L.
yarrow	*Achillea millefolium* L.
yellow birch	*Betula alleghaniensis* Britton