SOIL SURVEY

of

ANNAPOLIS COUNTY
Nova Scotia

J. I. MacDougall and J. L. Nowland

CANADA DEPARTMENT OF AGRICULTURE

and

J. D. Hilchey

NOVA SCOTIA DEPARTMENT OF AGRICULTURE
AND MARKETING

Report No. 16

NOVA SCOTIA SOIL SURVEY
Truro, Nova Scotia

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The soil maps were prepared by the Cartography Section, Soil Research Institute, Ottawa. The Nova Scotia Agricultural College provided headquarters and laboratory facilities for the work.

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SUMMARY

Annapolis County, with an area of 833,358 acres, occupies over 6% of the province. The climate is humid temperate, with mean January and July temperatures of 24 and 66 F, and an annual precipitation of 49 inches. The average frost-free season ranges from 93 to 140 days, and there are about 2,700 degree-days above 42 F in the year, rising to over 3,000 in parts of the Annapolis Valley.

The main physiographic features are the 3 to 6 mile wide trough of the Annapolis Valley bounded on the north by the North Mountain and on the south by the South Mountain. These latter features are part of the Atlantic peneplain and rise about 700 ft above the valley floor. The greater part of the County is drained by the Annapolis River and its tributaries. The Mersey and Medway rivers drain the southern part.

Approximately 78% of the County is covered by forest. The main tree species are red spruce, balsam fir, red maple, birches, white pine, and white spruce.

Beginning in 1604 the County became one of the first areas of European settlement on the North American continent. From that time the timber resources have been intensively exploited and a diversified system of agriculture has evolved, which today is based on livestock, poultry, and tree fruits. Farms occupy 19% of the County, but only 4.7% of the land is improved.

About 90% of the soils have developed on glacial till. The remainder of the area is occupied by peat and soils developed on water-deposited sediments of glacial, postglacial, and recent origin. Over three-quarters of the soils are moderately coarse to coarse textured, ranging from sandy loam to sand. The remainder comprise medium-textured soils (7.6%), moderately fine textured soils (8.9%), and rockland and peat (together 6% of the land area).

Well-drained and moderately well drained soils occupy 83% of the land area. These are dominantly Humo-Ferric Podzols, some Ferro-Humic Podzols, some Gray Wooded (Gray Luvisols), and small areas of Brunisols and Regosols. Soils with imperfect drainage occupy 5.6% of the area and are dominantly Gleyed Humo-Ferric Podzols with some Gleyed Regosols. Poorly drained soils other than peat and salt marsh (5.4%) are Gleyed Podzols, Gleysols, and Rego Gleysols.

INTRODUCTION

This report gives information obtained from the soil survey of Annapolis County made during 1963–1965. Part of the County had been surveyed previously (8).

The geographical background and the factors that affect the development and use of the soils are discussed briefly before the main part of the report, which describes the soils in detail and their general suitability for agriculture. In a later section, the soils are grouped into capability classes according to the physical hazards that limit their use for agriculture. They are also rated for suitability for crops commonly grown in the area.

The report is accompanied by soil maps printed on a scale of 1 inch to 1 mile. They identify soil areas by colors and symbols (shown in the legend) and also indicate the location of towns, highways, railroads, lakes, and rivers.

If you are interested in obtaining information about the soil in any part of the County, locate the area on one of the maps and identify the soil by its color and symbol given in the legend. The report and maps are complementary and both should be used to obtain information about any soil.

The maps and report, although compiled for agricultural purposes, contain information useful to those interested in other phases of land use such as forestry, highway construction, conservation, and recreation.

GENERAL DESCRIPTION OF THE AREA

Location and Extent

Annapolis County is situated in southwestern Nova Scotia between the latitudes 44° 19′ and 45° 04′ North, and longitudes 64° 47′ and 65° 46′ West. It is bounded by the counties of Kings to the northeast, Queens and part of Lunenburg to the southeast, Digby to the southwest, and a 50-mile shoreline on the Bay of Fundy to the north (Fig. 1). The County is 833,358 acres in area, or over 6% of the province. The County contains the western half of the valleys of the Annapolis and Cornwallis rivers, commonly called the Annapolis Valley.

Climate

The County, in common with the rest of the province, lies within a cool humid temperate climatic zone. The weather is variable as a result of the interaction between the dry continental and the cool moist Atlantic air masses.

Climatic data for the County are obtained from three main stations. Annapolis Royal is on a deep inlet of the Bay of Fundy; Springfield is situated in the interior about 30 miles from the Fundy and Atlantic coasts; and Greenwood is on the Annapolis River in western Kings County.

The 8-inch difference in annual precipitation (Table 1) between Springfield and Annapolis Royal can be taken as typical of the range between the upland areas of the North and South mountains and the lowlands of the Annapolis Valley. The loss of moisture by evapotranspiration is 22 inches for the valley and 21 inches elsewhere in the County.

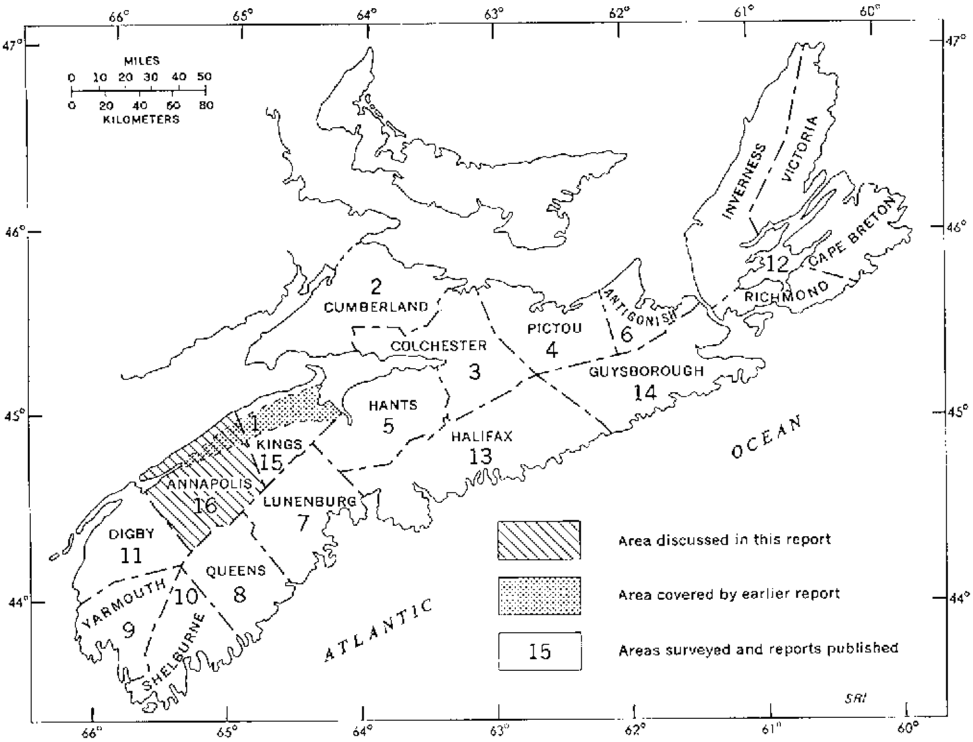

Fig. 1. Location of Annapolis County, and areas of Nova Scotia previously surveyed.

Table 1. Average Monthly Temperatures and Precipitation at Representative Stations[1]

	Annapolis Royal (Elev. 10 ft) 30 years record		Springfield (Elev. 549 ft) 30 years record		Greenwood (Elev. 80 ft) 10 years record	
	Temperature F	Precipitation inches	Temperature F	Precipitation inches	Temperature F	Precipitation inches
January	25.5	5.19 (23.2)[2]	22.3	5.75 (22.2)	23.0	5.19 (27.8)
February	25.1	4.05 (18.6)	21.8	4.91 (21.4)	23.0	4.20 (23.5)
March	32.0	3.44 (11.4)	28.8	4.81 (16.2)	30.3	3.23 (15.7)
April	41.6	2.90 (2.4)	39.6	3.84 (5.2)	41.4	3.10 (4.7)
May	51.4	3.04	50.6	3.57 (0.2)	52.0	3.04 (0.1)
June	59.4	3.44	59.3	3.56	60.8	2.96
July	65.3	2.98	66.1	3.42	67.4	2.36
August	64.8	3.75	64.6	4.03	65.9	3.83
September	58.3	3.81	57.3	4.23	58.3	2.87
October	49.6	3.77	47.2	4.27 (0.4)	48.2	3.06 (0.5)
November	40.6	4.81 (3.2)	37.6	5.45 (4.5)	39.1	4.56 (5.7)
December	29.8	4.43 (17.0)	26.4	5.38 (18.7)	27.5	4.90 (20.5)
Year	45.3	45.61 (75.8)	43.5	53.22 (88.8)	44.8	43.30 (98.5)

[1]From data sheets of the Meteorological Branch, Can. Dep. Transport, Toronto, 1964 and 1965.
[2]Snowfall in parentheses and included in total precipitation figures; 10 inches of snow equivalent to 1 inch of rain.

An estimate of the amount of moisture available to plants may be made from temperature and precipitation data (18). This estimate assumes that an average soil is capable of storing 4 inches of water. In Annapolis County, rainfall exceeds evapotranspiration in the fall, winter, and spring and a surplus results. The surplus water saturates the soil and the excess moves into drainage waters. This process results in the gradual leaching of nutrients and water-soluble constituents from the soil. In the summer, evaporation and utilization by plants of stored moisture proceed at a fast rate and a deficiency may result.

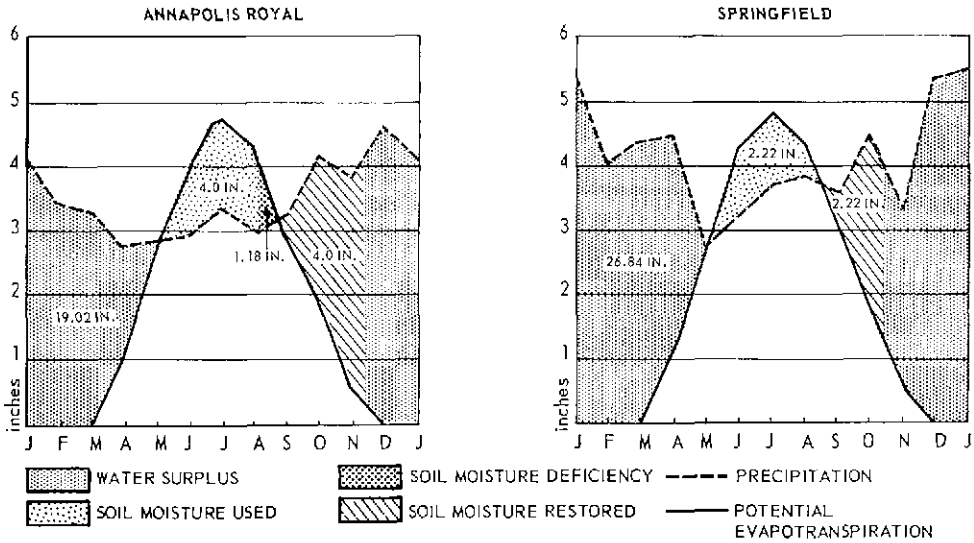

Fig. 2. Monthly variation in precipitation and soil moisture.

The graphs in Fig. 2 show that in an average year at Springfield 2.22 inches of the 4 inches of water stored in the soil are removed by late August. At Annapolis Royal, a 0.07-inch deficit occurs during August. These water losses are accelerated by windy and warmer than average weather, and may be severe on coarse-textured soils that have a low moisture-holding capacity. Undoubtedly such conditions frequently lead to significant summer moisture deficiencies over much of the County.

The July mean temperatures (Table 1) are 65 F at Annapolis Royal and 66 F at Springfield; the January means are 25 F and 22 F. Figures for total degree-days above 42 F are 2,800 to 3,000 on the floor of the valley, and 2,600 to 2,750 over the remainder of the County.

Table 2 shows the occurrence of the latest spring frost, the earliest fall frost, and the average frost-free period. There is a remarkable shortening of the frost-free period from Annapolis Royal with 139 days, to Middleton, 35 miles up the valley, with 93 days. This is owing to the remoteness of Middleton from temperate marine influences and the frequency of temperature inversions whereby cool night air collects in the valley bottom.

In Table 3 the information on frost for Annapolis Royal is expanded to show the probability of the occurrence of freezing temperatures after certain dates in the spring and before certain dates in the fall.

Table 2. Average and Extreme Dates of Frost and Length of Frost-free Period at Stations Representative of the County[1]

Station	Elevation ft	Observation period yr	Last frost in spring			Average frost-free period, days	First frost in fall		
			Earliest	Average	Latest		Earliest	Average	Latest
Annapolis Royal	10	35	Apr. 29	May 20	July 2	139	Sept. 9	Oct. 6	Nov. 7
Bridgetown	20	7	Apr. 28	May 31	June 16	119	Aug. 29	Sept. 27	Oct. 16
Middleton	70	16	May 22	June 8	June 25	93	July 17	Sept. 9	Oct. 11
Springfield	549	28	Apr. 25	May 15	June 3	140	Sept. 14	Oct. 2	Oct. 17
Greenwood	80	8	May 16	May 27	June 5	114	Sept. 12	Sept. 18	Sept. 24

[1]From climatic summaries of the Meteorological Branch, Can. Dep. Transport, Toronto, 1956.

Table 3. Probability of Frost Occurrence at Annapolis Royal[1]

Probability of last spring frost occurring on or after dates indicated				Probability of first fall frost occurring on or before dates indicated			
3 yr in 4	1 in 2	1 in 4	1 in 10	1 in 10	1 in 4	1 in 2	3 in 4
May 10	May 20	May 31	June 9	Sept. 20	Sept. 28	Oct. 6	Oct. 15

[1]From climatic summaries of the Meteorological Branch, Can. Dep. Transport, Toronto, 1956.

All the frost data are based on readings at the standard height of 4 ft. These readings are known to be as much as 5 F higher than those at ground level under certain conditions, such as in still dry air on clear nights.

Topography and Drainage

There are three main topographic regions in the County: the North Mountain, the Annapolis Valley, and the South Mountain and its hinterland.

The North Mountain is a basalt cuesta 3 to 5 miles wide and extending the length of the County. It has a steep south-facing escarpment backed by a gently undulating plateau, which merges into the moderately inclined dip slope to the Fundy coast. The plateau is partly composed of shallow elongated depressions etched out of less resistant lava flows and is drained by many short streams flowing into the Bay of Fundy. The average elevation is 600 ft, rising to 850 ft at the highest points of the escarpment.

The escarpment is breached at intervals of several miles by the ravines of small tributary streams of the Annapolis River. From its base, a pedimentlike footslope grades into the valley floor, which in places is divided by a low swell along the center of the valley.

The valley floor is a complex of shallow lacustrine basins, sandy outwash plains, and gently sloping terrace remnants, mostly lying 20 to 50 ft above the present level of both the river and the fluviomarine alluvial flats fringing the Annapolis Basin. Undulating glacial drift deposits intermingle with the above features and provide the strongest relief on the valley floor.

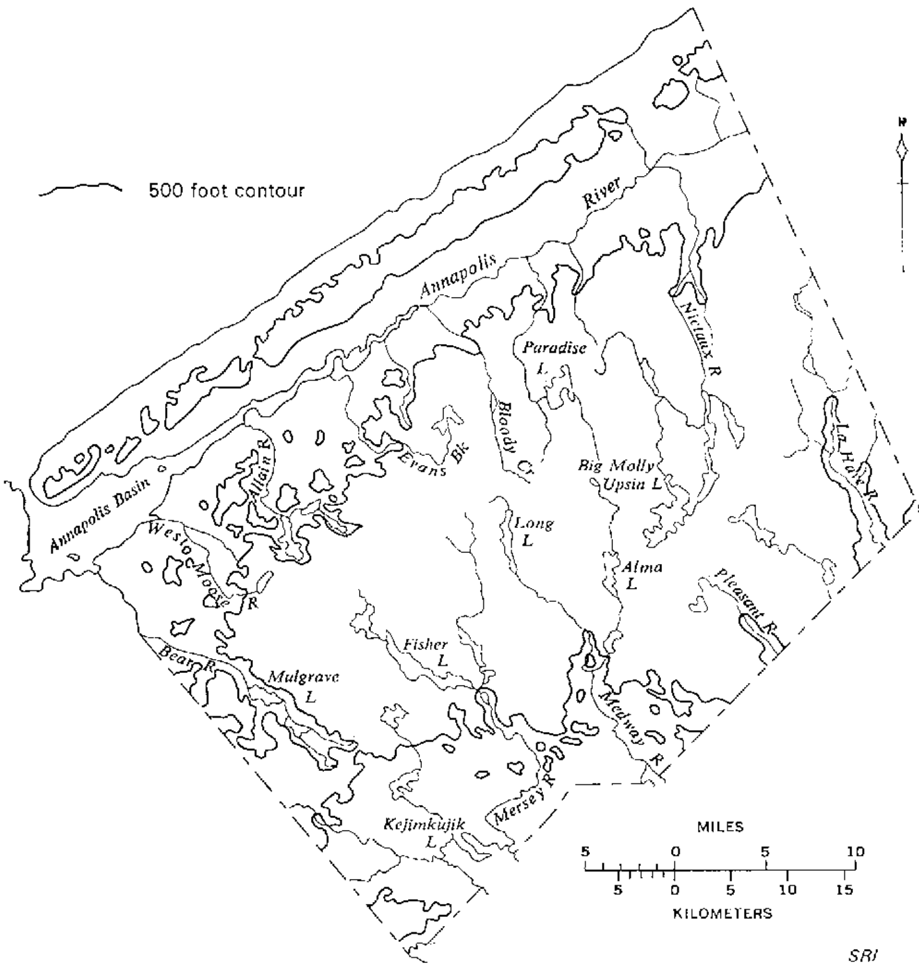

Fig. 3. Relief and drainage.

The Annapolis Valley is 6 miles wide at the eastern boundary of the County, narrowing gradually to less than 3 miles at Annapolis Royal. The Annapolis River drains a catchment basin that extends over half of the County, and also part of neighboring Kings County. The river was affected by the 30-ft tides of the Annapolis Basin as far upstream as Paradise, until the upper basin was cut off by the construction of the tidal dam at Annapolis Royal.

The slopes of the South Mountain are more dissected than those of the North Mountain, so that the rise to the summit level is more irregular and gradual; nevertheless, many of the valleys have very steep sides. The higher elevations of over 700 ft are fairly concordant with the North Mountain and together they form part of the Atlantic peneplain surface uplifted in Triassic times. The rolling topography of the inland part of the County is increasingly dominated towards the south by drumlins. Surface drainage is somewhat indeterminate except where streams escape to the Annapolis Valley, and there are innumerable lakes and boggy depressions. Beyond a tortuous and ill-defined divide, streams flow south to the Atlantic Ocean.

Falls in relative sea level have exposed a series of abandoned shorelines and raised beaches. A 200-ft bench on the footslope of the North Mountain is almost continuous from Victoria Beach to Granville Ferry and is a very conspicuous feature of the landscape. It occurs across the Annapolis Basin at Clementsport and is thought to be a raised beach (17). Others have been observed and plotted at various heights up to 100 ft above sea level on the coasts of both the basin and the Bay of Fundy.

Geology

The bedrock geology of the County comprises the inclined basalt flows of the North Mountain; the Triassic sandstones, conglomerates, and shales in which was excavated the Annapolis Valley; and remnants of the Paleozoic Meguma Anticline, which fringe the great granite batholith of the Southern Upland (Fig. 4).

The basalt trap occurs as both massive columnar-jointed flows and less-resistant amygdaloidal flows, which have a dip of 4° to 10° towards the north. The amygdaloidal flows are rich in zeolites and the upper flows contain up to 20% iron oxides, including some magnetite. There are approximately 66 flows, altogether 575 ft thick.

The basalt rests on the Triassic Annapolis Group, which consists of red quartzitic sandstones and conglomerate cemented by calcite and hematite. There are also some shales and siltstones in which the main clay mineral is illite.

The Triassic beds abut the granite batholith on the south side of the valley. However, remnants of the old Meguma Anticline into which the granite intruded, occur in the form of Ordovician slates in the eastern and western extremities of the County. In the east these are overlain in places by Silurian and Devonian interbedded slates and quartzite. The Meguma beds reappear over the granite in the southern part of the County. The slates are micaceous, strongly laminated, and frequently found interbedded with quartzite.

The granite is thought to have been intruded in Devonian times. It is coarse, porphyritic, and weathers slowly to a coarse sandy loam.

The rock formations are almost everywhere buried beneath a blanket of glacial till, scattered glaciofluvial outwash, kames and eskers, glaciolacustrine clays, and postglacial marine and river alluviums (Fig. 5).

Glacial till is thickest on the sides and floor of the Annapolis Valley where it is at least 50 ft deep, and also along sections of the Fundy coast. Over large tracts of the North and South mountains it is reduced to a surface smear locally pierced by scoured bedrock exposures. The till was deposited by the Labrador Ice Sheet and although some of it was of distant origin, the bulk was derived from local sources.

On the North Mountain where basalt predominates, the till varies from grayish-brown and yellowish-brown sandy loam to a reddish-brown sandy clay loam in which extraneous material is prominent. This material is derived from Carboniferous rocks and originated north of the surveyed area.

The till in the Annapolis Valley occurs mainly as lobes projecting from the valley sides into the lacustrine and glaciofluvial sediments of the valley floor. It is derived from a mixture of Carboniferous and Triassic sandstones and some basalt and granite. It is reddish brown and ranges in texture from sandy loam to sandy clay loam. Locally it shows some evidence of stratification.

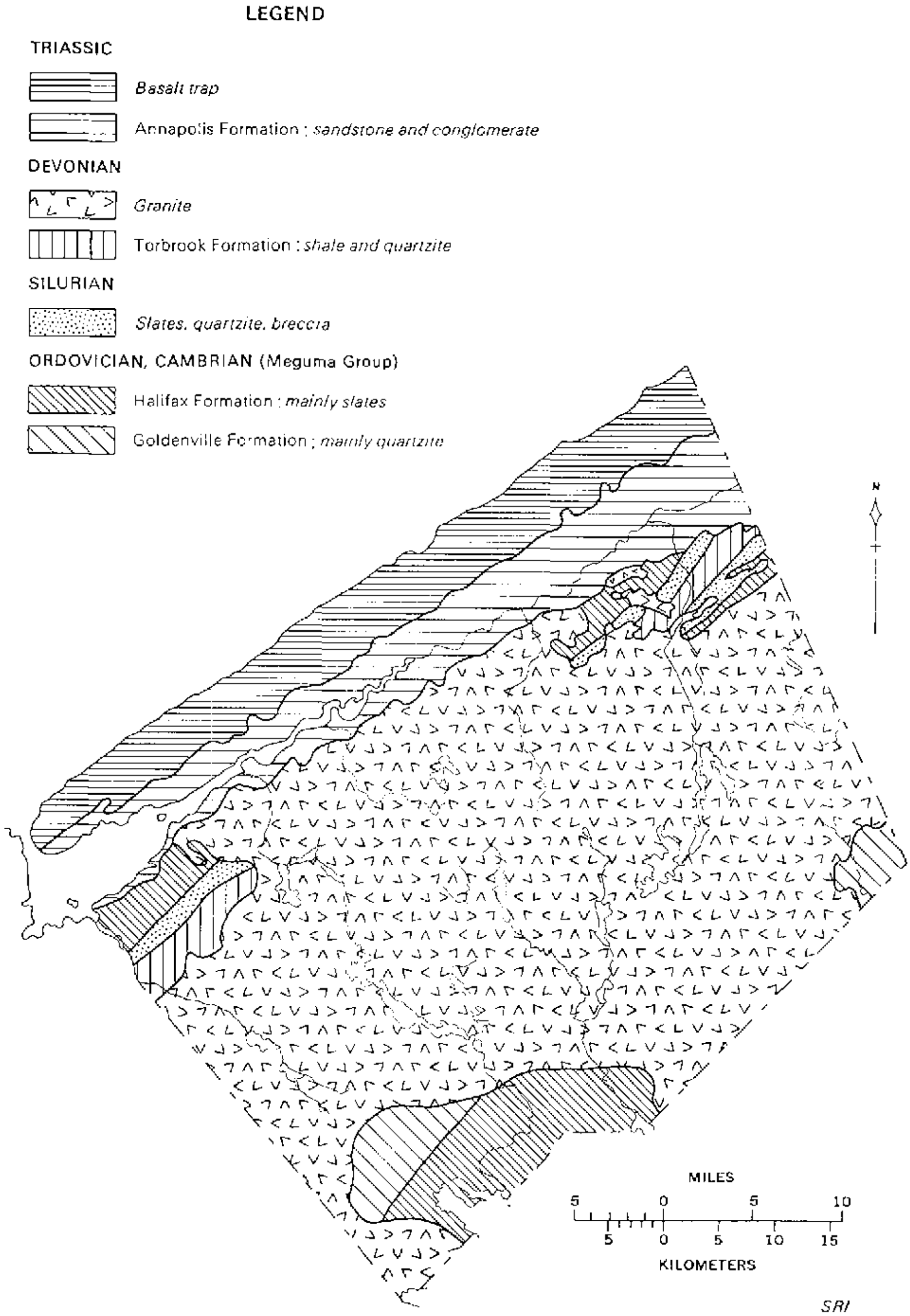

Fig. 4. Geological formations.

Table 4. Geological Formations in the Surveyed Area[1]

Era	Period	Formation	Lithology
Cenozoic	Quaternary	Recent	Peat, stream alluvium
		Pleistocene	Glacial till, kames, kame terraces, eskers, outwash
		Unconformity	
Mesozoic	Triassic	North Mountain basalt	Massive and amygdaloidal basalt
		Annapolis Group (Wolfville and Blomidon formations)	Red sandstones and conglomerate, with calcareous and hematitic cement, shales, and siltstones
		Angular Unconformity	
Paleozoic	Devonian	South Mountain batholith	Porphyritic granite
		Intrusive Contact	
	Devonian	Torbrook	Fossiliferous shale, slates, and quartzite; ironstone
	Silurian	New Canaan	Marine breccia and siltstone
		Kentville	Slate and siltstone
		White Rock	Quartzite with slate interbeds
		Disconformity	
	Ordovician	Halifax	Slate and quartzite
	Cambrian	Goldenville	Quartzite and slate

[1]Compiled from information from Department of Geology, Acadia University, Wolfville, N.S. (*see* Bibliography).

On the south side of the valley, the till contains more granite, but retains a reddish-brown color and sandy loam texture. It extends up the South Mountain and forms drumlins across the granitic southern half of the County. Here, however, the dominant till is of granite origin. It is a stony pale yellowish brown coarse sandy or gravelly loam, frequently shallow over bedrock.

In the southern part of the County the till derived from slates is medium textured and olive brown to yellowish brown. It is moderately stony and shallow except where it forms drumlins.

Over a large part of the southern upland, drumlins up to 200 ft high and 0.75 mile long occur. They are oval shaped and orientated northwest to southeast along the direction of the ice flow. They generally consist of stony till with a sandy loam to sandy clay loam texture.

The glaciofluvial deposits scattered across the County include eskers, kames, outwash, and lacustrine clays. Eskers, which are englacial stream deposits of gravel and sand, occur sporadically across the granitic interior, where they form narrow steep-sided ridges following tortuous courses for several hundred yards up to 2 miles. A related feature are kames, which may be attached to eskers but in this area are often separate. They are most abundant along the south slopes of the Annapolis Valley where they have coalesced to form kame terraces; the best examples of these are at Nictaux and Torbrook. Kames flanking the valley have been strongly dissected by contemporary streams.

Fig. 5. Parent materials of Annapolis County soils according to texture.

Kames merge into the broader and smoother outwash plains, which occupy large areas of the valley floor in the eastern part of the County. These plains consist of fairly uniform, medium and coarse stratified sand of mixed origin. In contrast, the kames and eskers consist mainly of slate and granite.

The fine-textured glaciolacustrine sediments vary little from place to place. They underlie the outwash sands at several locations in the valley. Isolated patches around the Annapolis Basin bear the same relation to gravels. They consist of laminated clay loams and silty clay loams and represent the bottom sediments of former glacial lakes; in several locations they are conspicuously varved.

Recent deposits are largely confined to the valley area and comprise strips of stream alluvium of variable texture, and also the considerable areas of marine alluvium fringing the Annapolis Basin. Much of the marine alluvium was reclaimed from salt marsh in early days by means of earth dykes, and it thus constituted some of the first land farmed in the County.

Vegetation

The natural vegetation of the County is forest composed of softwoods and mixed softwoods and hardwoods. The indigenous forest communities have been greatly modified by direct and indirect influences of man; in the Annapolis Valley very little undisturbed forest remains.

Forest covers 653,512 acres or 78% of the County and 625,678 acres are classed as productive forest (Table 9). About 61% of the productive forest consists of softwood stands, 37% of mixed softwoods and hardwoods, and less than 2% of hardwoods (8). Red spruce, *Picea rubens*, and balsam fir, *Abies balsamea*, together comprise half the softwoods, followed by white pine, *Pinus Strobus*, white spruce, *Picea glauca*, hemlock, *Tsuga canadensis*, and black spruce, *Picea mariana*. There are also small numbers of red pine, *Pinus resinosa*, and tamarack, *Larix laricina*.

Among the hardwoods, red maple, *Acer rubrum*, is dominant, and is third in stand volume after red spruce and balsam fir. Other common hardwoods are white birch, *Betula papyrifera*, red oak, *Quercus rubra*, aspen, *Populus tremuloides*, poplar, *Populus grandidentata*, yellow birch, *Betula alleghaniensis*, beech, *Fagus grandifolia*, sugar maple, *Acer saccharum*, alder, *Alnus rugosa*, and wire birch, *Betula populifolia*. There are a few white ash, *Fraxinus americana*.

In the forest classification scheme of Loucks (12) the bulk of the County is in the Red Spruce – Hemlock – Pine Zone. However, the North Mountain comes within the Spruce–Fir Coast Zone and the extreme south of the County falls within the Sugar Maple – Hemlock – Pine Zone. Boundaries between these zones are poorly defined.

The area of the Red Spruce – Hemlock – Pine Association is thought to have supported more hardwoods, in particular sugar maple and beech, before the advent of lumbering. The climate suits tolerant hardwoods, but the precipitation is just high enough to give spruces and hemlock the advantage. Today sugar maple and beech are restricted mainly to drier slopes and exposed ridges.

Red spruce and hemlock thrive best on soils that are well drained or moderately well drained, but in the Southern Upland hemlock competes well with other species in wetter areas. The red spruce is partly replaced by white spruce in the Annapolis Valley. Both red spruce and hemlock have been depleted by lumbering. White pine is dominant on glaciofluvial sands, and together with some red pine, forms extensive mature second-growth stands on the valley floor. These soils also support poplar, wire birch, white birch, and a ground flora of crowberry, *Corema Conradii*, hudsonia, *Hudsonia ericoides*, bearberry, *Arctostaphylos Uva-ursi*, and sweetfern, *Comptonia peregrina*, in areas that have been cut over.

Balsam fir, black spruce, and tamarack are dominant on poorly drained soils. Balsam fir, however, tolerates a variety of habitats owing to its ability to grow in the shade of other species, but its susceptibility to rot has been a limiting factor in this area. Imperfectly drained soils in the Annapolis Valley support white spruce, tamarack, balsam fir, and red maple, with some white birch, poplar, and hemlock.

White spruce is an active colonizer of abandoned farmland, except where wetter conditions favor alder and black spruce. On fire barrens, wire birch, red maple, red oak, and white birch succeed the initial heath species, such as blueberry, *Vaccinium* spp., pin cherry, *Prunus pennsylvanica*, witherod, *Viburnum cassinoides*, bracken, *Pteridium aquilinum*, sheep laurel, *Kalmia angustifolia*, and sweet fern. Wire birch is always the first tree to be established on dry sandy areas, but it is usually shaded out by other species before reaching maturity.

The North Mountain is in the Fundy Bay Ecoregion of the Spruce–Fir Coast Zone (12), which is characterized by late springs and a high incidence of fogs and strong winds. The basalt rock supplies the vegetation with a relatively rich source of nutrients. Under these conditions the undisturbed forest is a stable association of red spruce, balsam fir, and red maple, with scattered white spruce, white and yellow birch, and hemlock. Beech and sugar maple are found on dry slopes at higher elevations; sugar maple in particular is thought to have been much more extensive prior to forest exploitation. Mountain ash is a common but scattered species.

In the Sugar Maple – Hemlock – Pine Zone in the southern part of the County, the sugar maple is associated with beech and oak on well-drained drumlin slopes and with white pine on well-drained footslopes and valley floors. Moist sites support red spruce and hemlock, with some black cherry, *Prunus serotina*.

Peat bogs throughout the County are covered with sphagnum and other mosses, labrador tea, *Ledum groenlandicum*, sheep laurel, *Kalmia angustifolia*, cotton grass, *Eriophorum angustifolium*, and pitcher plant, *Sarracenia purpurea*. Estuarine salt marsh areas support marsh grass, *Spartina pectinata*, and glasswort, *Salicornia europaea*, with sea blite, *Cakile edentula*, and sand spurrey, *Spergularia marina*, as initial colonizers.

History of Development

Annapolis County was one of the first areas of European settlement on the continent of North America. The stockade at Port Royal (The Habitation) and then the permanent settlement at Annapolis Royal (Fort Anne) were established by the French in 1604–5. Subsequent development made use of the salt marshes fringing the Annapolis Basin, which were reclaimed by dyking and draining. Annapolis Royal alternated between French and English occupation and, after Nova Scotia was ceded to Britain in 1713, it had to withstand periodic Freuch and Indian raids for many years. It was not until 1854 that the English garrison was finally withdrawn.

The Acadian French settlers were expelled in 1755 for refusing to take an oath of loyalty to the Crown and many of their lands were given to about 400 "Planters" from Massachusetts. Agriculture in the area received a stimulus from these immigrants, and the United Empire Loyalists, who arrived between 1775 and 1783.

In the century and a half after initial settlement, small towns sprang up in the Annapolis Valley; Bridgetown in 1654, Lawrencetown in 1754, and Middleton in 1760–83. The Acadian pattern of straight narrow farm lots extending back from the river into the forested hills, which was imposed on the landscape in early years, still shows clearly on aerial photographs.

The forests of the North and South mountains were exploited from an early date for general building, shipbuilding, and fuel purposes. Shipbuilding was stimulated by a growing fishing industry and achieved considerable importance at Granville Ferry, Annapolis Royal, Bridgetown, and Clementsport, as well as in the small coves along the Fundy coast.

From early times timber was exported in quantity to Europe, the West Indies, and South America (16). Continuous intensive and unenlighteued cutting left a legacy of low-quality forest chocked with second growth in all but the most inaccessible areas. Lumbering remains a main source of income today, however, and both pulpwood and sawn timber are shipped out of Digby and Annapolis Royal.

A diversified system of agriculture had evolved by the mid-nineteenth century in the Annapolis Valley, in the Clementsport – Bear River area, and on the North Mountain dip slope. At this time the area under grain reached a maximum, from which it has declined. Many areas of the valley were suitable for livestock, and milk and beef production eventually rose to be the mainstay of farming, along with tree fruits.

From early times, fruit growing attained a prominent role in farming, with apples being the most important crop, supplemented by cherries, pears, plums, and later peaches. The first recorded planting of apple trees was at Annapolis Royal in 1633. In 1861, the apple crop amounted to 65,485 bu; this had risen to 318,159 by 1881, and 780,360 bu in 1931. With the present production of about half this figure, Annapolis County ranks second in the province as a producer of apples, and tree fruits generally.

Present-day farming is mainly concerned with dairy products, stock rearing, poultry, tree fruits, some specialized canning crops of vegetables, and small fruits. At present, it is a depressed industry, having suffered great decline from its peak of prosperity in the last century. Although the apple output has been maintained, the acreage in orchards has continually declined. Beef production is negligible. Any canning crop potential has hardly been tapped. Progressive farming is in the hands of a few operators, and the rest engage in near-subsistence farming.

Early industrial enterprises included small-scale iron mining and associated smelting at Nictaux and Clementsport, but these were short-lived. Saw mills, grist mills, and carding mills, which were active in the eighteenth and nineteenth centuries, were the forerunners of modern small-scale rural industries in Bridgetown, Middleton, Lawrencetown, and Annapolis Royal.

Fishing along the coastline of the County has always occupied a fairly large percentage of the population, either on a full-time or part-time basis. Clementsport was originally the base for herring, whereas pollock, cod, salmon, lobsters, and scallops were fished from the coves on the Fundy Coast.

The Annapolis River Tidal Dam was completed in 1960. Formerly the estuary had been tidal as far as the village of Paradise, but the causeway at Annapolis Royal now holds the water in the upper Annapolis Basin at nearly constant level thereby eliminating the need for miles of running dykes formerly required to protect the 5,000 acres of former marshland from salt water flooding.

Population, Industry, and Communications

The population of Annapolis County in 1961 was 22,649, reflecting only a small increase since 1881 when it was 20,598 (Fig. 6). The chief population centers are Middleton (1,921), Bridgetown (1,043), Annapolis Royal (800), and Cornwallis Naval Base. Smaller communities include the villages of Lawrencetown, Wilmot, Paradise, Nictaux, Clementsport, and Bear River.

From the area's traditional occupations of farming and lumbering have arisen rural industries offering a wider choice of employment. These light industries include a fruit-processing plant and a distillery at Bridgetown, a creamery, a fruit-packing plant, and a factory for the manufacture of apple barrels at Middleton, and a large sawmill and a milk pasteurization plant at Annapolis Royal. Near Bridgetown a modern plant produces elastic products, and there is a granite works at Nictaux West.

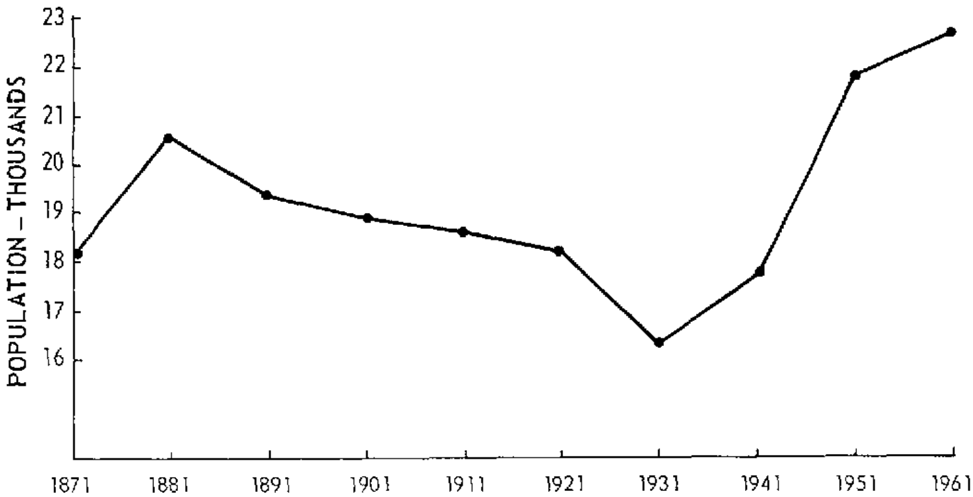

Fig. 6. Population of Annapolis County, 1871–1961.

Annapolis Royal is the county seat and shares with Middleton and Bridgetown the functions of retail distribution and community services for the County. Middleton is the only growth center; its population has more than doubled in the past 40 years, whereas other settlements have remained static or declined. However, unlike neighboring Digby and Kings counties, Annapolis County lacks a commercial focal center and the population looks outside the County for its main needs.

The naval training establishment of H.M.C.S. Cornwallis, established during the Second World War, provides some employment in the County.

The tourist industry is of some importance, nurtured by considerable scenic charm, opportunities for fishing, and historic sites. A National Park at Kejimkujik in the interior is an important tourist attraction.

The basic road network (Fig. 7) consists of the main paved highway, Route 1, along the Annapolis Valley, with two paved lateral links to the Atlantic Coast—Route 8 from Annapolis Royal to Liverpool and Route 10 from Middleton to Bridgewater. There are few secondary roads in the interior, but the Annapolis Valley is well endowed with both paved and good earth roads. Dense networks of country roads exist in the northeast around Middleton and lesser ones elsewhere in the valley and around Bear River. The Fundy Trail, serving the thinly populated Fundy Coast, is linked by many short spurs to Route 1 on the valley floor.

The railway was completed between Annapolis Royal and Halifax in 1869. The County is now served by the CPR, which follows Route 1, and the CNR which duplicates a part of the CPR in the valley and traverses the interior from Middleton to Bridgewater. The rail and road pattern confirms Middleton's position as the nearest approach to a focal center.

Annapolis Royal accommodates small to medium-sized vessels at its wharf, mainly for the loading of timber and pulpwood. Dangerous currents in the narrows have been curbed by the construction of the causeway, which might allow Annapolis Royal to take advantage of overcrowding in the scallop boat and ferry harbor of neighboring Digby.

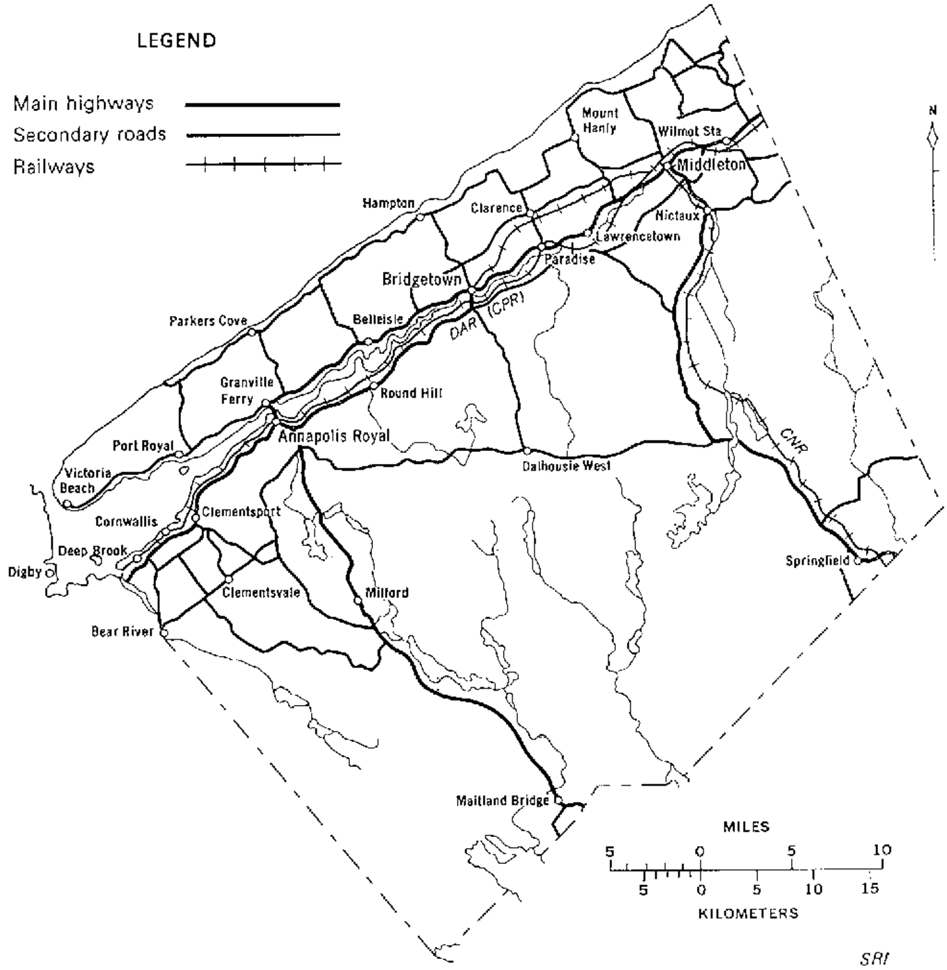

Fig. 7. Principal towns and communications.

SOIL DEVELOPMENT, CLASSIFICATION, AND MAPPING

The Factors of Soil Formation

Soils and variations between soils are produced by the interaction and variations between five main factors of soil formation: climate, living organisms (including vegetation), topography, parent materials, and time. Some of these topics have been discussed previously, but what follows relates their effect on soils.

Climate and microorganisms act on rocks and parent materials to produce soils. The chemical reactions involved are more rapid with higher temperatures, but depend on the availability of moisture to bring elements into solution. Rainfall and its excess over evaporation are important in determining how rapidly the products of weathering, including plant nutrients, are leached out of the soil. The climate of Annapolis County favors rapid leaching but slow replacement by weathering.

The climate of the County is also partly responsible for an accumulation in the soil of organic matter, which is slow to decompose at the low temperatures common for much of the year. Many other climatic effects on soil are exerted indirectly through vegetation.

Plant nutrients brought from depths in the soil by the vegetation enrich the surface through the accumulation of litter and this partly counteracts the downward removal of nutrients by water. However, the nature of the litter is all important, because this governs the leaching ability of percolating water. Both the litter and the live canopy of vegetation aid soil development by protecting the surface from erosion.

Organic matter in the soil provides the substrate for microorganisms, which play a vital role in the breakdown and synthesis of readily available plant nutrients. Organic matter thoroughly incorporated with mineral soil by earthworms results in good structure and the ideal combination of good moisture storage and rapid drainage of surplus water. Such conditions are approached under grasses and some deciduous trees.

Coniferous trees, on the other hand, drop a litter that is largely unpalatable to microorganisms and consequently decomposes slowly. Organic matter then accumulates as a dark surface layer of unincorporated mor. Infiltrating water is rendered acid and efficient in leaching out nutrients. This condition is dominant in Annapolis County and the rest of the province.

The influence of the topographic factor is threefold. The higher elevations usually receive more rainfall and hence the greater leaching of upland soils. Aspect affects biological activity and the rate of weathering in soil. But more important than these is the effect of slope on the movement of water.

Water tends to collect on level areas and is shed by slopes. This leads to either gleying or intense leaching depending on the permeability of the soil and the level of groundwater. On slopes, even permeable soils tend to be less mature because a proportion of the rainfall is lost as surface runoff. Such water is not available for leaching and can also erode surface soil, thus keeping the soil immature and often shallow.

Parent material determines the texture and mineral content of the soil. Therefore it partly determines soil fertility, internal drainage conditions, and color. Both physical and chemical weathering change rocks into unconsolidated parent material and then into its constituent particles. With time, further alteration of minerals and the formation of secondary clay minerals rely increasingly on chemical processes. These processes proceed more rapidly in parent materials containing high proportions of less resistant minerals, such as the ferromagnesian minerals; where resistant varieties such as quartz and orthoclase felspar are dominant, the soil usually has a coarse texture. In all soils, much depends on whether the valuable decomposition products remain in the soil or are removed in drainage water.

The rate of weathering is highly variable and thus the formation of soil depends on a fifth factor, time. Given time, even resistant minerals are broken down and the soil may develop to great depth. Soils in the surveyed area have developed over the relatively short span of 10,000 years, since the close of the last Ice Age. Much of the initial weathering from rock to unconsolidated material was achieved rapidly by glacial action, or by extended preglacial and interglacial weathering under favorable warm humid conditions, and on the whole, soils in the County are fairly mature.

The most immature soils are those forming on recent freshwater and marine alluvial deposits. These have periodically received fresh material from flooding and all remain at a young stage of development.

Fig. 8. A typical profile of a virgin Podzol—Nictaux sandy loam.

Soil Development in the Surveyed Area

The cool humid climate of the region interacting with the other soil forming factors has produced changes in the soil mantle, which can be observed in a vertical section or soil profile. The soil profile exhibits layers, or horizons, that differ from each other in thickness, texture, structure, consistence, or color. These are the result of additions, losses, transformations, or translocations brought about by the interaction of the soil forming factors as they reflect the operation of a particular kind of process. The upper part of the profile from which substances have been leached or removed is called the A horizon. The lower part in which some of the substances removed from the A horizon have accumulated is called the B horizon. Relatively unweathered underlying material, similar to that from which the A and B horizons developed, is called the C horizon. Each of these horizons may have subhorizons with differing characteristics. These are denoted by adding an appropriate subscript to the designation of the master horizon, e.g., A_e denotes a strongly eluviated part of the A horizon. The characteristic features of the horizons are the basis for classifying soils. Criteria used are the number and sequence of horizons and their thickness, color, texture, structure, consistence, and mineral and chemical compositions.

In the field, soils do not have sharp boundaries, but grade into others with different properties. Soil is a three-dimensional continuum and the features of each horizon vary hoth laterally and vertically. It is therefore necessary to choose arbitrarily the range of features for each soil named.

Under given climatic conditious and with similar drainage and aeration, soils over broad areas develop some characteristics in common, regardless of parent material differences. In Annapolis County most of the well-drained soils are members of the Humo-Ferric Podzol great group. The profile of a typical undisturbed Humo-Ferric Podzol soil (Fig. 8) in the County is described as follows:

Horizon	*Depth inches*	
L–F–H	4 – 0	Brown semidecomposed fibrous litter, H layer very thin and discontinuous.
Ae	0 – 4	Light-gray (10YR 7/2) sandy loam; weak, granular; porous; loose; abrupt boundary; pH 4.2.
Bfhl	4 – 9	Strong-brown (7.5YR 5/8) sandy loam; weak, granular; porous; very friable; gradual boundary; pH 4.6.
Bfh2	9 – 24	Yellowish-red (5YR 4/6) sandy loam; structureless to weak, granular; porous; gradual boundary; pH 4.9.
C	24 +	Coarse stratified sand and gravel; porous; friable.

In some of the well-drained soils of the County, such as those on the North Mountain, the B horizon is darker than normal in the upper part and possesses a higher content of organic matter. These soils are Ferro-Humic Podzols or Dystric Brunisols where evidence of eluviation is indistinct or lacking.

Some of the soils developed on finer textured parent materials have well developed Ae horizons and illuvial B horizons in which silicate clay is the main accumulation product, and which meet the requirements of a Bt horizon as defined. They lack sufficient accumulations of sesquioxides and organic matter to form a Podzol B. These soils are members of the Gray Wooded (Gray Luvisol) great soil group.

Wherever drainage is restricted by the topography or impermeable layers in the soil or parent material, the soils remaiu moist for considerable periods and develop duller colors than their well-drained counterparts. Where drainage is only moderately slow, the horizons are usually distinct, but have yellowish-brown, reddish-brown, or gray mottles; these mottles are more prominent as drainage becomes poorer. The soils that still have the characteristic horizons of Podzols, but are mottled, are called Gleyed Podzols.

Where water remains in the soil for a large part of the year, aeration is very poor and gleying becomes the dominant soil process. Horizons are less distinct and have colors of low chroma. Mottling is usually prominent, but may be lacking in some horizons that are permanently waterlogged. These soils are called Gleysols. The profile of a typical undisturbed Eluviated Gleysol (Fig. 9) is described as follows:

Horizon	*Depth inches*	
L-F-H	2 – 0	Mainly F layer of dark grayish brown semidecomposed organic matter; thin H layer of greasy mor.
Ahe	0 – 1	Very dark gray (10YR 3/1) sandy loam; high in organic matter; strong, granular; friable; abrupt boundary; pH 4.3.
Aeg	1 – 5	Gray to grayish-brown (10YR 5/1–5/2) fine sandy loam or loam; weak, granular; friable; abrupt boundary; pH 4.3.
Btg	5 – 9	Reddish-brown (2.5YR 4/4) clay loam; many coarse, prominent yellowish-brown (10YR 5/6) mottles; massive, but with some prominent sandy grayish-brown (10YR 5/2) fracture faces; hard; dense; plastic; slowly permeable; pH 4.5.
BC	9 – 27+	Reddish-brown (2.5YR 4/4) clay loam; massive, with some sandy fracture faces to 18 inches, firm and plastic; very slowly permeable; pH 5.0.

The sediments along streams and fringing the Annapolis Basin periodically receive fresh sediments during flooding and have not been in place long enough to develop horizons. The soils formed on these sediments are called Regosols.

Numerous wet depressions in the County, some of them the sites of former lakes, contain accumulations of organic material. Most of these organic soils lack horizons such as those found in mineral soils, but often display successive layers of moss and sedges in various stages of decomposition. In places, there may be a little admixture of mineral soil. These soils are collectively classed as Peat.

Soil Classification

Each of the great soil groups described above has a distinctive kind of profile, as a result of a particular kind of pedogenic environment. Within these groups there are local variations in the kind of horizon development, in soil texture, color, consistence, and in parent material. For this reason, it is convenient to divide the great groups into subgroups based on some characteristic such as the kind of development of the B horizon.

The subgroups are divided into soil series, the basic units used in mapping. The soils in each series have developed from the same kind of parent material, and possess the same drainage and horizon characteristics, except for texture of the surface layer.

The soil series in the County are arranged in Table 5 to show their principal relationships. The main differences in the soils are associated with differences in the texture and composition of the parent materials. The soil series in each horizontal

Fig. 9. A typical profile of a virgin Gleysol.

row in Table 5 have developed from the same kind of parent material, but differ in degree of drainage. In any vertical column (i.e., drainage class), soils with parent materials of similar texture within any subgroup (in italics) have similar physical features and usually similar management requirements. Such soils can be grouped into families, units which reflect common soil properties important to plant growth. There may be several families in one textural class if some soils within the class require different management practices to others.

Table 5. Classification of the Soils

Parent material	Rapidly drained	Well drained	Imperfectly drained	Poorly drained
	Orthic Ferro-Humic Podzols		*Gleyed Ferro-Humic Podzols*	*Undifferentiated Gleysols and Gleyed Podzols*
Dark yellowish brown sandy loam till		Rossway	Roxville	Tiddville
	Orthic Humo-Ferric Podzols		*Gleyed Humo-Ferric Podzols*	
Reddish-brown sandy clay loam till		Wolfville	Hantsport	
Reddish-brown loam to sandy clay loam till			Kentville	
Olive-gray to olive-brown shaly loam till		Bridgewater	Riverport	Middlewood
Reddish-brown sandy loam to loam till		Morristown		
Dark-red sandy loam to loamy sand till		Berwick	Debert	
Dark-red sand over reddish-brown clay		Avonport		
Dark reddish brown sandy loam to loam till		Glenmont		
Reddish-brown sandy loam till		Bridgetown	Annapolis	
Grayish-brown stony sandy loam till		Halifax	Danesville	Aspotogan
Reddish-brown sand outwash	Cornwallis		Kingsport	Millar
Red loamy fine sand outwash	Canning			
Brown gravelly or shaly outwash	Torbrook			
Brown gravelly outwash derived from basalt	Gulliver			
Pale-brown coarse sandy loam till		Gibraltar (ortstein)	Bayswater (ortstein)	Aspotogan
Yellowish-brown coarse sand and gravel	Nictaux (ortstein)			
			Gray Wooded (Gray Luvisols)	*Eluviated Gleysols*
Dark reddish brown clay loam till			Middleton	Kingsville
Dark-red silty clay loam lacustrine deposits			Fash	Lawrencetown
Reddish-brown silty loam alluvium			Acadia	
	Orthic Regosol		*Gleyed Regosol*	*Rego Gleysol*
Reddish-brown sandy loam alluvium	Cumberland		Bridgeville	Chaswood
Reddish-brown silty loam alluvium				Acadia
Organic soils				*Organic soil*
Semidecomposed organic material				Peat

Mapping Procedure

Differences in parent material, texture, structure, color, and consistence were used to separate the soils into soil series. Boundaries between series were determined by the examination of soil profiles in many locations. Profiles were examined within walking distance from roads, trails, and in pits dug in forested areas and fields, and in roadside exposures.

The boundaries were plotted on aerial photographs at a scale of 4 inches to 1 mile. Differences in stoniness and slope were recorded for each series in order to delineate soil phases within the series. Note was taken of the vegetation, crops, agricultural practices, and the suitability of the soils for various uses. Samples of the more important soils were collected for physical and chemical analyses.

DESCRIPTIONS OF THE SOILS

In the descriptions the soil color is followed by a set of symbols that designate the color in the Munsell system.[1] Unless otherwise stated, colors refer to soil in the moist condition. Dry soil color is designated as d.

This section gives information on the classification, locations, profiles, surface features, and agricultural uses of the soils. Acreage figures for soil phases are given in Table 20, as well as the percentage of cleared land in each phase. The soils are rated for agriculture on page 00.

The various soil series are described in detail. Because of the scale of mapping, any area outlined on the map as a soil series may include up to 15% of the soils of adjacent or other series. Usually the pockets of soil not separated or delineated are small. The profile described for each series is a cross section through one phase of the series at one point. Hence, it cannot show the range in characteristics of the series as a whole. However, an average profile of the series was selected and the range of characteristics is discussed in the text.

The soils developed from glacial till occupy 84% of the land area of the County. Over 90% of these soils are well drained, the rest are imperfectly or poorly drained. The other mineral soils have developed from glaciofluvial materials (5.5%), recent alluvium (1.0%), and lacustrine deposits (3.5%). Peat and rocky land occupy the rest of the land area. Most of the soils developed from glaciofluvial materials are well or excessively drained, but most of those on alluvial or lacustrine materials have imperfect or poor drainage.

Soils Developed from Moderately Fine Textured Parent Materials

These soils occupy less than 10% of the land area of the County. The moderately well drained series, Wolfville and Middleton, comprise 75% of this area; the imperfectly drained series, Fash, Acadia, and Hantsport, about 15%; and the poorly drained Kingsville and Lawrencetown the rest. About 46% of the area of these soils has been cleared.

The Wolfville, Middleton, Hantsport, and Kingsville series have developed from glacial till, the other series from water-deposited materials.

[1]Munsell Color Company Inc., Baltimore 2, Maryland, U.S.A.

Acadia Series (5,767 acres)

The Acadia soils are found along the Annapolis River and occupy less than 1% of the County. The soils consist of silt loam and silty clay loam sediments eroded by tides and redeposited as floodplains, which were dyked and drained to permit their use. They were among the first soils used by settlers and at various times in their history the dykes have been opened or have fallen into disrepair and the areas exposed to the tides. A causeway and aboideau at Granville Ferry now protects much of the Acadia soils in the County from salt water flooding and dykes are no longer necessary on the Annapolis River above this point.

The soils are nearly level to slightly depressional. They are usually lower near the uplands than along the river. Natural drainage is poor and artificial drainage, though often difficult to establish and maintain, is necessary for the best use of these soils.

The surface layers are reddish brown, the underlying layers may be reddish brown, but usually are dark gray or bluish gray. The reddish-brown and gray layers are similar mineralogically except that the reddish layers contain goethite and the gray layers do not (3). The gray layers are strongly acidic, are high in organic matter, and have considerable free iron. The gray color is probably produced by reduction of the iron oxides by anaerobic bacteria. None of these soils was ever forested. The Acadia soils are dominantly Orthic Gray Wooded (Gray Luvisols) and Regosols.

The profile of a moderately well drained cultivated soil is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Dark-brown (7.5YR 4/2) loam; medium, subangular blocky; moderately porous; good root development; some mottling; pH 4.6.
Btgj	6 – 18	Reddish-brown (5YR 4/4) silty clay loam; subangular blocky; hard; dense; moderately permeable; orange-brown mottles; many small fibrous roots; pH 4.6.
Cg2	18 +	Reddish-gray (5YR 5/2) silty clay loam; slowly permeable; laminated; moderately plastic; pH 4.6.

All Acadia soils show some mottling. In many cases the water table is near the surface and in these and more poorly drained areas mottling is more severe and nearer the surface. In very poorly drained areas, the surface may be peaty and peaty layers may occur in the solum at various depths. In some areas where these soils have been dyked for a long time, there is evidence of profile development. Thus, these soils have been classified both as Rego Gleysols and as Gray Wooded (Gray Luvisols).

Use—These soils in many cases have been used since the time of the earliest French settlers. They are more fertile than upland soils, but require applications of lime and fertilizer for best results. The establishment and maintenance of a good drainage system is a problem and this together with the frost hazard limits the use of these soils to growing hay, grain, roots, and pasture.

Drainage can only be improved by using open ditches because the subsoil is slowly permeable. Dykeland areas nearest the upland are usually the lowest and most poorly drained. Main channels that cut through these areas remove water from lateral drains in the marsh body as well as surface and seepage water from adjacent upland. Maintenance of ditches clogged by silt and coarse vegetation adds to the annual overhead cost.

The soils require careful management because of their poor structure and fine texture. They are, however, quite fertile, have good moisture-holding capacity, are free of stones, and are capable of high yields. They are used at about 50% of their capacity in Annapolis County.

Fash Series (3,636 acres)

The main areas of Fash soils are near Bridgetown and at Upper Granville. Smaller areas are at scattered points along the Annapolis River. The soils are moderately well drained and are found in association with the poorer drained Lawrencetown soils and in one or two areas in association with the Canning and Cornwallis soils.

The parent material is probably estuarine in origin and consists of silty clay loam material often varved or containing thin laminations of sand. The deposits are variable in depth, but are more than 3 ft thick. The land is level to gently undulating and surface drainage is usually adequate. The solum is mottled because internal drainage is slow. However, the soils possess good structure, which greatly improves their permeability and ease of management.

The soils are relatively free of stones. About 20% of the soil is forested; the main trees are spruce, maple, and birch. A profile of Fash soil under cultivation is described as follows:

Horizon	*Depth inches*	
Ap	0 – 4	Yellowish-brown (10YR 5/4) and light yellowish-brown (10YR 6/4 d) silty clay loam; strong, fine and medium, subangular blocky; moderately porous; clear irregular boundary.
Btg1	4 – 12	Reddish-brown (2.5YR 4/4) silty clay and silty clay loam; large distinct strong-brown (7.5YR 5/8) mottles mainly along structure faces. Strong, compound fine, angular blocky and moderate, prismatic; internal drainage moderate to good; plastic; organic matter content moderate to low; free of stones; gradual boundary to horizon below.
Btg2	12 – 20	Reddish-brown to weak-red (2.5YR 4/4–4/2) or pink (5YR 8/4 d) silty clay; many yellowish-brown (10YR 5/6) mottles; strong, fine, angular blocky and weak, prismatic; moderately permeable; plastic; free of stones; gradual boundary to horizon below.
Cgj	20 – 32+	Reddish-brown (2.5YR 4/4) silty clay loam with thin sandy depositional laminations; faint, pale-olive (5Y 6/4) streaks; moderate to weak, medium, angular blocky; slowly permeable; no roots; plastic; a few rounded pebbles.

The parent material is usually dark red (2.5YR 3/6) and there is usually less gleying than in the profile described above.

A few small areas of soils included with Fash have a fine sandy loam surface and coarser textured profiles than is usual for the series. Such areas have better drainage and physical characteristics. The soils are classified as dominantly Gray Wooded (Gray Luvisols).

Use- -The Fash soils are used chiefly for growing hay and grain, but good orchards may also be noted on these soils. About 80% of the soils have been cleared and used for agriculture. Good management will increase yields. The soils have a tendency to puddle when wet and bake when dry. However, they have good subsoil structure, and maintenance of high levels of organic matter will improve the tilth of the surface soil, which should not be cultivated when too moist. The soil is acid and both lime and fertilizer are required to maintain good yields. Free carbonates may occur in the C Horizon.

Hantsport Series (581 acres)

The Hantsport soils are imperfectly drained, cover only a small area, and are associated with the Wolfville soils. They have developed from reddish-brown sandy clay loam till on undulating topography. Internal drainage is slow and the profiles are mottled. About 75% of the soils are in forest; the main trees are spruce, fir, birch, beech, hemlock, and alder.

A profile occurring under a young stand of fir, birch, and beech is described as follows:

Horizon	*Depth inches*	
L–H	1 – 0	Semidecomposed organic mat consisting of moss, ferns, needles, and twigs.
Ah	0 – 4	Very dark brown (10YR 2/2) loam; friable; organic matter well mixed; abrupt boundary.
Aegj	4 – 6	Brown (10YR 5/3) sandy clay loam; distinct mottling; friable; moderately porous.
Btgj	6 – 17	Reddish-brown (5YR 4/3) sandy clay loam; distinct strong-brown (7.5YR 5/8) and pale-brown (10YR 6/3) mottles dominate the matrix color; strong, medium, subangular blocky; irregular, gradual boundary.
C	17 – 34+	Reddish-brown (5YR 4/3) sandy clay loam; subangular blocky; slightly plastic; moderately permeable; less mottled than the horizon above; some stone and slate fragments.

Some areas of Hantsport soils are quite shallow over bedrock and this restricts the movement of water. A few small poorly drained areas have been included in the Hantsport series. The Hantsport soils are dominantly Gleyed Humo-Ferric Podzols, but probably include some Gray Wooded (Gray Luvisols).

Use—The Hantsport soils are best suited for growing hay and grain, but most crops suited to the area may be grown. The surface soil may remain saturated for quite long periods after rains and the soils are slow to warm up in the spring. Organic matter levels are usually adequate and the stone content in the surface and profile is variable.

About 25% of the soils are farmed, and about 75% of them are considered to be potentially arable. The soils are acid and require lime and fertilizer for good yields.

Kingsville Series (2,189 acres)

The Kingsville soils occupy a small acreage in Annapolis County and occur mainly in two areas: north of Lawrencetown on the valley floor and north of East Arlington on the North Mountain.

The soils occur on gently undulating to depressional topography and have both poor surface and subsurface drainage. They have developed from reddish-brown clay loam till and are found in association with the Middleton and the Lawrencetown soils, which they closely resemble in profile characteristics. The Lawrencetown soils have developed from waterlaid sediments and the Kingsville soils have developed from clay loam till. The textures and color are very similar and in many areas the soils are difficult to separate. Both Kingsville and Lawrencetown soils are dominantly Low Humic Eluviated Gleysols with probable inclusions of Fera Gleysol.

Where forested, they support stands of spruce, fir, birch, alder, and hemlock. A profile occurring under pasture is described as follows:

Horizon	*Depth inches*	
Ap	0 – 5	Dark-gray (10YR 4/1) clay loam; weak, blocky; strongly mottled along root channels; high in organic matter; clear smooth boundary.
Aeg	5 – 9	Grayish-brown (10YR 5/2) clay loam; some sand lenses; diffuse yellow mottles; massive; wavy boundary.
Btg	9 – 17	Brown (7.5YR 4/4) sandy clay loam; common, medium, and coarse, prominent strong-brown (7.5YR 5/6) and grayish-brown (2.5Y 5/2) mottles; weak, fine, subangular blocky; hard; dense; slowly permeable; some sand pockets.
Btg2	17 – 23	Similar to the horizon above but less mottled.
C	23 +	Reddish-brown (5YR 4/3) sandy clay loam till; black manganese flecks; very slowly permeable; plastic; a few stones.

The Kingsville soils have more stone and cobbles than the Lawrencetown soils.

Use—About 35% of the Kingsville soils have been cleared. Drainage can only be improved by open ditches and when drained the soils are restricted to growing hay, grain, and pasture. There is little that can be done to improve the subsoil structure and permeability, but the addition of organic matter will improve the tilth and manageability of the surface soil. The soils are acid and infertile and require amendments each rotation for good yields.

Lawrencetown Series (6,197 acres)

Lawrencetown soils occur mainly between Lawrencetown and Middleton, north of the Annapolis River, but small areas also occur on the North Mountain. They have developed from lacustrine sediments on nearly level to depressional topography. The deposits are variable in depth and often have sand pockets deposited on the surface or in the profile. The C horizon or parent material usually has thin laminations or varves of sand between thin layers of clay. Because of the fine texture of the material and the poor structure in the solum, percolation of water is slow. Drainage is poor to very poor on depressional areas where water may stand for long periods after rains. The soils are usually free from stones. Where forested, the main trees are spruce, fir, birch, maple, poplar, alder, and elm.

A profile occurring under a mixed stand of maple, birch, beech, and spruce is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Dark-brown (10YR 3/3) loam; strong, granular; porous; high intimate organic matter; pH 4.7.
Aeg	6 – 11	Dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) loam; with prominent strong-brown and yellowish-brown mottles; strong, coarse, angular blocky peds with gray coatings; firm; pH 4.9.
Bgj	11 – 18	Dark reddish brown (2.5YR 3/4) loam; with reddish-gray (5YR 5/2) mottles and streaks; some black specks of manganese; slowly permeable; pH 6.1.
BC	18 – 22	Dark reddish brown (2.5YR 3/4–4/4) loam; weak, coarse, blocky to massive; very slowly permeable; pH 6.2.
C	22+	Dark reddish brown (2.5YR 3/4–4/4) silty clay; massive; very slowly permeable, pH 6.5.

In the very poorly drained areas this soil may be very strongly gleyed underneath, with a mucky or peaty surface.

Use—The Lawrencetown soils are restricted to a narrow range of crops and where cleared and cultivated (51%) are used chiefly for growing hay and pasture. The soils require careful management, which includes the maintenance of open ditches for drainage of surface water.

Middleton Series (28,240 acres)

The Middleton soils occur on the North Mountain between Arlington West and Upper Clarence, and on the valley floor along the base of the North Mountain from Clarence northeast into Kings County. They occupy 3.6% of the land area of the County.

The soils have developed from a dark reddish brown clay loam till. The till is usually quite deep and generally not very stony.

The soils are found on gently rolling land, but a few steep slopes occur. Surface drainage is usually good, but water moves very slowly through the massive parent material. Mottling in the profile is often pronounced, generally in the upper B horizon, and the soils are considered to be only moderately well drained.

Where forested, the main trees are spruce, fir, maple, and birch. A typical profile of a Middleton soil in a sparsely wooded area is described as follows:

Horizon	*Depth inches*	
L–H	1.5 – 0	Semidecomposed layer of moss and grass litter, spruce needles, and twigs; pH 4.7.
Ah	0 – 2	Dark grayish brown (10YR 4/2 d) and dark-brown (7.5YR 3/2) clay loam; moderate, granular; friable; earthworms present; gradual boundary; pH 4.6.
Btgj	2 – 7	Brown (7.5YR 5/4) and (7.5YR 4/4 d) sandy clay; weak, fine, subangular blocky; moderately permeable; fairly continuous 1 inch layer of sand occurs at the base of this horizon and as tongues and indentations or pockets into the horizon below; color of layer is pale brown (10YR 6/3); irregular boundary; pH 5.0.
Bg	7 – 13	Reddish-brown (2.5YR 4/4) clay loam; prominent strong-brown (7.5YR 5/6) mottles at the top of the horizon and on fracture faces; plastic; slowly permeable; weak, fine, subangular blocky; gradual boundary to horizon below; pH 5.2.
BC	13 – 34	Reddish-brown to dark reddish brown (2.5YR 4/4–3/4) clay loam; very slowly permeable; weak, coarse, angular blocky; vertical cracks extending into this horizon are light colored and sandy; many clay flows evident; a few coarse fragments mainly of trap rock; pH 6.6.
C	34+	Dark-red (2.5YR 3/6) clay loam; massive; firm; plastic; numerous coarse fragments; pH 6.7.

This profile was taken near Elliot on the floor of the valley.

Middleton soils include areas where the upper part of the profile is coarser textured than described above. This is particularly true of the Middleton soils mapped on the North Mountain. In this area the soils contain more stones and cobbles. Coarse fragments of basalt occur in the surface horizons and an increase in clay occurs in the B horizon. Surface layers are also darker colored than on the valley floor because they contain more organic matter. In many cultivated areas a sand layer or sandy pockets occur at or just below the plow layer.

Use—About 50% of the Middleton soils have been cleared. The agricultural use of the soils is restricted mainly to growing orchard, hay, grain, and pasture. Most of the farms are engaged in dairy or mixed farming. The soils are low in natural fertility. They require liberal amounts of lime and fertilizer, and careful management for optimum results. The soils have good moisture-holding capacity and even in dry years will give good forage yields.

Only a small percentage of the Middleton soils on the North Mountain have been cleared or cultivated. Their cobbliness and more severe climatic limitations due to the higher elevation and coastal influence make management of the soils more difficult than on the valley floor. They probably receive more rainfall and less heat units and the crops are seeded later in spring. They are, however, better supplied with organic matter.

Wolfville Series (23,598 acres)

The Wolfville soils occur mainly in two areas on the slopes of the South Mountain. One area occurs south of Cornwallis Naval Base and the other, which is mostly a shallow phase, occurs between Lawrencetown and the Kings County border south of Torbrook. Smaller areas, many with drumlin landform, occur at East Dalhousie and Springfield in the southeastern part of the County.

The soils have developed from a dark reddish brown sandy clay loam till on undulating to rolling topography. There is adequate surface drainage, but internal drainage is slow enough to result in some mottling in the profile. The soils are moderately well drained and are found in association with the imperfectly drained Hantsport soils. Surface and profile stone is moderate to severe.

The main trees of forested areas are spruce, fir, maple, birch, beach, and oak. A profile of a Wolfville soil is described as follows:

Horizon	*Depth inches*	
L–H	2 – 0	Semidecomposed layer of moss, spruce needles, and twigs; H layer very thin.
Ahe	0 – 3	Dark yellowish brown (10YR 4/4) loam; strong, fine, granular; friable; high in organic matter; abrupt boundary to horizon below.
Bfh	3 – 9	Strong-brown (7.5YR 5/6) clay loam; moderate, fine, granular; many rounded and subangular cobbles; clear boundary to horizon below.
Bfgj	9 – 21	Dark-brown (7.5YR 4/4) sandy clay loam; moderately permeable; large diffuse strong-brown (7.5YR 5/8) and brown (10YR 5/3) mottles, mainly along root channels and on fracture faces; strong, fine and medium, subangular blocky; gradual boundary.
BCgj	21 – 36	Reddish-brown (5YR 4/3) sandy clay loam with prominent yellowish-red (5YR 5/8) and pale-olive (5Y 6/3) mottles; pale-olive color dominant on structure faces of larger peds; firm; moderately slow internal drainage or permeability.
C	36+	Reddish-brown (5YR 4/3) sandy clay loam; weak to massive; slowly permeable; some coarse fragments.

This profile was taken 2 miles south of Cornwallis. The profile colors, particularly of the surface and upper B horizon, are darker than is usual for Wolfville soils in the province. This reflects the higher content of organic matter resulting from the coastal influence on temperature and precipitation.

The shallow phase mapped south of Nictaux is underlain by granite bedrock. Depths vary from very shallow to 24 inches. However, much of the area supports fairly good forest vegetation. The smaller areas mapped in the southeastern part of the County are coarse textured in the upper part of the profile.

Use—About 33% of the Wolfville soils are suitable for agriculture and 23% have been cleared and used for this purpose. The remainder are too stony, steep, or shallow and should remain in forest. The soils are moderately low in natural fertility and require repeated applications of lime and fertilizer to maintain good yields. A fairly wide range of crops can be grown, but care should be taken in cultivating crops on all slopes over 6% to safeguard against erosion.

Soils Developed from Medium-textured Parent Materials

These soils represent less than 8% of the County, and only about 13% of the 60,500 acres in this group have been cleared or utilized for agriculture. The Bridgewater, Middlewood, Morristown, Riverport, and Kentville soils have developed from till, the Cumberland, Bridgeville, and Chaswood soils from alluvium. The Bridgewater, Morristown, and Cumberland soils are well drained, the Kentville and Riverport soils are imperfectly drained, and the Chaswood and Middlewood soils are poorly drained. The soils range in texture from medium and fine sandy loam to silt loam.

Bridgeville Series (498 acres)

The Bridgeville soils are found in association with the Cumberland and Chaswood soils on floodplains of rivers and streams in the County. The parent material consists of sandy loam and silt loam alluvial sediments of varying thickness. Usually they become coarser textured with depth.

The topography is level to depressional. The soils are imperfectly drained, and the water table is near the surface for long periods. The soils are free of stones and where forested support black spruce, tamarack, red maple, and alder.

A profile of Bridgeville sandy loam is described as follows:

Horizon	*Depth inches*	
Ap	0 – 7	Dark grayish brown (10YR 4/2) loam; weak, subangular blocky; friable; many roots; pH 5.3.
Cgj1	7 – 20	Brown (10YR 5/3) sandy loam; weak, angular blocky; common, medium, distinct, yellowish-red (5YR 4/6) mottles; sticky; pH 5.2.
Cgj2	20 – 24	Grayish-brown (10YR 5/2) fine sandy loam; mottled; pH 5.4.
Cgj3	24+	Dark-gray (5Y 4/1) sandy with some peaty layers.

Many areas of Bridgeville soils are subject to severe flooding.

Use—The Bridgeville soils in the County occur as narrow strips along streams and as depressional areas intermingled with Cumberland soils. Because of their position and small extent, high water table, and susceptibility to frosts and flooding, they are used mostly for rough pasture. About 68% of the land has been cleared.

Bridgewater Series (34,120 acres)

Bridgewater soils occur as two main areas: one between Bear River and Princedale and the other along the southern boundary of the County between Kejimkujik and Tupper lakes. The soils are well drained and occur on undulating to steeply sloping and drumlin topography. The parent material is a shaly or sandy loam till derived mostly from slate. The stoniness of the till ranges from moderate to excessive. In the southern part of the County the till on the drumlins is deep, but between the drumlins it is shallow. Between Bear River and Clementsvale the till is variable in depth, but rock outcrops are common. Where forested, the main trees are spruce, fir, beech, and birch.

The soils occur in association with the imperfectly drained Riverport and poorly drained Middlewood soils.

A profile of a Bridgewater soil occurring under a medium age forest of red spruce with some birch is described as follows:

Horizon	*Depth inches*	
L–H	1·5 – 0	Semidecomposed organic matter, H horizon barely perceptible.
Ahe	0 – 3	Dark-brown (7.5YR 3/2) humic loam; mull-like organic matter; strong, fine, granular; friable; clear boundary.
Ae	3 – 6	Light brownish gray to light-gray (2.5Y 6/2–7/2) silt loam; weak, medium, subangular blocky; discontinuous horizons; friable; abrupt boundary.
Bfh1	6 – 9	Dark yellowish brown (10YR 4/4) loam; weak, fine, subangular blocky; readily permeable; clear boundary.
Bfh2	9 – 15	Olive-brown (2.5Y 4/4) loam; strong, fine and medium, subangular blocky; moderately permeable; gradual boundary.
Bfcj	15 – 28	Yellowish-brown (10YR 5/4) loam to sandy clay loam; slightly mottled; strong, platy, and fine, subangular blocky; moderately slow permeability; moderately indurated.
C	28 – 36+	Yellowish-brown (10YR 4/4) loam to sandy clay loam; moderately permeable; sticky; slightly plastic.

This profile is high in organic matter in the surface. The characteristic mull-like surface is common in soils near the coast. The Bridgewater soils in the southern part of the County have the normal podzol profile and do not possess this Ah surface. They are also somewhat coarser textured both on the surface and in the subsoil.

Use—Many of the Bridgewater soils in Annapolis County are too steep, stony, or shallow for agricultural use. About 13% or 4,500 acres have been cleared. Most areas will support good forest growth, but some of the shallow areas may be droughty.

In the areas classed as suitable for agriculture, the Bridgewater soils can be used for a wide range of crops. The main limitations are low natural fertility, cobble and stone contents, and steep slopes. The data shown for Bridgewater soil (Tables 18 and 19) are from a representative profile taken in the northern part of Queens County. At present, some of the steeper slopes under cultivation are eroding quite severely.

Chaswood Series (441 acres)

The Chaswood soils are poorly drained and occur in association with the well-drained Cumberland and imperfectly drained Bridgeville soils. The soils are derived from sandy loam to silt loam recent alluvium and occur as depressional areas in the flood plain of streams and rivers. Most of the areas are small in extent. The water table is at or near the surface for long periods.

Where forested, the soils support mixtures of tamarack, spruce, and alder. Cleared areas are covered with swamp grass, reeds, sedges, and cattails. The soils are free of stones.

A profile of a typical soil is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Very dark grayish brown (10YR 3/2) loam; mottled; granular; high in organic matter.
Cg1	6 – 18	Grayish-brown (10YR 5/2) silt loam; granular; very wet; sticky; mottled; free of stones.
Cg2	18+	Gray (10YR 5/1) sandy loam; very wet; friable; free of stones.

The texture of the Chaswood soils may vary from sandy loam to sandy clay loam. The surface is usually peaty and underlying horizons strongly gleyed.

Use—The soils require drainage before they can be used for crops. At present most areas are used for rough pasture.

Cumberland Series (1,359 acres)

The Cumberland soils occur on alluvial deposits along stream courses and represent the well-drained member of the catena.

The parent material is usually fairly deep (3–5 ft), is free of stones, and has a sandy loam texture. The topography is level except for evident stream erosion or current scars, and drainage is adequate to good.

A profile under cultivation is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Very dark grayish brown (10YR 3/2) sandy loam; strong, medium, granular; porous; friable.
C1	6 – 12	Dark-brown (7.5YR 4/2) sandy loam; friable; porous; slight mottling.
C2	12+	Dark-brown (7.5YR 4/4) sandy loam; friable; porous.

Use—The Cumberland soils occur mainly as small or narrow areas along streams. They are often difficult to cultivate because of small wet spots and stream erosion channels. They are also subject to seasonal flooding and frost hazard. For these reasons the soils are restricted to growing hay and pasture. Where flooding is prevented or is not too serious, the soils are suitable for most crops grown in the area. They have a moderate level of fertility, but require lime and fertilizer for best results. About 80% of the soils have been cleared.

Kentville Series (8,051 acres)

The Kentville soils are found on the floor of the valley in association with the Glenmont soils. They receive a good deal of runoff from the North Mountain and this tends to keep them moist or saturated with water for long periods. They have mottled profiles and are imperfectly drained. The larger areas occur north of Paradise, around Bridgetown, and along the base of the North Mountain from Bridgetown to Victoria Beach.

The soils have developed from reddish-brown sandy loam to loam till that seems to be waterworked. In Annapolis County the soil parent material is finer textured than similar soils mapped in Kings County. In a few areas the till is sandy clay loam, plastic, and only moderately permeable. Varying amounts of stones occur on the surface and in the profile. The topography is undulating to gently rolling.

A profile occurring under a vegetation of wire birch, red spruce, maple, fir, and poplar is described as follows:

Horizon	*Depth inches*	
L–F–H	3 – 0	Very dark gray (10YR 3/1) organic matter; pH 4.3.
Ahe	0 – 2	Very dark gray and dark gray (10YR 3/1 – 4/1) organic clay loam; friable; fine, granular; pH 4.5.
Bfhgj	2 – 6	Brown (10YR 5/3) sandy loam; strongly mottled with dark-brown and strong-brown mottles in a grayish-brown matrix; moderately firm; structureless; porous; some small granite and amygdaloidal trap cobbles; pH 4.9.
Bgj	6 – 11	Brown (7.5YR 5/4) sandy loam; angular blocky; many strong-brown and yellowish-brown mottles; firm in place, crushes under moderately firm pressure; few roots; pH 4.9.
BCgj	11 – 17	Dark yellowish brown (10YR 4/4) and dark grayish brown (10YR 4/2 d) loam; angular blocky; firm; gray sand coatings on faces of peds; indistinct mottles; some evidence of fragipan; pH 5.1.
C	17+	Weak-red (2.5YR 4/2 – 4/4) loam; slowly permeable; no roots or mottles; pH 5.3.

The Kentville soils often appear to have been waterworked. Some areas may have a two-storied parent material or ablation moraine, coarser in the surface and containing much material of trap and granite origin.

The cultivated layer is high in organic matter and a dark reddish brown (5YR 3/3) friable sandy loam. At Granville Ferry and near the coast the color is dark brown (7.5YR 3/2). The Kentville soils are Humo-Ferric Podzols, but some Gray Wooded (Gray Luvisol) soils of similar appearance were included in the areas mapped as the Kentville series.

Use.–About 43% or 3,500 acres of Kentville soils have been cleared. Where cultivated, they are suitable for most crops grown in the area. The chief limitations to more extensive use are stoniness and drainage. The soils are acid and require lime and fertilizer for satisfactory yields.

Middlewood Series (3,609 acres)

Middlewood soils have developed from a shaly loam till. They are poorly drained and occur as many small areas intermingled with the well-drained Bridgewater and imperfectly drained Riverport soils.

The soils occur generally on depressional areas and are usually stony or shallow. Vegetation consists of slow-growing black spruce, maple, tamarack, fir, and alder.

A profile of a typical soil under forest is described as follows:

Horizon	*Depth inches*	
L–H	4 – 0	Black (5Y 5/1) semidecomposed organic matter; greasy; some fibrous roots; pH 4.6.
Aeg	0 – 6	Dark-gray (5Y 4/1) loam; medium, granular; some faint brown mottles; shale fragments; pH 4.8.
Bg	6 – 16	Gray (5Y 5/1) loam; medium, granular; firm; shale fragments; pH 4.8.
BCg	16 – 20	Dark-brown (7.5YR 3/2) shaly sandy loam; firm; many prominent yellowish-brown and gray mottles; numerous shale fragments; pH 5.0.
C	20+	Grayish-brown (2.5Y 5/2) shaly loam; firm; prominent mottles; pH 5.0.

Use—The Middlewood soils are of little significance for agriculture because of stoniness, shallowness, and drainage.

Morristown Series (11,796 acres)

Morristown soils are well drained and cover 1.5% of the County. They occur north and south of Clementsvale and shallow areas occur at Inglisville and also east of Torbrook Mines.

The parent material is a reddish-brown shaly loam till derived from a mixture of reddish till similar to that of the Wolfville soils and slate or shale till similar to that of the Bridgewater soils. The depth and stoniness of the till is variable, but the areas mapped as shallow phase have less than 24 inches of soil over bedrock.

The topography is undulating to rolling. Surface runoff and internal drainage is good. The soils are found intermingled with Wolfville and Bridgewater soils.

A profile of a Morristown soil under forest is described as follows:

Horizon	*Depth inches*	
L–H	1·5 – 0	Semidecomposed organic mat; H layer very thin.
Ahe	0 – 5	Brown (7.5YR 5/2) sandy loam; friable; high in organic matter; granular; porous; permeable; abrupt boundary.
Bfh1	5 – 9	Yellowish-red (5YR 5/6) sandy loam to loam; granular to blocky; friable; permeable; shale fragments.
Bfh2	9 – 25	Reddish-brown (5YR 5/4) silt loam; granular; firm but friable; permeable; faint mottling.
C	25+	Reddish-brown (5YR 4/3) sandy clay loam; firm; some stone.

The parent material of this profile is finer textured than is normal for most of the Morristown soils in Annapolis County. Around Inglisville the parent material is compact, reddish-brown stony sandy loam till and the B horizon is yellowish-brown sandy loam. Outcrops occur over much of this area.

Use—A high percentage of the Morristown soils are forested and they are well suited to this purpose. The main trees are spruce, fir, maple, beech, birch, and poplar. About 17% of the Morristown soils have been cleared and are cultivated. Shallowness, steep slopes, and stoniness are the chief limitations to agricultural use. The soils are infertile, but where physical limitations are not too severe, most crops suited to the area can be grown.

Riverport Series (598 acres)

Riverport soils are imperfectly drained and occur near Bear River in association with the Bridgewater soils.

The topography ranges from nearly level to undulating and surface drainage is usually adequate; internal or profile drainage is restricted, often by the underlying bedrock.

The parent material is similar to that of the Bridgewater soils—a shaly loam till, often shallow, over bedrock.

Forest cover consists of spruce, tamarack, fir, birch, and maple. A soil under cultivation is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Dark-brown (10YR 3/3) loam; friable; permeable; strong, granular.
Bfhgj	6 – 14	Dark yellowish brown (10YR 4/4) loam with some sandy lenses; friable; granular; moderately permeable; mottled.
Bfgj	14 – 18	Light olive brown (2.5Y 5/4) loam; common, medium, prominent yellowish-red (5YR 5/8) mottles; moderately permeable; slightly plastic; slate fragments.
C	18+	Olive (5Y 5/3) loam to shaly clay loam; moderately permeable; slightly plastic.

Use—Only about 5% of the soils have been cleared for agriculture use. In general they are too stony or shallow, or require drainage, and the costs do not justify clearing at present because better soils are available.

Soils Developed from Moderately Course Textured Parent Materials

This group includes about 70% of the soils of Annapolis County. About 3% of the soils have been cleared. All of the soils have developed from till except the Avonport soils. The well-drained Berwick, Bridgetown, Gibraltar, Glenmont, Halifax, and Rossway soils make up over 90% of the soils of the group. The Avonport, Bayswater, Danesville, Debert, and Roxville soils are imperfectly drained, and the Aspotogan and Tiddville soils are poorly drained.

Annapolis Series (1,061 acres)

The Annapolis soils are imperfectly drained and occur in association with the well-drained Bridgetown soils as small scattered areas receiving excess seepage from surrounding slopes. Internal drainage is often restricted by a compact subsoil and in places by bedrock.

The soils have developed from a reddish-brown sandy loam till that may be stony or shallow. The main trees are spruce, fir, tamarack, alder, red maple, and poplar. A profile occurring under a mixed stand of birch, spruce, and alder is described as follows:

Horizon	*Depth inches*	
L–H	3 – 0	F layer fibrous and felty; H layer 1 inch of black, greasy mor.
Ahe	0 – 2	Dark grayish brown (2.5Y 4/2) sandy loam; high in humus; weak, granular to fine, blocky; porous; friable.
Ae	2 – 5	Light brownish gray (2.5Y 6/2) loamy sand; friable; single grain; slight yellowish mottling along root channels; abrupt boundary.
Bfh	5 – 10	Reddish-brown (5YR 4/4) loam; friable; permeable; blocky.
Bfgj1	10 – 15	Strong-brown (7.5YR 5/6) gravelly sandy loam; diffuse and distinct brownish-yellow (10YR 6/6) mottles; subangular blocky; porous.
Bfgj2	15 – 26	Brown (7.5YR 4/4) loamy sand; mottled; compacted; platy; clear boundary.
II Cgj1	26 – 33	Strong-brown (7.5YR 5/6) sandy clay loam; slowly permeable; mottled.
II Cgj2	33 – 36+	Dark grayish brown (10YR 4/2) gravelly sandy clay loam; slowly permeable.

This profile is finer textured in the lower horizons than is usual for Annapolis soils.

Use—Where cleared and cultivated the Annapolis soils are used for growing vegetables, hay, grain, and pasture. The soils are acid and have low natural fertility and in many cases the drainage needs to be improved for best use. The main limitations of the soils are stoniness and shallowness. About 50% of the soils have been cleared.

Aspotogan Series (29,635 acres)

Aspotogan soils occur as many small areas in association with Gibraltar soils and are poorly drained.

The topography is level to depressional and the soils receive seepage from surrounding soils. The downward movement of water is prevented by the underlying bedrock and the water table is near the surface for long periods.

The sandy loam till is derived predominantly from granitic material and is stony and usually shallow. Forest vegetation consists principally of spruce, fir, alder, tamarack, and maple. A profile occurring under mainly alder vegetation is described below. This profile is considerably more gleyed than is usual for Aspotogan soils.

Horizon	*Depth inches*	
L–H	2 – 0	Semidecomposed layer of organic matter; greasy.
Aheg	0 – 11	Very dark gray (10YR 3/1) peaty loam; granular; abundant roots; permeable; clear boundary; mottled.
Bg	11 – 30	Olive-gray (5Y 5/2) gravelly sandy loam; single grain; slight cementation between 11 and 18 inches; permeable; mottled; saturated with water.
Cg	30+	Light olive gray (5Y 6/2) sandy loam; cobbly and stony.

Use—Aspotogan soils are too wet and stony for agriculture. In most areas the poor drainage results in stunted and very slow growing trees.

Avonport Series (1,621 acres)

The Avonport soils occur on the floor of the valley between Bridgetown and Granville Ferry. The largest area occurs south of Bridgetown. The soils consist of alluvial sands deposited over clay at varying depths, but usually within 3 ft of the surface.

The topography is level to gently undulating. Surface drainage is usually adequate, but the movement of water through the profile is restricted by the underlying clay deposits. The soils remain moist for long periods and develop mottling in the profile. The moisture-holding capacity is often inadequate and the soils may be droughty during dry periods particularly on knolls where the clay deposits are usually about 3 ft from the surface. Most areas are free of stones.

Where forested, the soils support a growth of birch, maple, poplar, spruce, and wire birch. An Avonport soil (cultivated) is described as follows:

Horizon	*Depth inches*	
Ap	0 – 7	Dark-brown (7.5YR 4/2) sandy loam; very friable; porous; granular.
Ae	7 – 10	Grayish-brown (10YR 5/2) sand; mottled; loose and porous.
Bfhgj	10 – 15	Brown (7.5YR 5/4) sandy loam to loamy sand; friable; porous; structureless; few, medium, distinct strong-brown (7.5YR 5/6) and grayish-brown (2.5Y 5/2) mottles.
Bfhgj	15 – 25	Brown (7.5YR 5/4) loamy sand; weak, granular; porous; friable; mottling similar to the horizon above but more severe.
II C	25+	Reddish-brown (5YR 4/4) clay loam; plastic; slowly permeable; laminated waterlaid deposits.

The underlying clay is similar to the parent material of the Fash soils. Where the sand over clay is shallow, drainage is somewhat poorer.

Use—The Avonport soils are somewhat late in the spring and may be droughty in dry periods or in the summer. Although suitable for a fairly wide range of crops these soils are used in Annapolis County chiefly for growing hay and pasture. They are acid and require lime and fertilizer for good crop production.

Bayswater Series (4,553 acres)

The Bayswater soils are imperfectly drained and occur as small scattered areas in association with Gibraltar soils.

The parent material is similar to that of the Gibraltar soils and is a pale-brown coarse sandy loam till derived from the underlying granite rock. The soils are shallow, are somewhat depressional, and receive water from surrounding slopes. The stone content in the surface and subsoil is extremely high and all these soils are forested. The tree cover consists of spruce, fir, maple, hemlock, alder, and birch. A profile of Bayswater sandy loam is described as follows:

Horizon	*Depth inches*	
L–H	3 – 0	Black semidecomposed organic matter; F layer fibrous; H layer greasy mor.
Ae	0 – 4	Gray (10YR 6/1) sandy loam; loose; structureless; slight mottling.
Bfhgjcj	4 – 8	Dark reddish brown (5YR 3/4) sandy loam; many distinct strong-brown (7.5YR 5/6) mottles; slightly cemented.
Bfgj1	8 – 14	Brown (7.5YR 4/4) sandy loam; firm; weak, granular; mottled; permeable.
Bfgj2	14– 22	Yellowish-brown (10YR 5/4) sandy loam; firm; yellowish-brown mottles and gray streaks; structureless; permeable; cobbly and stony.
Cgj	22+	Brown (10YR 5/3) stony sandy loam; firm; mottled.

Use—The Bayswater soils are unsuitable for agriculture because of excessive stoniness, but they are fairly well suited to forestry.

Berwick Series (2,056 acres)

The Berwick soils are of small extent in Annapolis County and occur mainly around Torbrook Mines.

The soils are well drained and have developed from a reddish-brown sandy loam till, which appears to be waterworked. In Annapolis County the soil contains a higher proportion of trap material than in Kings County. The topography is gently to moderately undulating. Surface and subsoil drainage is good to rapid; stoniness is generally not a problem, but a few very stony areas exist. Where forested, the main trees are spruce, fir, birch, maple, and pine.

A Berwick soil under cultivation is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Dark reddish brown (5YR 3/4) sandy loam; friable; porous; strong, granular.
Bfh	6 – 14	Yellowish-red (5YR 4/6) sandy loam; friable; porous; weak, granular.
Bf	14– 20	Reddish-brown (2.5YR 5/4) sandy loam; friable; porous; slight mottling.
C	20+	Dark reddish brown (2.5YR 3/4) sandy loam; friable; porous; some stone and gravel.

The Berwick soils in Annapolis County are more gravelly and stony than similar soils in Kings County.

Use—The Berwick soils are suitable for all crops grown in the area. They are easily managed, but may be slightly droughty in dry periods. They require the liberal use of fertilizers as well as lime for satisfactory yields. About 42% of the soils have been cleared.

Bridgetown Series (42,544 acres)

The Bridgetown soils are well-drained and cover slightly over 5% of the land area of the County. They occur on the northern slopes of the South Mountain and as drumlin areas farther south.

The parent material is a sandy loam till composed of a mixture of reddish till similar to the Wolfville soils with varying amounts of granite, trap, and quartzite material. The till is quite stony and many areas are shallow. The topography is undulating to steeply sloping, which provides good surface drainage; internal drainage is moderately rapid.

Almost all of the Bridgetown soils are forested; the main species are spruce, fir, pine, maple, birch, and poplar. A profile occurring under pine, spruce, and birch is described as follows:

Horizon	*Depth inches*	
L–H	1 – 0	Thin layer of semidecomposed organic matter and forest litter.
Ahe	0 – 3	Dark-brown (7.5YR 3/2) sandy loam; friable; high in organic matter; porous.
Bfh1	3 – 6	Reddish-brown (5YR 4/4) sandy loam; strong, fine, subangular blocky; friable; porous.
Bfh2	6 – 14	Strong-brown (7.5YR 5/8) sandy loam; weak, subangular blocky; friable; permeable; irregular gradual boundary.
Bf	14– 24	Strong-brown (7.5YR 5/6) sandy loam; high gravel content; friable; porous; structureless.
C	24+	Yellowish-brown (10YR 5/6) gravelly sandy loam; high proportion of granite fragments.

The parent material of the Bridgetown soils is frequently more reddish than described above.

Use—Most areas of Bridgetown soils are too stony, steep, or shallow for agricultural use. About 13% of them have been cleared. These areas are deeper and less stony than normal. Where used for agriculture, the organic matter content should be high because the soils may be slightly droughty. They are also infertile and require lime and fertilizer, but can be used to grow a wide range of crops. At present most of the farms are small and do not make very efficient units. All areas are suitable for forestry.

Danesville Series (389 acres)

The Danesville soils are imperfectly drained and occur as two small areas in the southeastern part of the County associated with the Halifax soils.

The parent material is an olive-brown course sandy loam till. Stones in the surface and profile are too plentiful to permit clearing for agricultural use. Forest vegetation consists of red maple, spruce, birch, fir, and hemlock. A profile of Danesville sandy loam is described as follows:

Horizon	*Depth inches*	
L–H	3 – 0	Black semidecomposed organic matter; fibrous.
Aegj	0 – 3	Light brownish gray (10YR 6/2) sandy loam; friable; porous; mottled.
Bfhgjcj	3 – 11	Dark-brown (7.5YR 4/4) sandy loam; medium, granular; firm; distinct yellowish-brown (10YR 5/8) mottles; weakly cemented.
Bfgj	11– 20	Dark yellowish brown (10YR 4/4) sandy loam; firm; large diffuse mottles; permeable.
C	20+	Olive-brown (2.5Y 4/4) sandy loam; mottled; stony; firm but permeable.

Use—The Danesville soils are unsuitable for agriculture because of severe stoniness on the surface and in the profile. The soils are acid and have low natural fertility, but are well adapted to forestry, which is their best use.

Debert Series (200 acres)

The Debert soils are small in extent in Annapolis County. They are imperfectly drained and occur on fairly level topography in association with Glenmont soils.

The parent material is reddish-brown course sandy loam till. Surface drainage is slow and the water table is often quite high in the solum and is probably held up by underlying finer textured till. The soils are fairly free from stone. Where forested, the main trees are spruce, fir, poplar, tamarack, and alder. A profile under forest is described as follows:

Horizon	*Depth inches*	
L–H	2 – 0	Black semidecomposed organic material; fibrous.
Ae	0 – 3	Gray (5YR 6/1) sandy loam; loose and porous.
Bfhgj	3 – 10	Strong-brown (7.5YR 5/6) sandy loam; friable; permeable; structureless to weak, granular; mottling on root channels and faces of soil peds.
Bfgj	10 – 20	Brown (7.5YR 5/4) sandy loam; structureless; permeable; strongly mottled.
Cgj	20+	Reddish-brown (5YR 3/4) sandy loam; some cobbles; firm; mottled.

Use—If drained, the Debert soils are suitable for growing a wide range of crops. In Annapolis County the soils are small in extent and cleared areas (22%) are used mainly for growing hay and pasture. The soils are acid and have low natural fertility.

Gibraltar Series (387,658 acres)

Gibraltar soils occupy a larger acreage than any other soils in Annapolis County. They cover 49% of the land area or most of the southern portion of the County and are well drained.

They have developed from a pale yellowish brown course sandy loam till. The till is open, porous, stony, and usually shallow.

The topography ranges from undulating to rolling with some steep slopes and a very rough microrelief. Most of the area is in forest, and the main trees are spruce, fir, maple, birch, pine, hemlock, and oak.

A profile of Gibraltar sandy loam under medium age spruce is described as follows:

Horizon	*Depth inches*	
L-H	3 - 0	Brown semidecomposed layer of organic litter; H layer 1 inch thick, black; no mineral material.
Ael	0 - 1.5	Dark grayish brown (2.5Y 4/2) sand; structureless; organic matter content is low, but grains are coated; porous.
Ae2	1.5- 5	Light-gray (10YR 7/1) medium sand; very friable; porous; clear boundary.
Bfh	5 - 7	Strong-brown (7.5YR 5/6) sandy loam; weak, fine, subangular blocky; porous; friable; gradual boundary.
Bfcj	7 - 21	Yellowish-brown (10YR 5/6) loamy sand; permeable; many granite stones and cobbles; slightly cemented or indurated at 15-inch depth.
C	21+	Light olive brown (2.5YR 5/4) coarse loamy sand; many granite stones and cobbles.

Gibraltar soils in Annapolis County, as in the remainder of the province, are usually shallow and rock outcrops occur frequently. However, on drumlins the soils occur on deep till. Surface and profile stone is excessive.

Use—Almost all of the Gibraltar soils are in forest. They are too stony or shallow for agriculture, but are suitable for forestry. When forest fires occur in cutover areas, reforestation is slow because the soils are droughty when the organic matter is destroyed. Boulders and rough terrain impose limitations on the management of these soils for forestry.

Glenmont Series (13,265 acres)

The Glenmont soils are well drained and cover 1.7% of the County. They occur along the base of the North Mountain from Victoria Beach to Clarence in association with the Kentville soils. They are dominantly Humo-Ferric Podzols, but the mapped areas include profiles of Ferro-Humic Podzols.

The soils have developed from a reddish-brown sandy loam till that contains a large proportion of basaltic material. Generally, the profile is cobbly and stony. Internal and external drainage is good and the soils have a good moisture-holding capacity.

The topography is undulating to moderately sloping. Seepage from the North Mountain supplies moisture and tends to keep the associated Kentville soils moist for long periods. Where forested, vegetation consists mostly of spruce, fir, hemlock, birch, and poplar. A profile of Glenmont sandy loam occurring under spruce forest is described as follows:

Horizon	*Depth inches*	
L-H	2 – 0	Dark-brown to black fairly well decomposed organic matter; pH 3.9.
Ahe	0 – 3	Very dark grayish brown (10YR 3/2) sandy loam; friable; porous; weak, course, granular; high in organic matter, mixed by earthworm activity; pH 4.2.
Ae	3 – 5	Pinkish-gray (7.5YR 7/2) sandy loam; porous; loose; single grain; irregular abrupt boundary; pH 4.2.
Bfh1	5 – 15	Strong-brown (7.5YR 5/6) coarse sandy loam; friable and porous; weak, granular; cobbly; pH 4.4.
Bfh2	15 – 27	Brown (7.5YR 5/4) sandy loam; friable; porous; many cobbles and stones; pH 4.8.
Bfcj	27 – 30	Brown (7.5YR 5/2) sandy loam; very compact layer; crushes sharply between thumb and forefinger to a finer sandy loam than horizons above.
C	30+	Dark-brown (7.5YR 4/2) coarse sandy loam; porous; friable; cobbly; no compaction or cementation; pH 4.8.

In Annapolis County the Glenmont soils are more variable in texture than in Kings County where these soils were first mapped. The cultivated surface soil is dark-brown (7.5YR 3/2) sandy loam, friable, and high in organic matter.

Use—About 43% of 5,700 acres of the Glenmont soils have been cleared and are cultivated or used for rough pasture. The farms are small and the usefulness of many fields is diminished by steep slopes, gullies, or areas of poorly or imperfectly drained soils. The natural fertility is low and lime and nutrients must be added for efficient production. The soils erode easily and care must be taken in cultivating the steeper slopes.

Most areas still in forest are quite stony and cobbly.

Halifax Series (13,873 acres)

The Halifax soils are well drained and cover 1.7% of the County. The soils occur in two areas: one in the southern part of the County north of Kejimkujik Lake, and the other in the southeastern part of the County. The soils occur in association with the imperfectly drained Danesville soils. Both have developed from an olive, stony sandy loam till derived mainly from quartzitic material and both are stony and cobbly on the surface and throughout the profile.

The topography is undulating to gently rolling and provides good surface drainage. Internal drainage is moderately rapid.

Almost all the soils are forested; the main trees are spruce, fir, hemlock, maple, birch, and poplar. A profile of Halifax stony sandy loam from a location east of Big Dam Lake is described as follows:

Horizon	*Depth inches*	
L–H	3 – 0	Black (5YR 2/1) semidecomposed organic matter; fibrous; pH 3.7.
Ae	0 – 3	Gray (5YR 5/1) sandy loam; porous; friable; weak, granular; pH 3.8.
Bfh1	3 – 4	Strong-brown (7.5YR 5/6) sandy loam; granular; numerous roots; friable; porous; pH 4.2.
Bfh2	4 – 11	Yellowish-brown (10YR 5/6) sandy loam; weak, granular; numerous roots; friable; porous; some angular quartzite fragements; pH 4.4.
BC	11 – 18	Light olive brown (2.5Y 5/4) sandy loam; slightly firm in place but very porous; pH 4.2.
C	18+	Light olive brown (2.5Y 5/4) gravelly sandy loam; firm in place but not compact; quite porous; stony and cobbly; pH 4.4.

In a few profiles the B horizon may be weakly cemented. All profiles are low in nutrients and are quite acid.

Use—All the Halifax soils are forested and are unsuitable for agriculture.

Rossway Series (65,871 acres)

The Rossway soils are well drained and occupy about 8% of the land area of the County. They cover large areas of the North Mountain and occur on undulating to rolling topography. These soils are dominantly Orthic Ferro-Humic Podzols, but significant proportions of Dystric Brunisols are included in the mapping unit.

The soils have developed from a dark-brown sandy loam to loam till formed almost entirely from the underlying basalt rock. The till may be reddish in some areas and the profile resembles that of the Glenmont soils. In general the till is shallow, but pockets or scattered areas of deeper till occur. Forest cover consists of fir, spruce, birch, beech, poplar, and alder.

A profile of Rossway loam is described as follows:

Horizon	*Depth inches*	
L–F–H	2 – 0	Dark-brown and black, fairly well decomposed organic layer under a moss surface; fibrous, with incipient H layer; pH 4.1.
Ahe	0 – 2	Light olive brown (2.5Y 5/4) and dark grayish brown (10YR 4/2) loam; moderate, fine, granular; friable; permeable; high intimate organic matter content; pH 4.5.
Bhf	2 – 12	Yellowish-brown to strong-brown (10YR 5/8, 7.5YR 5/8) sandy loam; weak, fine, subangular blocky; friable; permeable; pH 5.2.
Bfh	12 – 18	Strong-brown (7.5YR 5/7) sandy loam; weak, fine, subangular blocky and single grains; cobbly; very friable and permeable; pH 5.4.
Bfgj1	18 – 23	Yellowish-brown (10YR 5/4) diffusely mottled sandy loam; moderate, medium, subangular blocky tending to platy; friable; permeable; somewhat cobbly; pH 5.7.
Bfgj2	23 – 30	Reddish-brown (5YR 4/4) with diffuse strong-brown (7.5YR 5/6) mottles; sandy loam; strong, coarse, platy; firm; moderately permeable; cobbly; pH 6.4.
C	30+	Yellowish-red (5YR 4/6) loam, with light olive brown (2.5Y 5/4) speckles; weak, coarse, platy, tending to massive; firm; slowly permeable; cobbly; pH 6.0.

The soils are fairly well supplied with nutrients; the pH in the surface layers is about 4.5 to 5.0 and in the subsoil 5.5 to 6.0. The surface layer of the soils, even under forest cover, is often well-mixed organic-mineral Ah and Ahe horizons.

Use—In Annapolis County, Rossway soils are too shallow, cobbly, and stony for agricultural use. They are best used for forest and even shallow areas support fairly good stands of spruce, well suited for pulp. The forest vegetation is slightly stunted by a combination of shallow soils and exposure.

Roxville Series (1,226 acres)

The Roxville soils are imperfectly drained and occur in association with the Rossway soils on the North Mountain. They are small in extent and have developed from a dark yellowish brown shallow and cobbly sandy loam till derived from the underlying basalt.

Roxville soils receive seepage from surrounding slopes and the shallow bedrock restricts the downward movement of water. Most of the soils are forested and the vegetative cover consists of alder, spruce, maple, and birch. A profile of a Roxville sandy loam under forest is described as follows:

Horizon	*Depth inches*	
L–H	3 – 0	Black moderately decomposed organic matter; thin L and F layers; H layer 2 inches; abrupt boundary; pH 4.5.
Ah	0 – 2	Very dark brown (10YR 2/2) silt loam; fine, subangular blocky; gradual boundary; friable; permeable; pH 5.1.
Ahe	2 – 5	Dark grayish brown (10YR 4/2) silt loam; high in organic matter; clear boundary.
Bhfgj	5 – 9	Yellowish-brown (10YR 5/6) sandy loam; mottled with large, distinct strong-brown (7.5YR 5/8) mottles; compact; permeable; pH 5.2.
Bfhgj	9 – 15	Dark-brown (7.5YR 4/4) loam; compact; sticky; more slowly permeable than horizon above; diffuse mottling; pH 5.3.
C	15+	Yellowish-red (5YR 4/6) sandy clay loam till derived from a mixture of basalt and some reddish material; slightly plastic; less permeable than horizon above; firm; bedrock at 3 ft.

This profile is a deeper soil than occurs on much of the area; the parent material has a reddish cast and is somewhat finer textured than normal. These soils are better supplied with nutrients than is usual for upland soils of the province.

Use—The Roxville soils are too shallow or stony for agricultural use. Small areas have been cleared and are used for gardens or as small fields for growing hay and grain. Forest vegetation is dense and stunted as a result of the shallowness of the soil, high moisture, and exposure.

Tiddville Series (203 acres)

The Tiddville soils are shallow and poorly drained and occur in association with the Rossway, Roxville, and Glenmont series. The topography is level or depressional. Surface drainage is slow and the water table is at or near the surface for long periods.

The surface and subsoil is stony and most areas support only stunted forest vegetation mainly alder, black spruce, fir, and red maple; the very poorly drained areas have mostly swamp grasses, cattails, and alder. A profile of a Tiddville soil is described as follows:

Horizon	*Depth inches*	
Ap	0 – 8	Very dark gray (10YR 3/1) sandy loam; peaty; weak, granular.
Aegj	8 – 10	Brown (7.5YR 5/2) sandy loam; friable; porous; mottled.
Bfhgj	10 – 20	Dark-brown (7.5YR 4/2) sandy loam; very firm in place; strongly mottled with many, large, distinct, yellowish-red (5YR 5/6) mottles; moderately permeable.
Cgj	20+	Dark-brown (7.5YR 4/2) sandy loam; firm in place; permeable; mottled.

Some of the areas mapped as Tiddville soils between Granville Center and Victoria Beach have reddish-brown (5YR 4/4) sandy loam parent material.

Use—The Tiddville soils are too wet and stony for agricultural use.

Soils Developed from Coarse-textured Parent Materials

Except for some areas of Millar soils all these soils have developed from water-laid sands and gravels deposited by glacial meltwaters. They cover 46,000 acres or about 6% of the land area of the County. The well or excessively drained soils—Canning, Cornwallis, Gulliver, Nictaux, and Torbrook—make up about 85% of these soils, and the remainder are imperfectly drained Kingsport and poorly drained Millar soils. About 40% of the soils in this group have been cleared and used for agriculture, but their use is limited by droughtiness and topography.

Canning Series (2,616 acres)

The Canning soils are well and excessively drained. They occupy less than 1% of the land area and occur in the northeastern part of the County, at Brickton and Nictaux West, and along the Basin southwest of Annapolis Royal.

Canning soils occur on undulating to rolling topography and have developed from deep, fine and medium fine sand, free of stones. Drainage is moderate to rapid and the moisture-holding capacity is moderately low. The soils tend to be droughty and irrigation may be required for some crops.

Where forested, vegetation consists of pine, wire birch, and spruce. A profile of a Canning sandy loam is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Dark-brown (7.5YR 4/4) sandy loam; friable; porous; fairly good moisture-holding capacity.
Bfh	6 – 14	Strong-brown (7.5YR 5/6) sandy loam; friable; porous; granular.
Bf	14 – 20	Yellowish-red (5YR 5/8) loamy sand; porous; structureless; loose.
C	20+	Yellowish-red (5YR 5/6) medium sand; porous; loose.

The Canning soils mapped southwest of Annapolis Royal have a sandy loam surface, and a better moisture-holding capacity than normal. Varying amounts of stone may also be found in this area.

Use—The Canning soils are acid and have a low natural fertility and moderately low moisture-holding capacity. Despite these limitations the soils are highly valued for agriculture. They are free of stones and easy to work. Because they drain and warm rapidly in the spring they can be seeded early. About 70% of the soils have been cleared.

The practice of manuring or plowing down cover crops is desirable. Farmers should consider the desirability of irrigation because when irrigated these soils are suitable for all crops grown in the area. Without irrigation lowered yields may be expected in most years and losses will occur during dry years. In areas of low frost hazard these soils are well suited to tobacco growing.

Cornwallis Series (8,113 acres)

The Cornwallis soils occupy about 1% of the land area. They occur on the floor of the valley from Lawrencetown in a widening belt through Middleton to the Kings County border. The parent material is a waterlaid yellowish-brown sand, consisting of mostly medium and coarse sand. The topography ranges from nearly level to undulating and drainage is rapid to excessive. The soils are relatively free of surface and subsurface stones, cobbles, and coarse gravel. Forest vegetation consists of pine, wire birch, poplar, and spruce. A profile of a Cornwallis sand under a cover of pine, some red spruce, and wire birch is described as follows:

Horizon	*Depth inches*	
Ap	0 – 6	Very dark gray (10YR 3/1) sand; loose; porous; structureless; numerous roots; pH 4.2.
Ae	6 – 9	Grayish-brown (10YR 5/2) sand; loose; porous; structureless; pH 4.4.
Bfhcj	9 – 13	Yellowish-red (5YR 4/6) sandy loam; weak ortstein; pH 4.8.
Bf	13 – 24	Strong-brown (7.5YR 5/6) loamy sand; structureless; weakly mottled and firm in the upper 8 inches; pH 5.2.
C	24+	Yellowish-red (5YR 4/6) and yellowish-brown (10YR 5/8) sand; mostly quartz; pH 5.5.

The Cornwallis soils are coarser textured and not as red as the Canning soils. However, the difference between the two soils in Annapolis County is not great.

Use—Cornwallis soils are acid, low in fertility, and too droughty in most years for adequate crop production without irrigation. Although some quite good crops, grown without irrigation, have been noted, the practice is not recommended where less droughty soils are available. Cornwallis soils are easily cleared and worked, are early, and irrigation should be considered for certain crops and market conditions. About 45% of the soils have been cleared.

Gulliver Series (3,502 acres)

Gulliver soils are rapidly drained and occur on the North Mountain in scattered areas along the Bay of Fundy.

The parent material is a stratified gravel derived mainly from basaltic material. The soils occur on undulating to sloping terraces, on old remnant beaches, and also on eskers and gravels eroded from adjacent ridges.

A profile of a Gulliver soil is described as follows:

Horizon	Depth inches	
L–H	4 – 0	Black (10YR 2/1) fairly well decomposed organic matter; H layer quite thick, friable and fluffy; granular.
Ae	0 – 10	Gray (10YR 6/1) gravelly sandy loam; very porous; structureless.
Bfh	10 – 11	Dark reddish brown (5YR 3/2) sandy loam; weakly cemented; angular blocky; peds have dark reddish brown (5YR 2/2) organic coatings.
Bfhcj	11 – 25	Strong-brown (7.5YR 5/6) sandy loam; weakly cemented; crushes to granular mass; weak, coarse, angular blocky.
C	25+	Coarse stratified gravel derived mainly from basalt.

The cultivated surface is dark reddish brown (5YR 3/2) sandy loam, dark-brown (7.5YR 3/2 d). Some of the Gulliver soils are shallow over bedrock. Stones and cobbles are variable both on the surface and in the profile. The loamy surface and upper B horizon give the Gulliver soils a higher water-holding capacity than is usually found in gravelly soils. The profile is also high in organic matter and resembles that of a Rossway soil.

Use—About 30% of the Gulliver soils have been cleared and are used mainly for small gardens or are farmed as small areas by fishermen on a part-time basis. The main limitations are steep slopes, stoniness, and shallowness.

Kingsport Series (3,449 acres)

The Kingsport soils occur in association with Cornwallis, Canning, and Nictaux soils and are imperfectly drained. The larger areas occur near Brickton, near Middleton, and between Wilmot Station and Torbrook West.

The soils occur on slightly depressional to gently undulating topography where subsoil drainage is restricted either by slowly permeable layers or by material similar to the parent material of the Fash soils, which seems to underlie many of the alluvial sands and gravels on the valley floor. The water table of the Kingsport soils is usually deep enough to permit use of these soils during the growing season.

The soils are relatively free from stones on the surface and in the profile. Where forested, the main trees are spruce, fir, tamarack, maple, poplar, and alder. A Kingsport soil profile is described as follows:

Horizon	Depth inches	
L–H	6 – 0	Dark reddish brown (5YR 2/2) organic material; L layer consists mostly of sphagnum moss; F layer thick, fibrous; H layer, thin, greasy.
Aegj	0 – 3	Reddish-gray (5YR 5/2) loamy sand; weakly colored with organic matter; porous; loose.
Bfhgj1	3 – 7	Dark reddish brown (5YR 3/2) sandy loam; discontinuously cemented; strong-brown mottles and much staining by organic matter.
Bfhgj2	7 – 16	Dark yellowish brown (10YR 4/4) gravelly loamy sand; very firm in place; thick platy or laminated; strongly mottled; organic streaks throughout.
BC	16 – 30	Dark-brown (10YR 4/3) gravelly loamy sand; similar to above horizon but without organic streaks.
C	30+	Dark grayish brown (2.5Y 4/2) gravelly sand; loose; very wet.

Where cultivated the soils usually have a black mucky surface underlain by gray sand. The B horizon is not always cemented.

Use—About 42% of the Kingsport soils have been cleared and are used chiefly for growing hay or pasture. With improved drainage the soils could be used for most crops, but they probably would be droughty and have poor air drainage or frost hazard. The soils are acid and infertile.

Millar Series (192 acres)

The Millar soils are associated with the Kingsport, Cornwallis, Nictaux, and Canning soils. They occur in small depressional areas, mainly along small streams, and are poorly drained.

The parent material consists of sandy alluvial sediments usually underlain at varying depths by slowly permeable clays. The soils have a peaty surface and the water table is at or near the surface most of the year. Vegetation consists of coarse grasses, ferns, lambkill, and sparse, stunted fir, spruce, and tamarack. A profile of a Millar soil is described as follows:

Horizon	*Depth inches*	
L–H	7 – 0	Black (10YR 2/1) semidecomposed peat; greasy; pH 4.8.
Aeg	0 – 8	Dark-gray (10YR 4/1) sand; impregnated with organic matter; loose; porous; very wet; pH 4.8.
Bg	8 – 18	Gray (10YR 5/1) sand; loose; porous; very wet; some organic streaks; pH 5.3.
Cg	18+	Gray (10YR 5/1) sand; porous; saturated with water.

Use—The Millar soils are unsuitable for agriculture unless drained. They can be used for rough pasture.

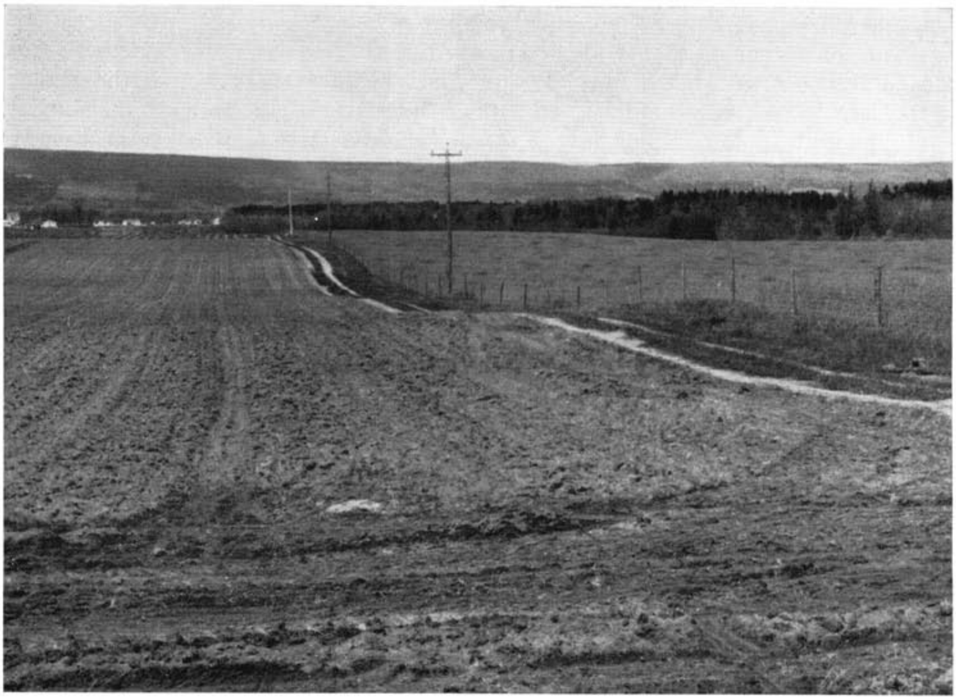

Fig. 10. Nictaux soils developed on coarse, stratified outwash and deltaic sands and gravels.

Nictaux Series (24,314 acres)

The Nictaux soils are excessively drained. They make up about 3% of the land area and the largest areas occur south of Paradise, at Nictaux Falls, at Trout Lake, and north of Douglas Road on the North Mountain. The soils occur on a variety of topography from nearly level areas at Nictaux Falls to steeply sloping areas on the North and South mountains.

The parent material is coarse, stratified outwash and deltaic sands and gravels. Vegetation consists of pine, hemlock, spruce, fir, and wire birch. A profile of a Nictaux soil occurring under mature forests of pine and hemlock is described as follows:

Horizon	*Depth inches*	
L–F	4 – 0	Brown semidecomposed fibrous litter, H layer absent.
Ae	0 – 4	Light-gray (10YR 7/2) sandy loam; weak, granular; no stones; porous; loose; abrupt boundary; pH 4.2.
Bfh1	4 – 9	Strong-brown (7.5YR 5/8) sandy loam; free of stones; weak, granular; abundant roots; porous; very friable; gradual boundary; pH 4.6.
Bfh2	9 – 24	Yellowish-red (5YR 4/6) sandy loam; free of stones; structureless to weak, granular; porous; good root development; gradual boundary; pH 4.9.
C	24+	Coarse stratified sand and gravel; porous; firm in place.

The Ae horizon may vary in thickness over short distances, and varying degrees of cementing may occur in the B horizon. The texture of the C horizon may vary from coarse sand to coarse gravel.

Use—In general the Nictaux soils are too droughty to be used for crops unless irrigated. However, 20% of the soils have been cleared and some areas are being used for growing crops. Yields from nonirrigated areas are low except in wet years. The soils are acid and have low natural fertility. Good forest vegetation occurs on most areas, but growth is slowed by droughtiness.

Torbrook Series (3,809 acres)

The Torbrook soils have developed from coarse-textured water-deposited sands and gravels derived mostly from shales and slates. The soils are rapidly drained and occur on a wide range of topography from nearly level to steeply sloping. The landforms consist of terraces, remnant beaches, eskers, and deltas. The larger areas are found at Torbrook, Clementsvale, and Kejimkujik Lake; smaller areas occur in the southern part of the County.

The Torbrook soils are less droughty than the Nictaux soils because the weathered parent material has a sandy loam surface. Surface and profile stone is variable. Forest vegetation consists of fir, pine, spruce, hemlock, birch, and maple. A profile is described as follows:

Horizon	*Depth inches*	
L–F	2 – 0	Very dark grayish brown (10YR 3/2) organic mat; fibrous; H layer absent.
Ae	0 – 3	Grayish-brown (10YR 5/2) sandy loam; friable; porous; granular.
Bfh	3 – 9	Strong-brown (7.5YR 5/6) sandy loam; weak, granular; friable; porous.
Bf	9 – 20	Brown (7.5YR 5/4) shaly sandy loam; friable; porous; slate fragments.
C	20+	Heterogeneous mixture of water-deposited slaty sand and gravel; porous.

Use—Where the soils are not too stony or steeply sloping they are used for growing hay, grain, vegetables, and orchards. Torbrook soils are droughty. Many areas are better left in forest because the rough topography limits the use of agricultural machinery. About 35% of the soils have been cleared.

Soils Developed from Organic Materials

Peat

Peat soils cover 33,832 acres or 4.3% of the land area. They occur as scattered depressional areas throughout the County but mainly in the southern part.

Present vegetation consists of sphagnum and other mosses, labrador tea, lambkill, cranberry, crowberry, bog rosemary, cotton grass, sedges, and reeds. Some bogs have sparse tree cover of fir, spruce, tamarack, and alder. The water table is at or near the surface most of the year.

Depths vary but most of the bogs are less than 5 ft in depth. The peat is usually poorly decomposed, but some of the bogs have a mucky surface and fairly well decomposed subsurface layers. The organic material is acid throughout and underlain by various tills.

Miscellaneous Land Types

Salt Marsh (497 acres)

The areas mapped as salt marsh are tidal sediments, equivalent to the Acadia soils, but occurring outside the dyke area and flooded periodically by the tides. The main areas occur adjacent to Annapolis Basin. The sediments are reddish-brown, silty clay loam texture and have no profile development. Vegetation consists of salt-tolerant grasses and sedges. The salt marshes are not used to any extent at present. A few areas, once dyked and farmed, have now been abandoned to the sea.

Rocky Land (14,390 acres)

This land type covers 1.8% of Annapolis County. It occurs mainly in the southern part of the County and consists of shallow soils where bedrock is exposed on 60% or more of the land surface. None of the areas are suitable for agriculture. They have some value for forestry, but are of low productivity.

LAND USE

Present Land Use

The broad pattern of land use in the County clearly reflects the importance of soil parent materials. For example, in the part of the County south of the Annapolis Valley and Basin cleared land is confined to areas of slate-rich till; smaller isolated clearings usually exist only where granitic deposits are modified by the inclusion of other materials.

The Annapolis Valley contains a great variety of parent materials and the best agricultural soils in the County. This area is sheltered from the sea by the North Mountain, yet has access to it by way of the Annapolis Basin. For these reasons it was attractive to the first settlers in Nova Scotia.

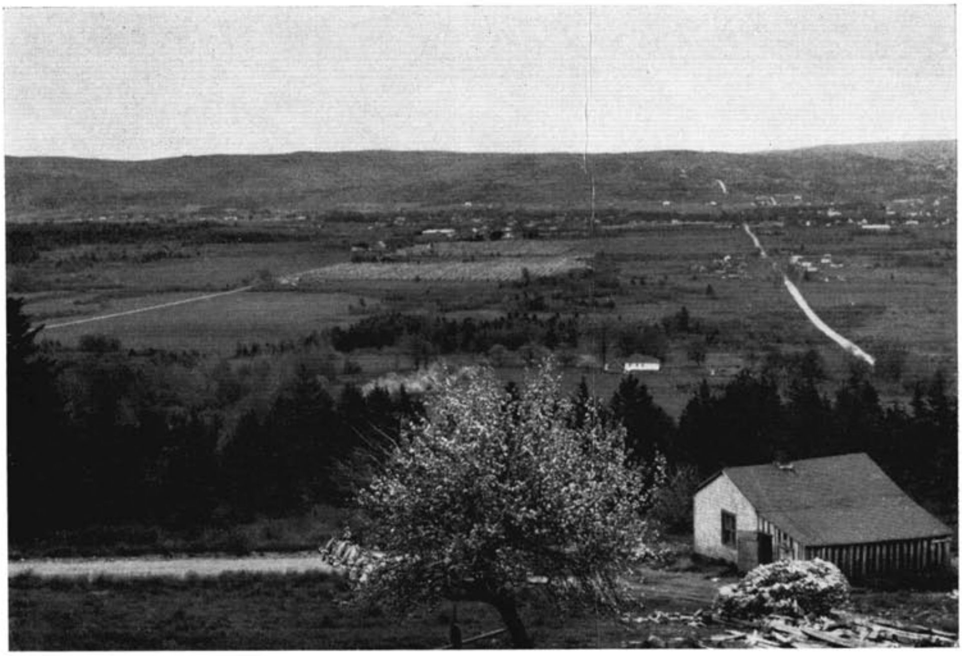

Fig. 11. Middleton and Lawrencetown soils.

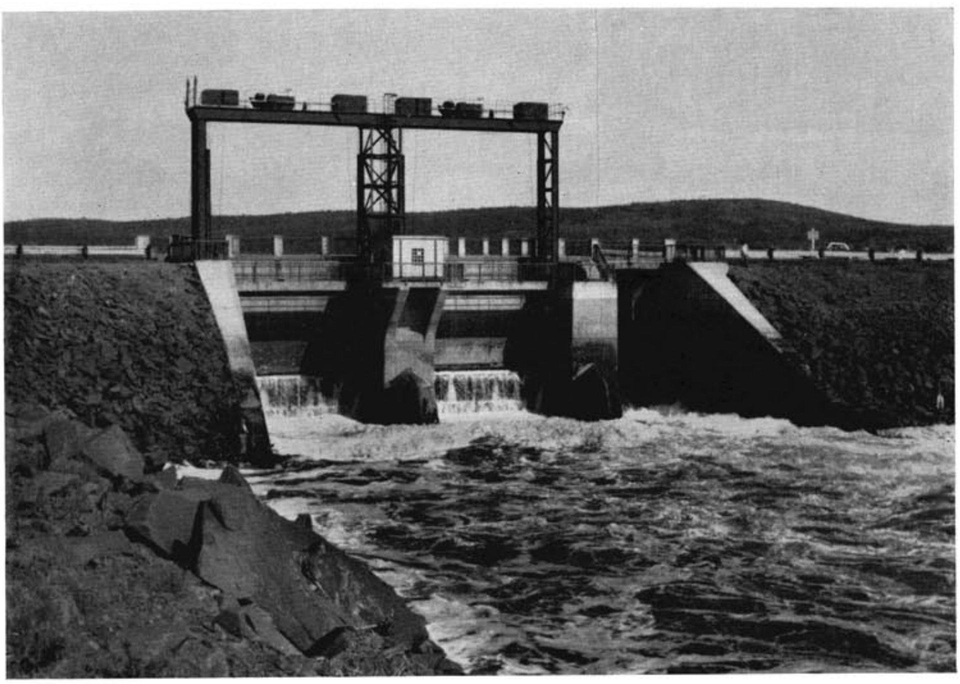

Fig. 12. Annapolis River Tidal Dam.

Fig. 13. Middleton soils in foreground; Cumberland and Chaswood soils on lower flats in the background.

Fig. 14. Middleton soils on the North Mountain.

Early Acadian settlers dyked the estuarine salt marshes and drained them through tidal aboideaux. The reclaimed land was well suited to cattle farming. Many soils on the gently sloping parts of the valley floor were found to be well suited to apple trees, and from early times this crop has had an important place in the mixed farming system. As markets developed, so did commercial mixed farming based on the sale of animal products, apples, and a few vegetables. The development of this system of agriculture to a peak of prosperity in the last century and its subsequent decline, were discussed briefly under "History of Development."

The value of sales (1966) indicates that present agricultural income in Annapolis County is derived mainly from dairy products, cattle, poultry and eggs, tree fruits, and hogs, in this order. Tree fruits, in particular, have suffered a great decline; orchards occupied 9,086 acres in 1931 compared with 1,300 acres in 1966. The numbers of cattle have remained virtually the same over this period of time, sheep have declined, hogs have increased over 100% and poultry by 34% (Table 6). The sale of forest products off farm woodlots is an important source of revenue, exceeding that from tree fruits in 1966.

Table 6. Numbers of Livestock in Annapolis County, 1966

Poultry	97,316
Hens and chickens	97,284
Geese	13
Turkeys	—
Ducks	19
Cattle	11,907
Cows and heifers for milk production	4,315
Steers (1 yr and over)	2,155
Sheep	3,190
Pigs	6,657
Horses	420

Specialization in canning crops has progressed more slowly than in neighboring Kings County. Small fruits and vegetables (excluding potatoes and turnips) were grown on 159 acres in 1931, and on 542 acres in 1966 (Table 7). There is probably considerable potential for expansion in the field of horticulture.

Table 7. Acreage of Field Crops in Annapolis County, 1966

All field crops	24,336
Hay	19,049
Oats cut for hay	419
Grain	2,395
Oats	1,404
Mixed grain	477
Rye	82
Barley	290
Wheat	132
Potatoes	532
Vegetables	192
Fodder crops	427
Tree fruits	1,300
Small fruits	350
Turnips, mangels, swedes	67
Togacco	1
Other	23

Farms occupy 154,756 acres or about 19% of the County. About 4.7% of the County or 39,251 acres is improved, compared with 51,918 acres of improved land in 1931. The improved and unimproved land on farms in 1966 and the acreage of improved land used for different purposes are shown in Table 8. About 62% of the improved land was under crops and 27% under pasture. The total number of farms listed in the 1966 census was 823, of which 225 were classed as commercial, that is, had sales of produce in excess of $1,200 annually; only 118 farms had sales of over $5,000.

Table 8. Acreage and Uses of Farm Land in Annapolis County, 1966

Total land area	822,400
Number of farms	823
Area in farms	154,756
Average area per farm	188
Improved land	39,251
Crops	24,609
Summerfallow	134
Pasture	10,761
Other	3,747
Improved area per farm	48
Unimproved land	115,505
Woodland	89,730
Other	25,775

The average size of farm in the County is 188 acres of which 48 acres is improved land. These figures are reduced by the inclusion of a great number of small non-commercial farms. The number of farms with a total capital value exceeding $15,000 in 1961 was 221; those exceeding $25,000 numbered 86. The 1961 census disclosed that 860 of the farms possessed electricity, and that agricultural equipment on farms included 535 tractors, 111 hay balers, 30 threshing machines, and 8 combines. Irrigation was used on 313 acres.

In 1966, 698 of the 823 farms in the County were operated by owners. Most of the remainder were classed as joint operations by owner and tenant.

Forests cover 78% of the County (1958) and the acreages of various types are shown in Table 9. For completeness, Table 9 includes the acreage of agricultural and other improved land. It should be noted that woodland on farms is included in the forest figures. Productive forest covers 75% of the County area. Composition of the forests by species was discussed under "Vegetation."

The forests contain a net merchantable pulpwood volume of over 5 million cords (8), placing Annapolis County fifth in the province; it is third in net merchantable sawlog volume with 891 million feet board measure, or over 10% of the total for the province.

The average annual forest production during 1952–56 expressed in net merchantable pulpwood equivalents was 77,179 cords of softwood and 2,129 cords of hardwood, representing 5.8% of the province's total. Together these quantities amount to 65% of the allowable annual cut, and further exploitation is in part limited by the inaccessibility of large areas of forest.

Table 9. Acreages of Forest and Other Land in Annapolis County[1]

	Acres	%
Forest land		
Productive forest		
Softwood	384,885	46.0
Mixed	230,591	27.6
Hardwood	10,202	1.2
Total productive forest	625,678	74.8
Depleted forest	27,834	3.3
Total forested land	653,512	78.1
Non-forested land: Brushland, rock barren, and old burn not restocking	20,791	2.5
Waste land: Tidal mud flats, marsh, muskeg with stunted trees, sand and gravel pits, etc.	32,225	3.9
Agricultural and other improved land	80,880	9.7
Water: Lakes, rivers, and estuaries	48,763	5.8
Total area	836,171	100.0

[1]From Hawboldt, L. S., and R. M. Bulmer. 1958. The Forest Resources of Nova Scotia. N.S. Dep. Lands and Forests.

Soil Capability Classes

The soil capability classification for agricultural purposes is an interpretive grouping made from soil survey data. In this report the mineral soils are grouped into seven classes according to their potentialities and limitations for agricultural use. The first three classes are considered capable of sustained production of common cultivated crops, the fourth is marginal for sustained arable culture, the fifth is capable of use only for permanent pasture and hay, the sixth is capable of use only for wild pasture, and the seventh class is for soils and land types considered incapable of use for arable culture or permanent pasture. Although the soil areas in classes one to four are capable of use for cultivated crops they are also capable of use for perennial forage crops. Soil areas in all classes may be suitable for forestry, wildlife, and recreation. For the purpose of this classification, trees, tree fruits, cranberries, blueberries, and ornamental plants that require little or no cultivation are not considered as cultivated or common field crops.

The class is a grouping of subclasses that have the same relative degree of limitation or hazard. The subclass denotes the kind of limitation or hazard. The limitation or hazard becomes progressively greater from Class 1 to Class 7. Twelve kinds of limitation are recognized: adverse climate (c); poor soil structure or low permeability or both (d); erosion (e); low fertility (f); overflow (i); moisture deficiencies attributable to soil characteristics (m); salinity (n); stoniness (p); shallowness to bedrock (r); a combination of adverse soil characteristics (x); adverse topography, slope, or pattern (t); and excess water other than that due to overflow (w). Each subclass may be divided into textural groups of soils that have nearly similar management requirements.

The capability classification is applied to virgin as well as cultivated soils and is based on the following assumptions: (1) the soils will be well managed under a largely mechanized system; (2) soils that can be improved by practical means are classed according to their limitations in use remaining after improvements have been made; (3) capability groupings may be changed as new information about soils becomes available or by major reclamation works that permanently change the limitations in use for agriculture; (4) distance to market, kind of roads, location, size of farms, characteristics of landownership and cultural patterns, and the skill or resources of individual operators are not criteria for capability groupings.

The tables accompanying the following discussion (Tables 10 to 15) list all the soil phases, their acreages, and the capability classes and subclasses into which they fall. The phase symbols express the conditions of topography and stoniness within a given soil series. The symbols for topography are:

Symbol	*Slope, %*	*Topography*
A	0 – 0.5	Depressional to level
B	0.5 – 2	Very gently sloping
C	3 – 5	Gently sloping
D	6 – 9	Moderately sloping
E	10 – 15	Strongly sloping
F	16 – 30	Steeply sloping
G	31+	Very steeply sloping

The symbols for stoniness are:

Symbol	*Degree of stoniness*
0	Free of stones
1	Slightly stony; no hindrance to cultivation
2	Moderately stony; enough stone to interfere with cultivation unless removed
3	Very stony; enough stone to be a serious handicap to cultivation
4	Too stony for cultivation

Soil Capability Class 1

Soils in this class have no important limitations in use for crops. They are level or have very gentle slopes; they are deep, are well to imperfectly drained, and have a good water-holding capacity. They are easily maintained in good tilth and productivity, and damage from erosion is slight. They are moderately high to high in productivity for a wide range of field crops adapted to the region.

There are no soils in Annapolis County that meet all these requirements.

Soil Capability Class 2

Soils in this class (Table 10) have moderate limitations that restrict the range of crops or require moderate conservation practices. They are deep and have a good water-holding capacity. The limitations are moderate and the soils can be managed and cropped with little difficulty. The soils are moderately high to high in productivity for a fairly wide range of field crops adapted to the region.

The limitation of soils in this class may be any one of the following: adverse regional climate; moderate effects of accumulative undesirable characteristics; moderate effects of erosion; poor soil structure or slow permeability; low fertility correctable with consistent moderate applications of fertilizers and usually lime; gentle to moderate slopes; occasional damaging overflow; and wetness correctable by drainage but continuing as a moderate limitation.

In Annapolis County soils placed in this class occupy only 2,000 acres or 0.3% of the land area. These soils have slopes less than 9% and not enough stone to interfere with cultivation. The maintenance of organic matter and fertility is the main management problem. The Fash soils included in this class have a loam texture in the surface and upper solum, which greatly improves these particular soils. The remaining acreage of the Fash series has been placed in Class 3, the range of crops that can be grown being limited by wetness or impermeability of the subsoil.

Table 10. Soils in Capability Class 2, Those with Moderate Limitations

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
Moderately fine	f	Wolfville	C–1	213	94
		Fash	B–0	359	81
			C–0	236	93
				808	88
Moderately coarse	f	Berwick	C–0	149	87
			C–1	992	58
			D–0	71	45
		Kentville	C–0	76	100
				1,288	57
Total area (Class 2)				2,096	69

Soil Capability Class 3

Soils in this class (Table 11) have moderately severe limitations that restrict the range of crops or require special conservation practices. The soils have more severe limitations than those in Class 2 and conservation practices are more difficult to apply and maintain. Under good management these soils are fair to moderately high in productivity for a fairly wide range of field crops adapted to the region.

In this class the limitations that restrict cultivation, ease of tillage, planting and harvesting, the choice of crops, and the application and maintenance of conservation practices are a combination of two of those described under Class 2 or one of the following: moderate climatic limitations including frost pockets; moderately severe effects of erosion; intractable soil mass or very slow permeability; low fertility correctable with consistent heavy applications of fertilizers and usually lime; moderate to strong slopes; frequent overflow accompanied by crop damage; poor drainage resulting in crop failures in some years; low water-holding capacity or slowness in release of water to plants; stoniness sufficiently severe to seriously handicap cultivation and necessitate some clearing; restricted rooting zone; moderate salinity.

The soils in this class occupy about 9% of the land area of the County or about 68,000 acres. The moderately fine textured soils are used mainly for growing hay, grain or tree fruits. They are slow to warm up in the spring and have varying degrees of wetness or slowly permeable subsoil. Slopes in the class range up to 15% and care should be exercised in cultivating the steeper slopes.

The medium-textured soils have been placed in subclass p, which denotes stoniness or cobbliness. Although this limitation is listed as the main one, it may not be severe enough by itself to place this soil in Class 3. Other limitations exist such as topography, occasional bedrock outcrops, and low fertility.

The moderately coarse textured soils make up 25% of the class and are generally limited by varying degrees of shallowness or stoniness. Exceptions are droughtiness of the Avonport and wetness on the Debert and Kentville soils.

All the coarse-textured soils are limited by droughtiness. On these soils the addition of organic matter will improve the moisture-holding capacity and irrigation should be considered.

Table 11. Soils in Capability Class 3, Those with Moderately Severe Limitations

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
Moderately fine	d	Middleton	B–0	463	87
			B–1	831	81
			B–2	120	7
			C–0	1,348	75
			C–1	4,293	68
			C–2	960	71
			D–0	1,147	82
			D–1	3,041	73
			D–2	9,378	42
			E–1	814	64
	s	Wolfville	C–0	96	88
			C–1	407	60
			C–2	1,910	57
			D–1	887	80
			D–2	3,423	49
	t		E–2	344	38
	s	Hantsport	B–2	121	24
			C–2	325	12
	w	Acadia	A–0	5,767	100
		Fash	B–0	498	88
			C–0	1,952	80
			C–1	233	33
			D–0	358	81
				38,716	66
Medium	p	Bridgewater	C–2	1,903	32
			D–1	594	91
			D–2	1,945	52
	tp		D–2	738	72
			E–2	601	64
	p	Morristown	C–2	766	47
			D–2	859	29
		Riverport	B–2	120	20
				7,526	49
Moderately coarse	m	Avonport	B–0	80	9
			C–0	639	91
			C–1	716	84
			D–0	177	100
		Berwick	C–1	130	25
			C–2	104	57
	p	Bridgetown	C–0	241	92
			C–1	630	98
			C–2	946	84
			D–1	590	100
			D–2	1,379	75
		Glenmont	B–1	92	100
			C–1	1,517	95
			C–2	2,318	45
			D–1	460	82
			D–2	236	69

Table 11. Soils in Capability Class 3, Those with Moderately Severe Limitations—Conc.

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
	r	Rossway	D–1	180	58
	w	Kentville	B–0	76	84
			C–0	353	85
			C–1	236	61
			D–1	132	100
	wp		B–1	592	87
			B–2	925	27
			C–1	626	91
			C–2	2,276	39
	p	Annapolis	B–2	52	54
			C–1	334	88
			C–2	176	70
	w	Debert	C–0	73	44
			C–1	127	9
				16,413	69
Coarse	m	Canning	C–0	1,495	76
			D–0	460	68
			D–1	184	74
			D–2	192	78
		Cornwallis	B–0	496	100
		Gulliver	C–1	103	78
			C–2	88	68
		Torbrook	B–1	140	46
			B–2	60	60
			C–2	1,435	42
			D–1	164	71
			D–2	554	50
	x	Kingsport	C–0	127	57
				5,498	64
Total area (Class 3)				68,153	65

Soil Capability Class 4

Soils in this class (Table 12) have severe limitations that restrict the range of crops or require special conservation practices or both. They are suitable for only a few crops, or the yield for a range of crops is low, or the risk of crop failure is high. The limitations may seriously affect such farm practices as the timing and ease of tillage, planting, and harvesting, and the application and maintenance of conservation practices. These soils are low to medium in productivity for a narrow range of crops, but may have higher productivity for a specially adapted crop.

The limitations include the adverse effects of a combination of two or more of those described in Classes 2 and 3 or one of the following: moderately severe climate; very low water-holding capacity; low fertility difficult or unfeasible to correct; strong slopes; severe past erosion; very intractable mass of soil or extremely slow permeability; frequent overflow with severe effects on crops; severe salinity causing some crop failures; extreme stoniness requiring considerable clearing to permit annual cultivation; very restricted rooting zone, but more than 1 ft of soil over bedrock or an impermeable layer.

Table 12. Soils in Capability Class 4, Those with Severe Limitations

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
Moderately fine	r	Middleton	C–2 shallow	140	43
			D–2 shallow	162	12
	w	Kingsville	B–0	84	62
			B–1	49	73
			B–2	925	14
			C–2	903	49
	rp	Wolfville	C–2 shallow	271	83
			D–1 shallow	88	86
			D–2 shallow	273	91
	w	Lawrencetown	B–0	2,584	51
			B–1	1,964	73
			B–2	1,141	24
			C–0	75	91
			C–1	309	28
				8,968	49
Medium	t	Bridgewater	E–2	717	34
	rp	Morristown	C–2 shallow	831	81
			D–2 shallow	564	48
	i	Cumberland	B–0	1,248	75
			B–2	88	100
		Bridgeville	A–0	84	62
			B–0	414	74
				3,946	65
Moderately coarse	tp	Bridgetown	E–2	289	83
	rp		C–2 shallow	104	92
			D–2 shallow	78	79
	p	Gibraltar	C–2	599	65
			D–2	217	74
	rp	Glenmont	D–2	1,173	41
		Rossway	C–2	4,541	25
			D–1	371	27
			D–2	1,393	46
			E–2	238	2
		Roxville	C–2	108	59
				9,111	37
Coarse	t	Canning	E–0	178	68
	m	Cornwallis	B–0	4,562	33
			C–0	3,055	54
		Gulliver	D–1	350	54
			D–2	1,553	38
	t		E–2	87	46
	m	Nictaux	B–0	2,766	40
			C–0	2,949	79
			C–1	329	72
			C–2	433	22
			D–0	783	40
			D–1	519	64
			D–2	1,205	13
		Torbrook	C–0	179	47
			E–2	100	68
	w	Kingsport	B–0	3,194	41
			B–1	68	100
			B–2	60	30
				22,370	46
Total area (Class 4)				44,395	46

These soils occupy 6% of the land area of the County. The moderately fine textured soils have either severe drainage problems or other limitations such as shallowness or stoniness. Only partial correction of drainage can be effected by open ditches. The Bridgeville and Cumberland soils, which are subject to flooding and frost hazard, are difficult or inefficient to work because of field size and shape. The moderately coarse textured soils have severe limitations of stoniness or shallowness. The coarse-textured soils in this class have severe limitations of droughtiness and would be suitable for cash crops only with irrigation and additions of lime, nutrients, and organic matter.

Soil Capability Class 5

Soils in this class (Table 13) are capable only of producing perennial forage crops, but improvement practices are feasible. Soils in this class have such serious soil, climatic, or other limitations that they are not capable of use for sustained production of annual field crops. However, they may be improved by the use of farm machinery for the production of native or tame species of perennial forage plants. Feasible improvement practices include clearing of bush, cultivation, seeding, fertilizing, and water control.

The limitations include the adverse effects of one or more of the following: severe climate; low water-holding capacity; severe past erosion; steep slopes; very poor drainage; very frequent overflow; severe salinity permitting only salt tolerant forage crops to grow; and stoniness or shallowness to bedrock that make annual cultivation impractical.

In Annapolis County the soils are limited in use by wetness, steep slopes, and droughtiness. About 0.5% of the land area of the County has been placed in this class.

Table 13. Soils in Capability Class 5, Those Limited to Perennial Forage Crops

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
Moderately fine	t	Middleton	F–2	619	28
Medium	t	Bridgewater	F–2	453	12
		Morristown	F–2	128	16
	w	Middlewood	B–2	172	19
		Chaswood	A–0	96	75
			B–0	193	73
			B–1	152	66
				1,194	35
Moderately coarse	t	Rossway	F–2	554	9
Coarse	t	Nictaux	E–1	711	0
			E–2	248	11
	w	Millar	B–0	64	25
			B–2	128	31
				1,151	7
Total area (Class 5)				3,518	21

Soil Capability Class 6

Soils in this class (Table 14) are capable only of producing perennial forage crops, and improvement practices are not feasible. They have some natural sustained grazing capacity for farm animals, but have such serious soil, climatic, or other limitations so as to make impractical the application of improvement practices that can be carried out in Class 5. Soils may be placed in this class because their physical nature prevents improvement through the use of farm machinery, or the soils are not responsive to improvement practices, or because of a short grazing season, or because stock-watering facilities are inadequate. Such improvement as may be effected by seeding or fertilizing by hand or by aerial methods shall not change the classification of these soils.

The limitations include the adverse effects of one or more of the following: very severe climate; very low water-holding capacity; very steep slopes; very severely eroded land with gullies too numerous and too deep for working with machinery; severely saline land producing only edible, salt-tolerant, native plants; very frequent overflow allowing less than 10 weeks effective grazing; water on the surface of the soil for most of the year; stoniness or shallowness to bedrock that makes any cultivation impractical.

Where costly clearing is required to change Class 7 to Class 6, those areas are rated as Class 7. In Annapolis County, salt marsh, and cleared land too stony to permit the use of machinery but of use for pasture, have been placed in this class.

Table 14. Soils in Capability Class 6, Those Limited to Unimproved Pasture

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
Moderately fine	i	Salt marsh	A–0	497	100
Moderately coarse	p	Gibraltar	C–3	360	100
			C–4	12	100
			D–4	36	100
			E–3	40	100
		Nictaux	D–3	38	100
				486	100
Total area (Class 6)				983	100

Soil Capability Class 7

Soils in this class (Table 15) have no capability for arable culture or permanent pasture. All classified soils (except organic soils) not included in Classes 1 to 6 are placed in this class.

Class 7 soils may or may not have a high capability for trees, native fruits, wildlife, and recreation. No inference is made as to the capability of the soils and land types in this class beyond the scope of their capability for agriculture.

In Annapolis County the land in this class occupies 80% of the County. The main limitations are shallowness, extreme stoniness, or steep slopes. Almost all this land (98%) is under forest.

Table 15. Soils in Capability Class 7, Those Unsuitable for Agriculture

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
Moderately fine	p	Middleton	B–3	313	9
			C–3	879	18
			C–3 shallow	665	27
			D–3	667	4
			D–3 shallow	1,624	22
	t		F–3	296	27
			G–2	69	0
			G–3	411	0
	p	Kingsville	B–3	179	45
			C–3	49	76
		Wolfville	C–3	832	5
			D–3	1,355	7
			D–3 shallow	10,619	3
			D–4	209	0
			E–3	1,516	17
			E–3 shallow	545	6
			E–4	293	0
	t		G–2	317	0
	p	Hantsport	C–3	135	56
		Lawrencetown	B–3	92	0
			C–4	32	0
				21,097	8
Medium	p	Bridgewater	C–3	10,531	5
			C–4	7,609	0.3
			D–3	1,579	11
			D–4	485	4
			E–3	4,620	9
			E–4	1,964	0
			F–3	381	0
		Morristown	C–3	124	0
			C–3 shallow	6,608	4
			C–4	594	20
			D–3	503	6
			D–4	546	0
			F–3	84	0
			F–4	189	0
		Riverport	B–3	121	0
			B–4	76	0
			C–3	281	1.4
		Middlewood	B–3	1,043	0
			B–4	2,394	0
		Cumberland	B–3	23	52
				39,755	3
Moderately coarse	p	Berwick	D–3	610	7
		Bridgetown	C–3	1,717	9
			C–3 shallow	92	17
			C–4	2,278	1.4
			D–3	16,846	6
			D–3 shallow	2,291	11
			D–4	8,996	0.2
			E–3	1,802	8
			E–4	4,100	0
			F–3	165	12
		Gibraltar	C–3	1,076	45
			C–4	285,273	0.2
			D–3	1,428	40
			D–4	80,267	0.2
			E–3	3,931	1.9
			E–4	14,278	0.3
			F–4	141	0

Table 15. Soils in Capability Class 7, Those Unsuitable for Agriculture—Conc.

Texture	Subclass	Soil series	Soil phase (topography and stoniness)	Acres	Percent cleared
		Glenmont	C-3	3,543	12
			C-4	1,232	7
			D-3	2,193	19
			D-4	320	0
			E-3	181	0
		Halifax	C-3	176	27
			C-4	13,625	0.3
			D-3	72	0
		Rossway	C-3	3,026	8
			C-4	261	0
			D-3	47,631	1.7
			D-4	273	0
			E-3	201	0
			E-4	346	0
	t		G-2	657	0
			G-3	6,199	4
	p	Kentville	B-3	281	1.4
			C-3	1,780	14
			C-4	148	19
			D-3	550	44
		Annapolis	B-3	84	0
			B-4	80	0
			C-3	335	26
		Bayswater	B-4	4,553	0.3
		Danesville	B-4	389	0
		Roxville	B-3	71	0
			C-3	326	1.2
			C-4	437	18
			D-3	180	67
			D-4	60	80
	t		G-3	44	27
	p	Aspotogan	B-4	29,635	0.6
	w	Tiddville	B-2	44	0
	p		B-3	159	15
	r	Rocky land		14,390	0
				558,773	1.2
Coarse	p	Canning	D-3	107	15
		Gulliver	D-3	1,289	11
	t		G-3	32	0
	p	Nictaux	C-3	1,197	0
			C-4	10,853	0.1
			D-3	1,167	6
			D-4	795	4
			E-3	321	0
		Torbrook	C-3	426	7
			C-4	96	0
			D-3	333	16
			D-4	322	0
				16,938	2
Total area (Class 7)				636,563	1.6

Table 16. Distribution of Land in the Different Capability Classes

Capability Class	Acres	Percentage of total land area	Percentage of cleared land in each class
2	2,096	0.3	69
3	68,229	8.6	65
4	44,319	5.6	46
5	3,518	0.5	21
6	983	0.1	100
7	636,563	80.6	1.6
Peat	33,832	4.3	
Total land area	789,540	100.0	
Lakes, rivers, and estuaries	43,818		
Area of County	833,358		

Organic Soils

Organic soils are not rated in the soil capability classes. However, areas of peat are indicated by the letter O on the Land Use Capability Map. None of these areas have been improved for agricultural use. Peat occupies 33,832 acres or 4.3% of the County. The distribution of land in the different capability classes is shown in Table 16.

Ratings of the Soils for Various Crops

The ability of a soil to produce crops depends on the soil environment provided for plants. This environment depends on available nutrients, moisture, aeration, and temperature as well as physical factors such as stoniness, texture, and topography. Although crop yields are the best measure of productive capacity, reliable figures are not available so other information has been used to rate the soils. This information was obtained by observation during the survey, from farmers and other workers, and from our knowledge of the soils involved.

In Table 17 the soils in Capability Classes 2, 3, and 4 are rated on suitability for production of specific crops. These ratings assume good management practices. Also the ratings are general because areas of soil classed as good crop land may contain small parcels of poor crop land. Similarly, soils rated as poor crop land may have value for certain crops.

Table 17. Ratings[1] of the Soils in Capability Classes 2 to 4 for Selected Crops[2]

Series	Acres	Hay	Grain	Apples	Small fruits	Potatoes	Canning crops	Pasture
				Class 2: Good crop land				
Berwick	1,212	F–G	G	G	G	G	G	F–G
Fash	585	G	G	G	G	G	G	G
Kentville	76	G	G	F	F	F	F–G	G
Wolfville	213	G	G	G	F–G	F–G	F–G	G
Total	2,096							

Table 17. Ratings[1] of the Soils in Capability Classes 2 to 4 for Selected Crops[2]—Conc.

Series	Acres	Hay	Grain	Apples	Small fruits	Potatoes	Canning crops	Pasture
				Class 3: Good to fair crop land				
Acadia	5,767	G	G	P	P	F–P	F–P	G
Annapolis	562	G	G	F	F	F	F	G
Avonport	1,612	F	F	P	F–P	F	F	F
Berwick	234	F–G	F–G	G	G	G	G	F
Bridgetown	3,786	F–G	G	G	G	G	G	F–G
Bridgewater	5,781	G	G	F–G	G	G	F–G	G
Canning	2,331	F–G	F–G	F	F–G	F–G	F–G	F–P
Cornwallis	496	P	P	P	F	P	F–P	P
Debert	200	G	F	P	P	F	F	G
Fash	3,041	G	G	F–G	F	P	F	G
Glenmont	4,623	G	G	F–G	G	F–G	F	F–G
Gulliver	191	F–G	F–G	P	F–G	G	F–G	F–G
Hantsport	446	F–G	F–G	P	F	P	P	F–G
Kentville	5,216	G	F–G	F	F	F	F	G
Kingsport	127	F–G	F	P	P	F–P	P	F–G
Middleton	22,395	G	G	G	F–G	F	F–P	G
Morristown	1,625	F–G	F–G	G	G	G	F–P	F–G
Riverport	120	G	F	P	F–P	F	P	G
Rossway	180	G	G	P	F–G	G	F	G
Torbrook	2,353	F–P	F–P	F	F–G	F–G	F	F–P
Wolfville	7,067	G	F–G	F–G	F–G	F	F	G
Total	68,153							
				Class 4: Fair to poor crop land				
Bridgetown	471	F–G	F–G	P	F–G	G	F–G	F–G
Bridgewater	717	G	F–G	F	P	P	P	G
Bridgeville	498	F	P	P	P	P	P	G
Canning	178	F–G	P	P	P	P	P	F–G
Cornwallis	1,617	P	P	P	F–P	F–P	F–P	P
Cumberland	1,336	G	F–P	P	P	P	P	G
Gibraltar	816	F–G	F	P	F	F–G	F	F–G
Glenmont	1,173	F–G	F–G	F–G	F–G	G	F–G	F–G
Gulliver	1,990	F	F–G	P	F–G	G	F	F
Kingsport	3,322	F	F–P	P	P	F–P	P	F
Kingsville	1,961	G	F–P	P	P	P	P	G
Lawrencetown	6,073	G	F–P	F–P	P	P	P	G
Middleton	302	G	G	F–G	F	F–P	F	G
Morristown	1,395	G	G	F–G	F–G	G	F–G	G
Nictaux	8,984	P	P	P	F–P	F–P	P	P
Rossway	6,543	F–G	F–G	P	P	F–G	F	G
Roxville	108	G	F	P	P	F	P	G
Torbrook	279	F–P	F–P	F–P	F–G	P	P	F–P
Wolfville	632	F–G	F–G	P	F	F–G	F	G
Total	44,395							

[1]G, good; P, poor; F–G, fair to good; F–P, fair to poor.
[2]Classes 5 to 7 are unsuitable for crops.

PHYSICAL AND CHEMICAL COMPOSITION OF THE SOILS

The physical and chemical analyses of a soil help us to predict its usefulness for the growth of plants. They also indicate the value and extent of the changes in the parent material due to soil-forming processes, and assist in the classification of soils.

In the County considerable amounts of nutrients, organic matter, iron, aluminum, and clay have been moved from the upper to the lower part of the solum, or from the soil completely. The soils are generally acid, are often low in organic matter, and require lime and fertilizers for satisfactory crop production.

Not all the soils of the County were analyzed, but the data in Tables 18 and 19 show the variation in composition that may be expected among some of the soils. Some of the differences are brought out in the following discussion.

Organic Matter and Nitrogen

The decomposition of organic matter and the production of nitrogen in the soil depend on biological activity, which in turn is governed by temperature, moisture, aeration, acidity, the supply of nutrients, and the amount and kind of organic matter. Decomposition proceeds faster when the temperature is high and the soil is well aerated. Under forest, the annual addition of leaf litter and the decomposition of surface organic matter tend to balance one another, so that organic matter levels remain fairly constant. When the land is cleared a new environment is created. Increased aeration speeds up the decomposition of organic matter and the hazard of erosion losses is greater. The organic matter comes to a new equilibrium with its environment, usually at a lower amount than under forest and with a lower carbon-nitrogen ratio.

The loss of volatile material when the soil is heated in a furnace (the "Loss on ignition" in Table 18) is an indication of the amount of organic matter present, but not all of this volatile material is organic matter. In the surface layers of forested soils this ranges from 60 to 90%. In cultivated soils the range is about 6 to 10%.

In the County the Glenmont and Rossway soils are the highest in organic matter. Some other soils such as the Lawrencetown and Middleton have high organic matter contents in the surface layer, but very little in the rest of the profile. The Middleton and Kingsville soils on the North Mountain were noted in the field to have a higher content of organic matter than their counterparts on the valley floor. Glenmont and Rossway soils also have considerable organic matter in the B horizon and the Canning, Berwick, and Kingsport soils exhibit this feature to a lesser degree.

The effect of organic matter on the soil depends on its state of decomposition. Undecomposed material regulates infiltration of water and helps prevent erosion. As decomposition proceeds, organic residues and colloids act as binding agents on mineral soil particles, improving the structure of the soil mass. Finally a residue known as humus remains. This material is an important source of plant nutrients.

The maintenance of soil organic matter at levels high enough to supply all the nitrogen for a crop is not feasible. Nitrogenous fertilizers can supply a large part of the requirement more economically. However, organic matter should be maintained at a level sufficient to ensure good soil structure in the plow layer. This can be achieved by using a short rotation of grass and legumes with cash crops, and with sufficient applications of manure.

Table 18A. Chemical and Physical Analyses of Representative Soil Profiles

Horizon	Depth inches	Loss on ignition %	pH	Lime required tons/acre	Total N %	Oxalate Fe%	Dithio-nite Fe%	Oxalate Al%	Dithio-nite Al%	Exchange acidity(H)	Exchangeable bases Ca	Mg	K	Gravel %	Total sand (2–0.05 mm) %	Silt (0.05-0.002 mm) %	Clay (less than 0.002 mm) %
										meq per 100 g of soil							
								Kentville sandy loam									
L-F-H	3–0	78.8	4.3		2.0					65.9	3.15	3.03	0.56				
Ahe	0–2	28.1	4.5	12.0	0.80	0.48	0.92	0.78	1.03	28.4	0.89	1.04	0.56	6	18.3	37.6	44.1
Bfhg	2–6	6.5	4.9	6.0	0.13	1.26	2.16	0.64	0.67	15.3	0.76	0.63	0.13	1	54.1	27.8	18.1
Bg	6–11	3.6	4.9	3.9	0.06	0.66	1.60	0.52	0.60	8.3	1.06	1.31	0.10	19	57.6	27.6	14.8
BCg	11–17	1.8	5.1	3.5	0.03	0.60	1.45	0.33	0.35	6.1	1.09	1.28	0.21	27	43.7	37.8	18.5
C	17+	1.0	5.3	2.1	0.01	0.42	1.20	0.18	0.17	1.7	4.07	2.63	0.36	21	48.5	33.7	17.8
								Rossway sandy loam									
L-F-H	2–0	80.8	4.1		1.46					76.3	2.07	1.28	2.38				
Ahe	0–2	18.8	4.5	8.8	0.35	1.20	2.31	1.02	1.06	19.5	0.76	0.99	0.31	10	49.0	36.6	14.4
Bfh1	2–12	10.1	5.2	3.1	0.16	1.07	2.42	2.20	1.60	8.9	0.22	0.09	0.10	34	57.7	36.4	5.9
Bfh2	12–18	7.6	5.4	3.1	0.11	1.18	2.85	1.76	1.48	7.6	0.27	0.18	0.03	33	59.1	35.9	5.0
Bfgj1	18–23	4.4	5.7	2.1	0.06	0.66	1.40	1.53	0.91	4.9	0.39	0.43	0.05	26	65.7	31.9	2.4
Bfgj2	23–30	2.2	6.4	1.4	0.03	0.54	1.48	0.63	0.39	2.7	3.34	2.03	0.13	31	57.2	38.2	4.6
C	30+	3.1	6.0	1.7	0.02	1.10	2.32	0.38	0.27	3.6	8.34	4.95	0.26	16	43.1	47.1	9.8
								Lawrencetown loam									
Ap	0–6	8.4	4.7	5.3	0.62	0.37	0.66	0.18	0.25	10.4	4.16	1.87	0.44	0	41.5	39.5	19.0
Aeg	6–11	1.2	4.9	2.8	0.06	0.20	0.98	0.16	0.20	6.2	3.16	1.67	0.21	22	43.5	34.9	21.6
Bg	11–18	1.6	6.1	0.7	0.02	0.33	1.02	0.17	0.16	2.2	9.41	3.56	0.28	20	48.8	34.0	17.2
BC	18–22	1.1	6.2	0.7	0.02	0.31	1.32	0.16	0.16	1.8	12.37	4.68	0.33	15	41.3	36.1	22.6
C	22+	2.5	6.5	1.0	0.03	0.33	1.78	0.16	0.16	2.6	19.88	6.80	0.44	0	8.1	48.1	43.8
								Middleton clay loam									
Ap[1]	0–6	6.3	5.4	2.8	0.02					6.3	5.74	2.68	0.23	9	41.9	38.8	19.4
L-H	1.5–0	53.7	4.7		0.93					24.6	3.44	3.13	0.90				
Ah	0–2	16.9	4.6	9.2	0.46	0.76	1.70	0.62	0.70	20.2	1.98	1.42	0.46	0.3	36.0	34.0	30.0
Btgj	2–7	4.2	5.0	4.2	0.12	0.62	1.48	0.49	0.57	8.7	0.53	0.34	0.18	23	48.0	11.7	40.3
Bg	7–13	1.6	5.2	2.1	0.02	0.35	1.62	0.23	0.26	4.1	7.03	2.95	0.41	9	37.0	32.9	30.1
BC	13–34	1.0	6.6	0.7	0.02	0.15	1.50	0.18	0.18	1.8	11.54	4.62	0.49	9	31.9	36.6	31.5

[1]Plow layer from North Mountain plateau, Middleton loam.

Table 18B. Chemical and Physical Analyses of Representative Soil Profiles

Horizon	Depth inches	Loss on ignition %	pH	Lime required tons/acre	Total C %	Total N %	Total SiO_2 %	Total R_2O_3 %	Free Fe_2O_3 %	Total CaO %	Total MgO %	Exchange Acidity(H) meq per 100 g of soil	Exchangeable bases Ca meq per 100 g of soil	Exchangeable bases Mg meq per 100 g of soil	Exchangeable bases K meq per 100 g of soil	Gravel %	Total sand (2–0.05 mm) %	Silt (0.05–0.002 mm) %	Clay (less than 0.002 mm) %
									Bridgewater sandy loam										
Ap	0–6	16.0	4.8	9.2	5.47	0.15	60.9	21.4	1.51	0.53	0.86	11.97	1.39	0.18	0.90	6.6	59.0	35.8	5.2
Bfh	6–16	6.2	5.0	3.5	1.98	0.14	62.6	22.4	1.48	0.83	1.25	5.50	0.00	0.16	0.07	30.8	61.2	34.2	4.6
Bf	16–30	3.6	5.3	2.1	0.75	0.07	70.5	20.7	1.37	0.58	0.93	2.97	0.00	0.10	0.05	35.8	56.4	39.8	3.8
C	30+	2.5	5.5	1.0	0.24	0.03	72.9	21.3	0.92	0.62	1.05	0.70	0.04	0.40	0.03	29.2	50.6	42.8	6.6
									Gibraltar sandy loam										
L–H	10–0	95.6	3.2			1.14	3.3	0.2		0.16	0.42	119.4	2.21	6.52	1.17				
Ae	0–4	3.4	3.9	3.5	0.35	0.05	86.2	7.6	0.19	0.57	0.19	5.33	0.08	0.08	0.01	3.8	59.8	37.4	2.8
Bfh	4–6	8.5	4.7	7.4	2.15	0.11	76.4	11.7	0.73	0.61	0.25	10.50	0.03	0.18	0.00	24.7	62.6	35.0	2.4
Bf	6–20	3.6	5.0	2.4	0.97	0.04	81.3	11.5	0.49	0.74	0.27	3.37	0.03	0.06	0.00	15.9	60.6	37.0	2.4
C	20+	0.8	5.0	0.7	0.24	0.01	85.2	9.4	0.11	0.77	0.29	1.23	0.00	0.00	0.00	1.6	55.2	42.4	2.4
									Glenmont loam										
Ap	0–5	19.7	5.6	7.1	8.06	0.50	52.7	22.2	1.68	1.81	2.37	10.1	8.88	2.83		7.8	35.4	46.9	17.7
Ae	5–10	12.5	5.5	5.8	3.39	0.23	56.2	25.4	1.80	1.42	2.41	8.7	1.63	0.52	0.38	19.3	41.2	48.7	10.1
Bfh1	10–18	10.4	5.5	5.5	2.54	0.18	58.5	25.6	1.80	1.45	2.46	8.4	1.05	0.36	0.20	20.4	39.2	51.3	9.5
Bfh2	18–28	8.2	5.9	3.5	1.72	0.14	61.2	24.6	1.60	1.67	2.47	5.9	2.86	1.22	0.50	20.1	40.0	51.2	8.8
C	28+	4.3	5.9	1.2	0.15	0.02	64.0	24.5	1.43	1.73	2.81	1.9	7.85	5.89	0.54	8.3	38.9	48.2	12.9
									Acadia silt loam										
Ap	0–10	7.1	5.6	2.8		0.23	65.8	18.4		0.95	1.22	6.73	8.50	2.33	0.24		17.2	63.0	19.8
Cg	10–24	5.8	5.1	6.0		0.16	64.4	26.2		0.52	1.57	9.67	2.39	3.50	0.33		10.4	53.8	35.8
									Nictaux sand										
L–H	2–0	79.3	4.3		45.00	0.88	17.4	1.9		0.62	0.28	46.2	11.24	3.28	1.17				
Ae	0–9	0.56	4.2	1.4	0.24	0.03	90.2	6.3	0.16	0.13	0.05	2.5	0.09	0.04	0.02	32.0	88.5	10.5	1.0
Bfhc	9–18	2.63	5.0	2.4	0.39	0.04	82.3	12.7	0.11	0.11	0.23	3.3	0.09	0.10	0.03	38.5	94.3	3.7	2.0
Bfhcj	18–36	1.47	5.4	1.4	0.20	0.06	86.1	9.8	1.00	0.18	0.20	1.6	0.09	0.06	0.02	12.7	97.5	2.0	0.5
C	36+	1.17	5.3	1.0	0.17	0.18	87.5	7.7	0.25	0.17	.29	1.3	0.09	0.16	0.04	13.7	92.5	6.9	0.6

NOTE: The data for Bridgewater, Gibraltar, Glenmont, and Nictaux soils are derived from representative profiles located outside but adjacent to Annapolis County.

Table 19. Available Nutrients in Pounds per Acre[1] in Horizons of Representative Soils

Series	Horizon	Depth inches	Ca	Mg	K	P
Kentville	L–F–H	3–0	122	71	45	6
	Ahe	0–2	359	253	437	62
	Bfhg	2 6	306	153	101	24
	Bg	6–11	427	318	78	16
	BCg	11–17	439	311	164	13
	C	17+	1,640	639	281	58
Rossway	L–F–H	2–0	80	30	193	13
	Ahe	0–2	306	241	242	6
	Bhf	2–12	89	22	78	6
	Bfh	12–18	109	44	23	10
	Bfgj1	18–23	157	104	39	6
	Bfgj2	23–30	1,346	493	101	12
	C	30+	3,361	1,203	203	18
Lawrencetown	Ap	0–6	1,676	454	343	22
	Acg	6–11	1,273	406	164	8
	Btg	11–18	3,792	865	218	108
	BCg	18–22	4,985	1,137	257	252
	C	22+	8,012	1,652	343	404
Middleton	Ap[2]	0–6	2,313	651	179	34
	L–H	1.5–0	1,331	73	73	4
	Ah	0–2	798	345	359	96
	Btgj	2–7	214	83	140	18
	Bg	7–13	2,833	717	320	12
	BC	13–34	4,651	1,123	382	380
Acadia	Ap	0–10	3,425	566	187	86
	Cg	10–24	963	850	257	18
Bridgewater	Ap	0–6	560	44	702	
	Bfh	6–16		39	55	
	Bf	16–30		24	39	
	C	30+	16	97	23	
Gibraltar	L–H	10–0	86	152	95	
	Ae	0–4	32	19	8	
	Bfh	4–6	12	44		
	Bf	6–20	12	15		
	C	20+				
Glenmont	Ap[2]	0–5	3,579	688		2
	Ae	5–10	657	126	296	4
	Bfh1	10–18	423	87	156	1
	Bfh2	18–28	1,153	296	390	3
	C	28+	3,164	1,431	421	15
Nictaux	L–H	2–0	435	76	95	4
	Ae	0–9	36	10	16	24
	Bfhc	9–18	36	24	23	12
	Bfhcj	18–36	36	15	16	14
	C	36+	36	39	31	34

[1]Calculated on the basis of 2,000,000 lb of soil per acre to a depth of 6 inches for each horizon, except that organic horizons were calculated on the basis of 193,000 lb per acre.

[2]Plow layer from North Mountain plateau.

Note: Data for Bridgewater, Gibraltar, Glenmont, and Nictaux series are from representative profiles located outside but adjacent to Annapolis County.

pH

The term pH is used to express the acidity or alkalinity of a soil. Values below 7 represent increasing degrees of acidity and those above indicate alkalinity. Soils become acid through leaching. Products of the decomposition of surface organic matter move down through the soil with percolating water and remove cations, including nutrient ions, from the surfaces of soil colloids. Sandy soils contain less colloidal material and therefore become acid more rapidly than finer textured soils. Acidity affects the solubility and availability of many plant nutrients, and restricts the growth of microorganisms and the production of nitrogen in the soil. In the County all the soils are acid and to obtain satisfactory crop yields their pH must be raised by liberal liming.

Exchangeable Bases

The capacity of a soil to hold exchangeable cations gives some indication of the nutrients available for plant growth and the response of the soil to fertilizer applications. Organic matter, the clay fraction, and colloidal material possess the ability to hold elements such as Ca, Na, Mg, K, and others on their surfaces in the form of ions. These are readily available to plants. Generally any cation can be replaced by another. By washing the soil with a solution containing the appropriate element, it is possible to displace all the cations in turn and thus obtain a measure of the cation-exchange capacity of the soil and of the individual elements held there. The exchange capacity is usually within the range of 2 to 50 meq per 100 g of soil.

The data (Tables 18 and 19) show that most soils are low in exchangeable bases. Soils with markedly higher levels of available Ca and Mg include the Acadia, Lawrencetown, Fash, Middleton, Kentville, Wolfville, Glenmont, and Rossway soils. Available K reaches moderate to high levels in the Acadia, Lawrencetown, and Glenmont soils; the Fash, Middleton, Kentville, Wolfville, and Rossway soils have somewhat higher levels than the remaining soils of the County, which are very deficient in this important plant nutrient.

Phosphorus

Between one third and one half of the P in soil occurs as organic phosphates; the rest is derived chiefly from the rock mineral, apatite. Phosphate in the soil, whether natural or applied as fertilizer, is very slowly soluble, especially under acid conditions. Only a small proportion of it is in a form available to plants; however, unlike other plant nutrients, almost no phosphate is leached out of the soil.

The data in Table 19 give some indication of the amounts of available P in some of the soils of the County. Variability between soils and between horizons in the same soil is governed by their acidity and organic content. A higher pH, as in the lower layers of the Lawrencetown soils, releases a greater amount of phosphate in available form, even in the absence of organic matter. A high content of organic matter raises phosphate levels, but under acid conditions these levels are limited by the slowness of decomposition. This influence is shown in the upper layers of the Rossway soils.

Iron and Aluminum

Iron and aluminum in combination with organic matter have certain beneficial effects on soil structure and cation-exchange capacity, particularly in the B horizon of soils. Knowledge of the distribution and movement of these elements in the soil profile is of prime importance in understanding the nature of prevailing soil processes, and in differentiating certain classes of soil. It further aids interpretation of other chemical and physical characteristics of soils.

Most soils contain appreciable Fe and Al; the amounts vary with the parent material. These elements are leached through the soil in percolating water and a large proportion is deposited in the B horizon. Many soil separations are based on the extent of this process, the proportion of translocated Fe and Al to translocated organic matter, and the degree to which the process is interrupted by poor soil drainage.

In Table 18, the amounts measured in dithionite extracts from the soil include most of the Fe and Al occurring in crystalline oxides in unweathered soil material in addition to that which has entered the leaching process. The oxalate extracts include, for the most part, only the active Fe and Al, that is, the proportion of the total that has been leached or is available for leaching. This occurs as amorphous oxides in the soil.

Comparison of the oxalate Fe and Al in a given soil horizon with that in the parent material gives some indication of the intensity of podzolization and the depth to which soil forming processes have penetrated. This is evident in the data for the Kentville and Middleton soils. The oxalate Fe figure is of less value in poorly drained soils, such as the Lawrencetown soils, in which active Fe may be locked up in secondary crystalline oxides. The unusually high value for oxalate Fe in the C of the Rossway soils may be due to the presence of olivine and hornblende in the basalt-rich parent material.

Physical Composition

The soils of the County vary widely in texture. Soil texture is determined by the proportion of particles of different size grades. These are divided into three basic groups, or fractions: clay (less than 0.002 mm effective spherical diameter), silt (0.002–0.05 mm), and sand (0.05–2 mm). Texture is determined on the material less than 2 mm diameter, called the fine earth, and therefore disregards gravel.

Soil textural names, such as sandy clay loam and silt loam, given to various combinations of the three size grades are shown graphically in Fig. 15, and are defined in the glossary. The general term fine-textured refers to a soil with a high proportion of clay and silt; coarse-textured indicates a preponderance of sand.

The amounts of sand, silt, and clay in some soils of the County are given in Table 18.

Methods of Analyses

pH was determined electrometrically.

Loss on ignition, total silica, sesquioxides, calcium, magnesium, nitrogen, and exchangeable bases were determined by methods given in A.O.A.C. Methods of Analysis, 6th Ed; 1945. Exchangeable potassium was determined by the flame photometer.

Available phosphorus was determined by the method of E. Truog (J. Amer. Soc. Agron. 1930. 22:874).

Free iron was determined by the method of V. J. Kilmer (Soil Sci. Soc. Amer. Proc. 1960. 24:420–425).

Oxalate and dithionite extractable iron and aluminum were determined by the method of J. A. McKeague and J. H. Day (Can. J. Soil Sci. 1966. 46:13–22).

Physical analysis was done by the method of V. J .Kilmer and L. T. Alexander (Soil Sci. 1949. 68:15–24), with modifications by J. A. Toogood and T. W. Peters (Can. J. Agr. Sci. 1953. 33:159–171).

Table 20. Acreages of the Soil Series and Phases and Percentages of the Total Land Area

Phase	Acres	Percentage of land area
	Acadia series	
A–0	5,767	0.73
	Annapolis series	
B–2	52	
B–3	84	
B–4	80	
C–1	334	
C–2	176	
C–3	335	
Total	1,061	0.13
	Aspotogan series	
B–4	29,635	3.75
	Avonport series	
B–0	80	
C–0	639	
C–1	716	
D–0	177	
Total	1,612	0.21
	Bayswater series	
B–4	4,553	0.58
	Berwick series	
C–0	149	
C–1	1,122	
C–2	104	
D–0	71	
D–3	610	
Total	2,056	0.26
	Bridgetown series	
C–0	241	
C–1	630	
C–2	946	
C–2 shallow	104	
C–3	1,717	
C–3 shallow	92	
C–4	2,278	
D–1	590	
D–2	1,379	
D–2 shallow	78	
D–3	16,846	
D–3 shallow	2,291	
D–4	8,996	
E–2	289	
E–3	1,802	
E–4	4,100	
F–3	165	
Total	42,544	5.39
	Bridgeville series	
A–0	84	
B–0	414	
Total	498	0.06

Phase	Acres	Percentage of land area
	Bridgewater series	
C–2	1,903	
C–3	10,531	
C–4	7,609	
D–1	594	
D–2	2,683	
D–3	1,579	
D–4	485	
E–2	1,318	
E–3	4,620	
E–4	1,964	
F–2	453	
F–3	381	
Total	34,120	4.32
	Canning series	
C–0	1,495	
D–0	460	
D–1	184	
D–2	192	
D–3	107	
E–0	178	
Total	2,616	0.33
	Chaswood series	
A–0	96	
B–0	193	
B–1	152	
Total	441	0.06
	Cornwallis series	
B–0	5,058	
C–0	3,055	
Total	8,113	1.03
	Cumberland series	
B–0	1,248	
B–2	88	
B–3	23	
Total	1,359	0.17
	Danesville series	
B–4	389	0.05
	Debert series	
C–0	73	
C–1	127	
Total	200	0.03

Table 20. Acreages of the Soil Series and Phases and Percentages of the Total Land Area—Cont.

Phase	Acres	Percentage of land area
	Gibraltar series	
C-2	599	
C-3	1,436	
C-4	285,285	
D-2	217	
D-3	1,428	
D-4	80,303	
E-3	3,971	
E-4	14,278	
F-4	141	
Total	387,658	49.10
	Glenmont series	
B-1	92	
C-1	1,517	
C-2	2,318	
C-3	3,543	
C-4	1,232	
D-1	460	
D-2	1,409	
D-3	2,193	
D-4	320	
E-3	181	
Total	13,265	1.68
	Gulliver series	
C-1	103	
C-2	88	
D-1	350	
D-2	1,553	
D-3	1,289	
E-2	87	
G-3	32	
Total	3,502	0.44
	Fash series	
B-0	857	
C-0	2,188	
C-1	233	
D-0	358	
Total	3,636	0.46
	Halifax series	
C-3	176	
C-4	13,625	
D-3	72	
Total	13,873	1.76
	Hantsport series	
B-2	121	
C-2	325	
C-3	135	
Total	581	0.07
	Kentville series	
B-0	76	
B-1	592	
B-2	925	
B-3	281	
C-0	429	
C-1	862	
C-2	2,276	
C-3	1,780	
C-4	148	
D-1	132	
D-3	550	
Total	8,051	1.02
	Kingsport series	
B-0	3,194	
B-1	68	
B-2	60	
C-0	127	
Total	3,449	0.44
	Kingsville series	
B-0	84	
B-1	49	
B-2	925	
B-3	179	
C-2	903	
C-3	49	
Total	2,189	0.27
	Lawrencetown series	
B-0	2,584	
B-1	1,964	
B-2	1,141	
B-3	92	
C-0	75	
C-1	309	
C-4	32	
Total	6,197	0.79
	Middleton series	
B-0	463	
B-1	831	
B-2	120	
B-3	313	
C-0	1,348	
C-1	4,293	
C-2	960	
C-2 shallow	140	
C-3	879	
C-3 shallow	665	
D-0	1,147	
D-1	3,041	
D-2	9,378	
D-2 shallow	162	
D-3	667	
D-3 shallow	1,624	

Table 20. Acreages of the Soil Series and Phases and Percentages of the Total Land Area—Cont.

Phase	Acres	Percentage of land area
Middleton series—Concl.		
E–1	814	
F–2	619	
F–3	296	
G–2	69	
G–3	411	
Total	28,240	3.58
Middlewood series		
B–2	172	
B–3	1,043	
B–4	2,394	
Total	3,609	0.46
Millar series		
B–O	64	
B–2	128	
Total	192	0.02
Morristown series		
C–2	766	
C–2 shallow	831	
C–3	124	
C–3 shallow	6,608	
C–4	594	
D–2	859	
D–2 shallow	564	
D–3	503	
D–4	546	
F–2	128	
F–3	84	
F–4	189	
Total	11,796	1.49
Nictaux series		
B–0	2,766	
C–0	2,949	
C–1	329	
C–2	433	
C–3	1,197	
C–4	10,853	
D–0	783	
D–1	519	
D–2	1,205	
D–3	1,205	
D–4	795	
E–1	711	
E–2	248	
E–3	321	
Total	24,314	3.08
Riverport series		
B–2	120	
B–3	121	
B–4	76	
C–3	281	
Total	598	0.08
Rossway series		
C–2	4,541	
C–3	3,026	
C–4	261	
D–1	551	
D–2	1,393	
D–3	47,631	
D–4	273	
E–2	238	
E–3	201	
E–4	346	
F–2	554	
G–2	657	
G–3	6,199	
Total	65,871	8.34
Roxville series		
B–3	71	
C–2	108	
C–3	326	
C–4	437	
D–3	180	
D–4	60	
G–3	44	
Total	1,226	0.16
Tiddville series		
B–2	44	
B–3	159	
Total	203	0.03
Torbrook series		
B–1	140	
B–2	60	
C–0	179	
C–2	1,435	
C–3	426	
C–4	96	
D–1	164	
D–2	554	
D–3	333	
D–4	322	
E–2	100	
Total	3,809	0.48

Table 20. Acreages of the Soil Series and Phases and Percentages of the Total Land Area—Conc.

Phase	Acres	Percentage of land area
Wolfville series		
C–0	96	
C–1	620	
C–2	1,910	
C–2 shallow	271	
C–3	832	
D–1	887	
D–1 shallow	88	
D–2	3,423	
D–2 shallow	273	
D–3	1,355	
D–3 shallow	10,619	
D–4	209	
E–2	344	
E–3	1,516	
E–3 shallow	545	
Wolfville series—Concl.		
E–4	293	
G–2	317	
Total	23,598	2.99
Miscellaneous soils		
Peat	33,832	4.28
Salt marsh	497	0.06
Rocky land	14,390	1.82
Total	48,719	6.17
Total land area	789,540	100.00
Lakes and rivers	43,818	
Total area	833,358	

GLOSSARY

Alluvium—Sediment deposited by streams.

Available nutrients—Nutrients capable of being taken up by plants at a rate important in crop production.

Consistence—The degree and kind of cohesion or adhesion of the soil mass, or its resistance to deformation or rupture.

Drift—Material deposited by glacial ice or by meltwater from a glacier.

Eluviated Gleysol great group—In this group are Gleysolic soils with or without an Ah horizon under virgin conditions and with Aeg and Btg horizons. They may have up to 12 inches of consolidated peat on the surface.

Fera Gleysol subgroup—Soils of this subgroup have an A, B, C, horizon sequence, a noncalcareous Ah or Ap horizon containing less than 3% organic matter and a high chroma, strongly gleyed B horizon with an accumulation of dithionite extractable Fe (1% greater than in the C horizon) and little or no accumulation of dithionite extractable Al (no more than 0.5% higher than the C horizon). They may have up to 12 inches of consolidated peat on the surface.

Ferro-Humic Podzol great group—Soils that under virgin conditions have organic surface horizons (L, F, H), light colored eluvial horizons (Ae, or Aej) and with dark (generally with chroma and value of 3 or less) illuvial horizons (Bhf) in which organic matter and sesquioxides are the main accumulation products. The upper 4 inches of the B horizon contains more than 10% organic matter and the organic matter to Fe ratio is less than 20. The Bhf horizon is generally underlain by Bfh or Bf horizons. The solum is acid.

Glaciofluvial material—Material sorted and deposited by water that originated from the melting of glacial ice.

Gleyed soil—A dull-colored soil with yellow and gray mottling, due to partial oxidation and reduction of Fe through intermittent saturation with water in the presence of organic matter.

Gleysolic order—Soils of this order are saturated with water at some season, or are artificially drained. They have developed under hydrophytic vegetation or may be expected to produce hydrophytic vegetation if left undisturbed. They may have an organic horizon less than 12 inches thick, or an Ah horizon, or both. The B and C horizons are dull colored and mottled.

Gleysol great group—In this great group are Gleysolic soils that have an Ah horizon not more than 3 inches thick under virgin conditions. When mixed to a depth of 6 inches, this layer (Ap) has less than 3% organic matter or it differs from the next underlying horizon (Ae, B, or C) by not more than 1.5 Munsell units of value when moist if the underlying horizon has a value of 4 or more than 1 unit if the underlying horizon has a value of 3 or less. There may be up to 12 inches of peat on the surface.

Gravel—Rock fragments 2 mm to 3 inches in diameter.

Gray Wooded (Gray Luvisol) great group—Soils with organic surface horizons (L–H), with light-colored eluviated horizons (Ae) and with illuvial horizons (Bt) in which clay is the main accumulation product. An increase in dithionate extractable Fe and small increases of organic matter are often associated with the accumulation of clay, but increases in oxalate extractable Fe and Al are not significant. The organic matter content and color of the Ap may vary considerably.

Humo-Ferric Podzol great group—Soils that under virgin conditions have organic surface horizons (L,F,H), light-colored eluvial horizons (Ae) and with Bfh, Bf horizons generally having a chroma of 4 or more, but the average organic matter content of the upper 4 inches of B horizon is less than 10%. In the Bfh and Bf horizons Fe + Al (oxalate extraction) exceeds that of the C horizon by about 0.8% or more and the organic matter to oxalate Fe ratio is less than 20. The solum is acid.

Horizon—A layer in the soil approximately parallel to the land surface and differing from adjacent layers in properties such as color, structure, texture, consistence, and biological and chemical characteristics.

The main organic horizons are as follows:

L— An organic layer characterized by accumulation of organic matter in which the original structures are recognizable.

F— An organic layer characterized by accumulation of partly decomposed organic matter. The original structures are recognizable with difficulty.

H— An organic layer characterized by accumulation of decomposed organic matter in which the original structures are not recognizable.

The main mineral horizons are as follows:

A— A mineral horizon or horizons formed at or near the surface in the zone of removal of materials in solution and suspension, or maximum in situ accumulation of organic matter or both. It includes horizons in which organic matter has accumulated as a result of biological activity (Ah); horizons that have been eluviated of clay, Fe, Al, organic matter (Ae) or all of them; horizons similar to the above but transitional to the underlying B or C horizon (AB or A and B); and horizons markedly disturbed by cultivation or pasturing (Ap).

B— A mineral horizon or horizons characterized by one or more of the following: an enrichment of silicate clay, iron, aluminum, or organic matter alone or in combination (Bt, Bf, Bfh, Bhf, Bh); an alteration by hydrolysis or oxidation to give a conspicuously darker, stronger, or redder color than overlying, underlying horizons in the same sequum (Bm) or both; a prismatic or columnar structure characterized by the presence of exchangeable sodium or Mg (Bn) or both.

C— A mineral horizon or horizons not appreciably affected by the soil-forming processes indicated in A and B, excepting the process of gleying and the accumulation of dolomite and salts more soluble in water (Cca, Csa, Cg and C).

The mineral subhorizons described in this report are denoted by the following lower-case suffices:

- c— A horizon cemented by soil-forming processes.
- e— A horizon characterized by removal of clay, Fe, Al, or organic matter; usually lighter colored than the layer below.
- f— A horizon enriched with hydrated Fe.
- g— A horizon characterized by permanent or periodic reduction and gray colors, often mottled.
- h— A horizon enriched with organic matter. When used with A, it must be at least one Munsell unit of value darker than the horizon immediately below.
- j— A symbol showing that the property indicated by the suffix before it is weakly expressed.
- k— A horizon enriched with carbonate.
- m— A horizon slightly altered by hydrolysis, oxidation, solution, or all of them to give a change in color or structure or both.
- p— A layer disturbed by the activities of man; used only with A.
- s— A horizon enriched with salt, including gypsum.
- t— A horizon enriched with silicate clay.

Humic Gleysol great group—In this group are Gleysol soils that have an Ah horizon more than 3 inches thick under virgin conditions. When mixed to a depth of 6 inches, this layer (Ap) has more than 3% organic matter; on being rubbed or crushed it is darker in color than 3.5 on the Munsell scale when moist (5.0 when dry), and is at least 1.5 units of value (moist) darker than the next underlying horizon (Ae, B, or C). There may be up to 12 inches of peat on the surface.

Illuviation—The process of removal of soil material from one horizon to another.

Mor—Organic matter that rests, with little incorporation on the uppermost mineral or organic-mineral horizon.

Mottles—A variegated pattern of spots and streaks of colors, usually yellows and grays, sometimes blues, indicating poor drainage.

Munsell color notation—A color designation system based on the three simple variables of color; hue, value, and chroma. Hue is the dominant color, value indicates the degree of lightness or darkness of a color in relation to a neutral gray shade, and chroma indicates the strength or degree of departure of a particular hue from a neutral gray of the same value. In writing the Munsell notation, the order is: hue, value, chroma, with a space between the hue letter and the succeeding value number, and a virgule between the two numbers for value and chroma, e.g., 5 YR 5/6 is a soil with hue 5YR, value 5, and chroma 6. It is called yellowish red.

Ortstein—This is a B horizon that is irreversibly cemented with Fe and humus.

Parent material—The unaltered or practically unaltered mineral material from which the solum develops.

Peat—Unconsolidated soil material consisting largely of undecomposed or partly decomposed organic matter accumulated under conditions of excessive moisture.

Ped—A soil aggregate.

Percolation—Downward movement or flow of water through the soil when it is saturated.

Permeability—The ease with which air, water, or plant roots penetrate into or through the soil to all parts of the profile. Classes of permeability are: slow, moderate, and rapid.

pH—The intensity of acidity or alkalinity expressed as the logarithm of the reciprocal of the hydrogen-ion concentration. With this notation, pH 7 is neutral; lower values indicate acidity, higher values alkalinity.

The classes of acidity are as follows:

Slightly acid	pH 6.1 to 6.5
Medium acid	5.6 to 6.0
Strongly acid	5.1 to 5.5
Very strongly acid	4.5 to 5.0
Extremely acid	below 4.5

Podzolization—The process by which, under good or imperfect drainage, forested soils develop light-colored eluviated (Ae) horizons and illuvial (B) horizons with accumulations of sesquioxides, organic matter, clay, or any combination of these.

Profile—A vertical section of a soil through all its horizons and extending into the parent material.

Rego Gleysol subgroup—Gleysol soils with an Ah or Ap horizon that grades into dull-colored, gleyed parent material. There may be up to 12 inches of peat on the surface.

Rego Humic Gleysol subgroup—Humic Gleysol soils with an Ah or Ap horizon that grades into dull-colored, gleyed parent material. There may be up to 12 inches of peat on the surface.

Regosolic order—Well and imperfectly drained soils with good to moderate oxidizing conditions having horizon development too weak to meet the requirements of soils in any other order. Soils with non-Chernozemic Ah horizons may be included.

Regosol great group—Includes all Regosolic soils covered in the definition for the Regosolic order.

Relief—The elevations or inequalities of the land surface when considered collectively.

Rooting Zone—That portion of the soil in which roots grow. Root growth may be prevented by an impermeable horizon, a free water table, or a coarse-textured droughty horizon.

Soil series—A group of soils formed from the same parent material and having horizons similar in characteristics and arrangement except for the texture of the surface soil.

Solum—The part of the soil profile above the C horizon, or the A and B horizons.

Structure—The arrangement of primary soil particles or aggregates, the aggregates being separated by surfaces of weakness. There are four main types of structure: structureless, platelike, prismlike, and blocklike. These may be subdivided into kinds of structure based on the arrangement of the faces and edges of the aggregates. The following kinds of structure are mentioned in this report:

Blocky—Having blocklike aggregates with sharp, angular corners.

Granular—Having more or less rounded aggregates, with no smooth faces or edges.

Single-grained—In individual, noncoherent particles.

Massive—In a cohesive mass, with no observable aggregation of particles.

Platy—In thin, horizontal plates; the horizontal axis is longer than the vertical one.

The class of structure depends on the size of the aggregates and may range from very fine to very coarse. The degree of development or grade of structure is defined as weak, moderate, or strong.

Subsoil—The part of the soil below the plow layer.

Texture—The percentages of sand, silt, and clay in a soil determine its texture. Particles 2 to 0.05 mm in diameter are called sand, those 0.05 to 0.002 mm are called silt, and those below 0.002 mm are called clay. The ranges of each in the various textural classes are shown in Fig. 15. Sands are coarse textured, loams are medium textured, and clays are fine textured.

Till—Glacial drift deposited by the ice with little or no transportation by water. It is usually an unstratified, unconsolidated, heterogeneous mixture of clay, silt, sand, and gravel, and sometimes boulders.

Varves—A succession of thin layers of material, usually coarse grained at the base and fine grained at the top. They are usually found in glacial lake deposits.

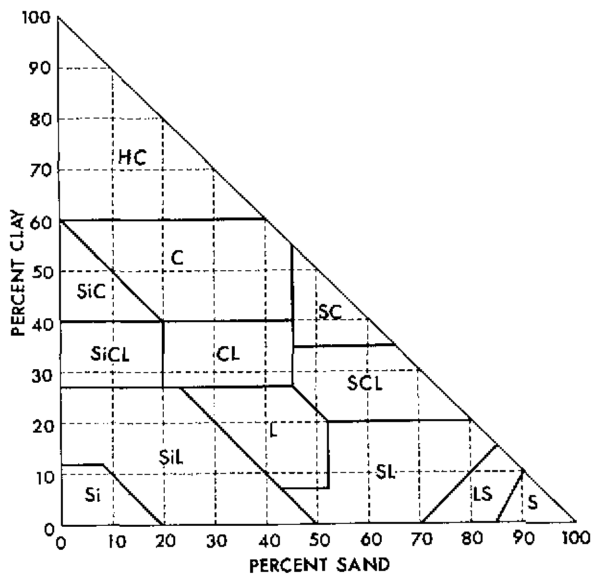

Fig. 15. Percentages of clay, silt, and sand in the main soil textural classes.

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