SOIL SURVEY

of

Lunenburg County

Nova Scotia

by

D. B. CANN

Canada Department of Agriculture
Experimental Farms Service

and

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REPORT No. 7—NOVA SCOTIA SOIL SURVEY

TRURO, NOVA SCOTIA

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
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INTRODUCTION

This report deals with the soils of Lunenburg County. The first part of the report is concerned with a general description of the area and a discussion of the soil-forming factors and their effect on soil development. The latter part of the report describes the characteristics of the individual soils, their use and management, and their place in the agriculture of the county. A particular combination of soils and topography has restricted most of the agriculture of the area to the oval-shaped hills or drumlins and has resulted in a selective use of land not usually found elsewhere in the province.

The report is accompanied by a soil map showing the location and areal distribution of the various soil types. Due to the scale of mapping, the variations on a single farm may not appear on the map, but the principal soil types are shown and their variations are described in the text.

Farmers or others who are interested in a particular piece of land should first locate the area on the soil map. The soils may then be identified by their color and symbol as they appear in the legend on the margin of the map. Specific information on the individual soils can then be obtained from the text. The essential information on any soil can be found without reading the whole report. Further useful information is contained in the sections on the use and management of the soils and their suitability for use.

Readers who are interested in the broader aspects of soil conservation, wildlife conservation, highway planning, or land settlement will find useful information throughout the report.

GENERAL DESCRIPTION OF THE AREA

Location and Extent

Lunenburg County lies on the southern coast of Nova Scotia between 44°10′ and 44°55′ north latitude and between 64°00′ and 64°55′ west longitude. It is bounded on the north by Annapolis and Kings counties, on the east by Hants and Halifax counties, on the south by the Atlantic ocean, and on the west by Queens county. The greatest distance from east to west is 40 miles and from north to south, 38 miles. The county has an area of 767,808 acres or about 1,200 square miles.

The principal town is Bridgewater, situated on the Lahave river. It is 70 miles west of Halifax and 150 miles east of Yarmouth. Other important urban centers are Lunenburg, Mahone Bay, and Chester. The villages of New Germany, New Ross, Barss Corner, Hemford, Northfield, and Chester Basin are farming centers, while fishing is the principal occupation at Blandford, Lahave, Western Shore, Riverport, Petite Riviere, Vogler's Cove, and Dublin Shore.

Settlement and Population

Lunenburg county was one of the first areas in the province to be settled. In 1632 some 300 settlers under Razilly established themselves at Lahave. By 1634 there were forty families in the village and the first school in Canada had been founded by Franciscan monks. In 1636 the colony was moved to Port Royal, but settlement was renewed in 1654.

The town of Lunenburg was settled in 1753 when about 1,500 German, French, and Swiss settlers were given land in that area. Later, many of the French migrated to other parts of the province, but the Germans remained and built a prosperous community. Their language and customs have been retained to the present day.

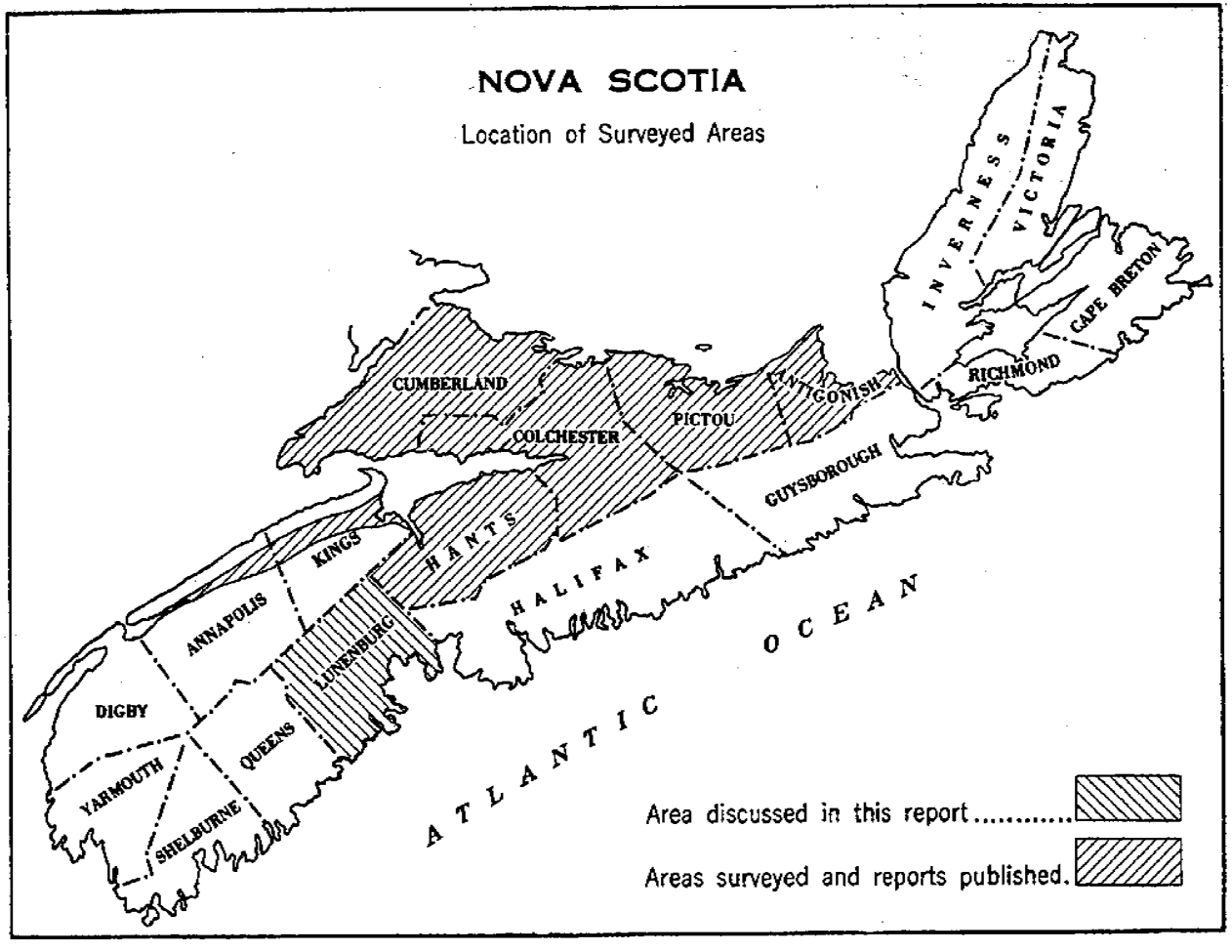

Figure 1. Location of the surveyed area.

The 1951 census gives the population of Lunenburg county as 33,256 persons. Of these, about 24 per cent are urban and the remainder are rural dwellers. Of the rural population, only 41 per cent are engaged in farming, the remainder being occupied chiefly by fishing or lumbering. The trend of population over the past seventy years shows a steady increase. This is illustrated in Figure 2.

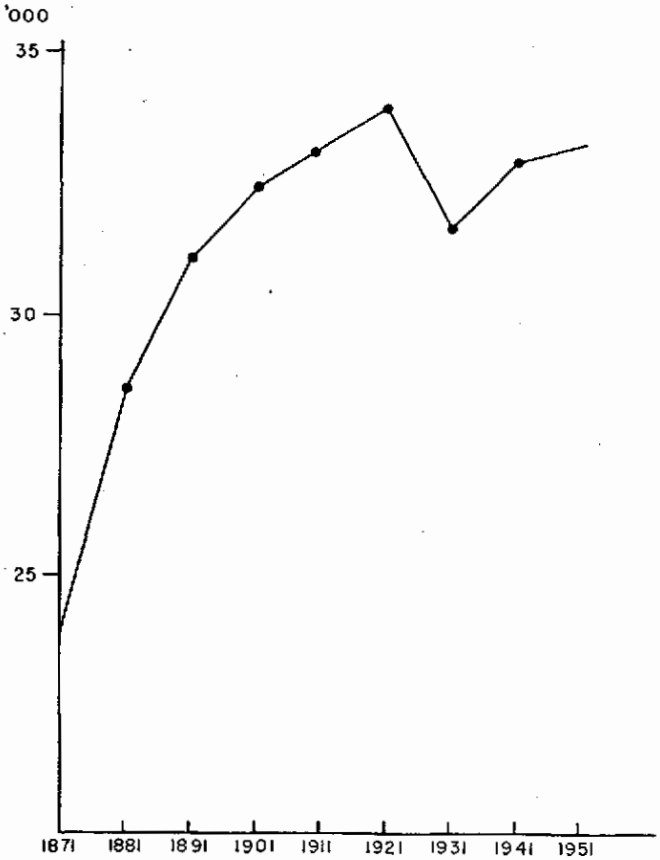

Figure 2. Trend of population in Lunenburg County.

The population is largely of German stock or from British Isles races, with a small proportion of other races. The racial origin of the population is given in Table I.

TABLE I. RACIAL ORIGIN OF POPULATION 1951

British Isles races	11,854
German	15,531
Netherlands	1,482
French	2,894
All others	1,495
Total	33,256

Transportation and Markets

Lunenburg county is well supplied with roads and railway facilities for getting products to market. The principal roads are shown in Figure 3. It may also be noted that Lunenburg county has numerous harbors which

facilitate shipment by water. Lunenburg, Mahone Bay, Bridgewater, and Lahave are the principal ports, and goods are shipped by water to all parts of the world. Considerable farm produce is grown on the numerous islands along the coast and this is brought to market by boat.

A paved highway and rail facilities connect the principal towns with the Annapolis Valley at Middleton, making shipping facilities available on both the north and south shores of the province.

Most of the farm produce is consumed locally. Large quantities of cabbage are grown for the manufacture of sauerkraut and this product is an important agricultural export. Other exports are milk and eggs, fresh and processed fish, pulpwood, and lumber.

Industries

Several non-agricultural industries are found in Lunenburg county. In Bridgewater, the manufacture of gas engines and building materials, and fruit and vegetable canning are important sources of income and employment. Lunenburg supports a shipbuilding and ship-fitting industry, as well as fish

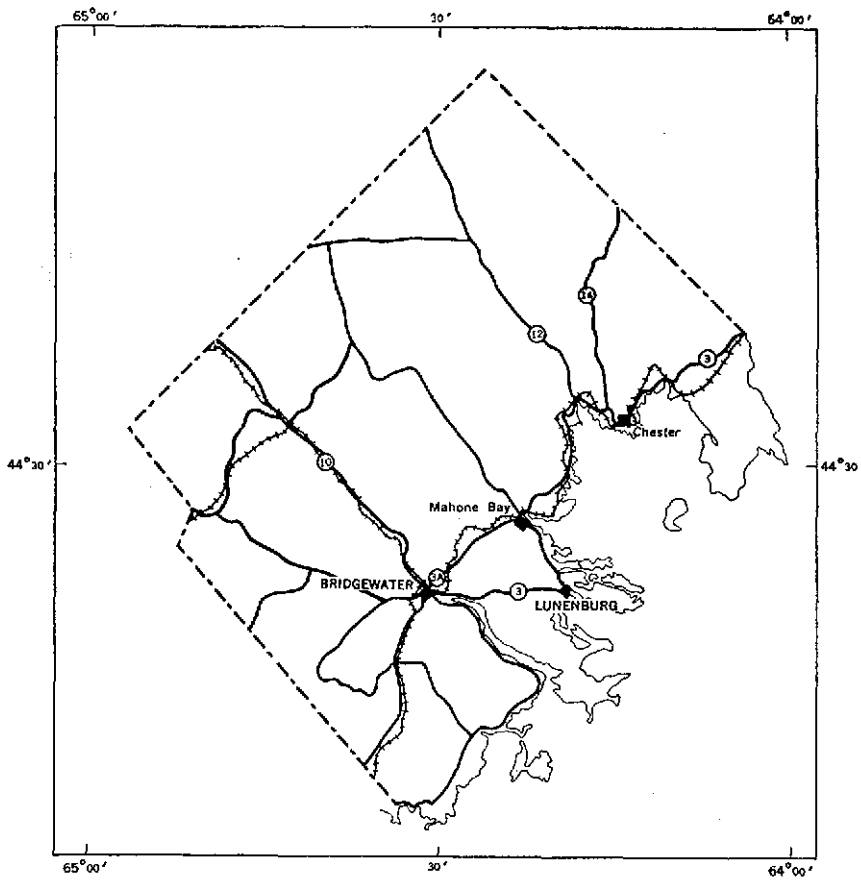

Figure 3. Outline map of Lunenburg County showing location of roads, railroads and principal towns.

processing plants, and the manufacture of marine engines, stoves and furnaces. Mahone Bay is also a shipbuilding center. Other smaller industries include barrel and box manufacturing and food processing.

These industries have attracted a large number of people from the farm, particularly from those areas where the soil is not very fertile. This has also increased the demand for farm produce.

Community Facilities

All except the more remote sections of the county are supplied with electricity and telephone communication. Good schools are found in the larger towns and in the municipal districts. A well-equipped hospital is maintained at Bridgewater.

The scenery and recreational facilities in Lunenburg county are equal to any in the province. A large number of tourists visit the area during the summer months and many have permanent summer homes along the coast. This provides an additional market for farm produce as well as seasonal employment for many of the residents.

FACTORS AFFECTING SOIL FORMATION IN LUNENBURG COUNTY

Soil formation is largely the result of climate acting on parent materials. The effects which are produced will be modified or enhanced by such factors as vegetation, drainage, topography, erosion, and time. Over broad areas, the climate is a major factor in soil formation and, given sufficient time, the other factors tend to reach an equilibrium with the climate. A brief discussion of the various soil-forming factors as they exist in the surveyed area is given below.

TABLE II.—MEAN MONTHLY TEMPERATURE AND PRECIPITATION AT SELECTED STATIONS

	Liverpool		Springfield	
	Years Observed 26 Elevation 40 feet (Approx.)		Years Observed 19 Elevation 550 feet (Approx.)	
	Temperature	Precipitation	Temperature	Precipitation
December	29	5.82 (10.6)*	28	5.32 (17.5)
January	24	5.68 (16.5)	25	5.48 (22.6)
February	23	5.61 (21.9)	22	4.00 (19.6)
Winter	25	17.11	25	14.80
March	30	4.60 (11.6)	30	4.33 (13.2)
April	39	5.04 (4.7)	40	4.48 (7.4)
May	49	4.11 (0.2)	51	2.78 (0.4)
Spring	39	13.75	40	11.59
June	57	4.67	61	3.19
July	64	4.33	65	3.70
August	63	4.51	64	3.86
Summer	61	13.51	63	10.75
September	57	4.10	57	3.58
October	49	5.76 (0.1)	49	4.47 (0.3)
November	39	5.31 (1.7)	39	4.31 (4.2)
Fall	48	15.17	48	12.36
Year	44	59.54 (67.3)	44	49.50 (85.2)

*Inches of snowfall. 10 inches of snow=1 inch of rain.

Climate

Lunenburg county has a humid temperate climate. There are no climatic stations in the area, but two stations—one at Springfield on the north and one at Liverpool on the west—give some indication of the type of climate that may be expected in the county.

The average annual temperature is 44 degrees and is fairly uniform over the area. Mean summer temperatures range from 50 to 75 degrees with an average of 62° Fahrenheit. Precipitation is variable throughout the county, but, in general, more moisture occurs along the coast than inland. This is reflected in soil development. The Liverpool station reports the highest precipitation in the province—nearly 60 inches—while the Springfield station has ten inches less rainfall. More snow falls at Springfield than at Liverpool. The temperature and precipitation recorded at these two stations for a period of years is given in Table II. The data are compiled from reports of the Meteorological Division, Department of Transport, Canada.

The rainfall is fairly well distributed throughout the year and about one third of the precipitation falls during the growing season. The growing period averages 170 to 190 days and the frost-free season ranges from 110 to 140 days on the average.

The effect of precipitation on soil formation is dependent on the amount of water that actually runs through or remains in the soil. This will, in turn, be governed by the other soil-forming factors. The calculation of Thornthwaite [1] values from the meteorological data shows that there is no serious depletion of soil moisture during the summer months.

Parent Materials

The parent materials from which the Lunenburg county soils are developed were deposited almost entirely by glacial ice. This glacial drift is derived principally from the underlying rock formations, but is often mixed with material carried in from the north. Where the underlying rocks were hard, the drift cover is thin and frequently the bedrock may be exposed. On the other hand, drumlins composed of deep drift are a feature of the landscape where the underlying rock is slate. The distribution of the drift is shown in Figure 4 and the underlying bedrock pattern is shown in Figure 5.

The greater proportion of the drift is glacial till. In the northern part of the county, this is a reddish brown sandy clay loam to clay loam, resulting from a mixture of red shaly material brought from the north with slate and granite. It is frequently stony and slowly permeable by water. The medium-textured till is found in the central and western part of the county. It is derived largely from slate and is an olive colored loam to sandy loam. Soils developed from this material are well suited to agriculture.

Where the underlying bedrock is granite or quartzite, the till is thin and consists of a yellowish brown sandy loam or gravelly sandy loam. Water percolates rapidly through this material and consequently the soils tend to be droughty. Much of this material is very stony.

Throughout the county, many deposits of sand and gravel occur in the form of outwash plains, kames, eskers, and terraces. This material was deposited by streams flowing from or within the ice sheet and is coarse textured, varying in its degree of sorting. Along the present river channels throughout the county are recently deposited fine-textured materials in the form of flood

[1] Thornthwaite, C. W. An Approach Toward a Rational Classification of Climate. Geog. Rev. 38:55-94, 1948.

plains. These are moderately permeable and stone free. Numerous depressional areas containing organic material are scattered throughout the county. These are former shallow lakes in which plant remains have accumulated to form peat.

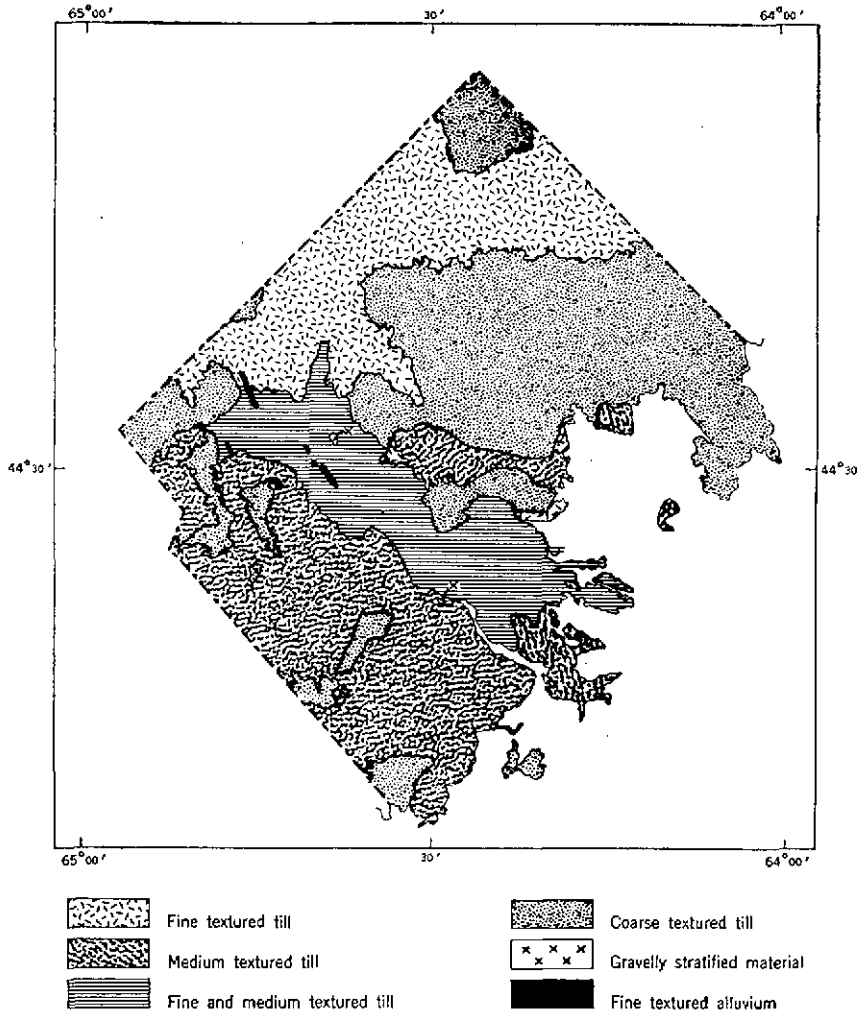

Figure 4. Distribution of parent materials in Lunenburg County.

Vegetation

More than 80 per cent of Lunenburg county is in woodland. The principal trees found in the county include beech, sugar maple, red maple, red oak, yellow birch, wire birch, white pine, red and black spruce, balsam fir, hemlock, and juniper.

In the eastern part of the county where the drift is thin over the granite bedrock, fir and spruce of pulpwood size occur near the coast. Farther inland, some of the higher ridges support a growth of mixed hardwoods and hemlock, with some poplar and pine on the shallower dry areas. Around the lake borders and less well-drained positions red maple, fir, hemlock, poplar, and larch are the principal cover. Numerous black spruce and fir swamps occur throughout the area.

The western part of the county where the drift is derived largely from slate supports a growth of black spruce and fir along the coast, together with pine and hemlock on the drier sites. Often, good stands of red spruce and

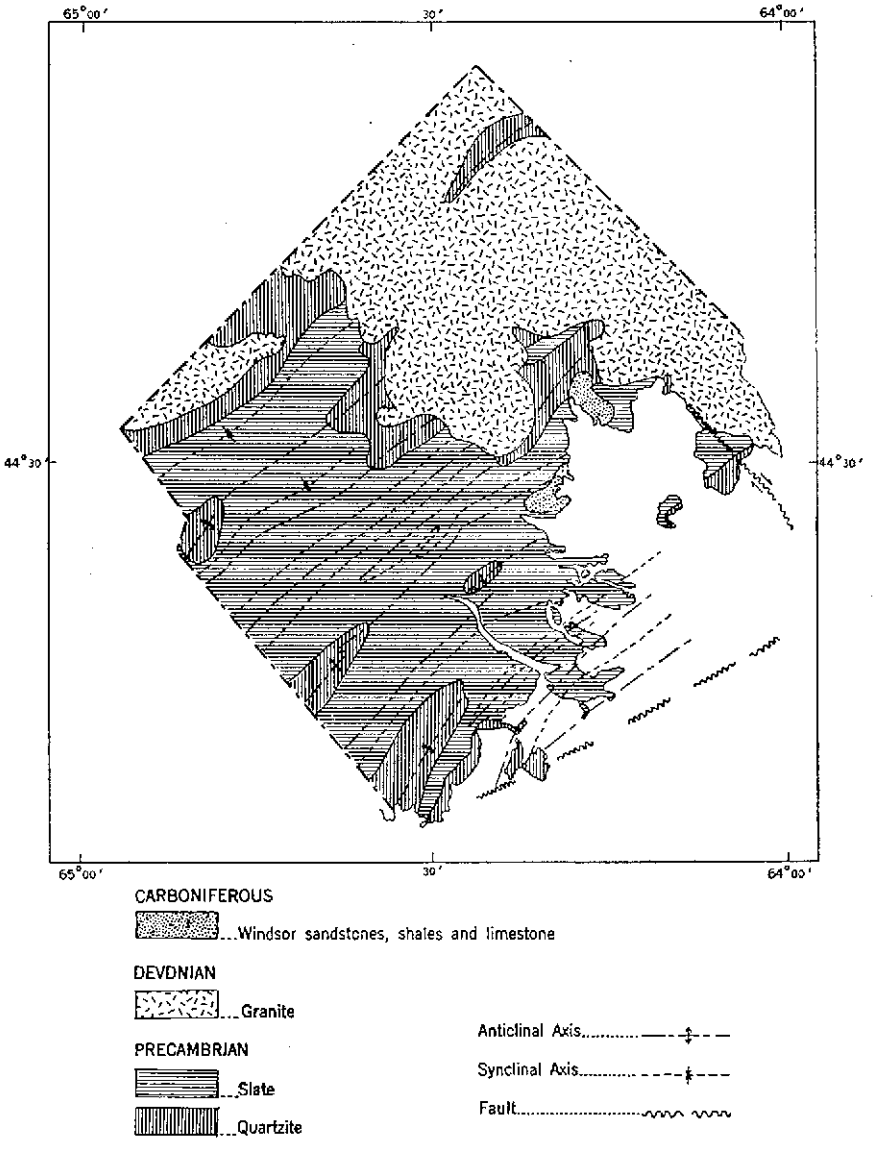

Figure 5. Geological formations of Lunenburg County.

hemlock mixed with hardwoods are found on the slate soils, varying from almost pure spruce to pure hemlock stands. In the interior of the county, where the drift is thin, there are large areas of barrens covered with blueberry bushes, ferns, bracken, and stunted fir and pine. A considerable amount of red oak is found in this area, growing in association with other hardwoods on the better drained and higher elevations. Pine and wire birch are the dominant vegetation on the very sandy deposits. Boggy depressions support a growth of sphagnum moss, sedges, club-moss, cattails, and cotton grass.

The cultivated areas are occupied by grasses and legumes. Timothy *(Phleum pratense)* is the principal grass grown for hay, either alone or in mixture with red clover *(Trifolium pratense)*, white clover *(Trifolium repens)*, and brown top *(Agrostis tenuis)*. Pasture grasses include brown top, red fescue *(Festuca rubra)*, Kentucky bluegrass *(Poa pratensis)*, couch grass *(Agropyron repens)*, and poverty grass *(Danthonia spicata)*. In the rough pastures a number of weeds common to the southwestern part of the province are found. Among these may be mentioned blue-eyed grass, green brier, wild raspberry and blackberry, goldenrod, bladderwort, gentian, and spiraea. In the wetter places the spike rush, bulrush, bog fern, sedges, and club-moss thrive. Along the coast the salt marshes are covered with sea-blite, saltwort, rockweed, pondweed, juncus, and broadleaf species.

Topography and Drainage

Lunenburg county may be described as an undulating plain rising from the seacoast northwards until it reaches an elevation of 700 to 800 feet along the South Mountain about 40 miles inland. The undulations and dissections within this plain result from its mode of origin and subsequent glaciation. The underlying slates and quartzites were originally folded in long parallel pitching anticlines having a northeast-southwest trend. The slates, being the

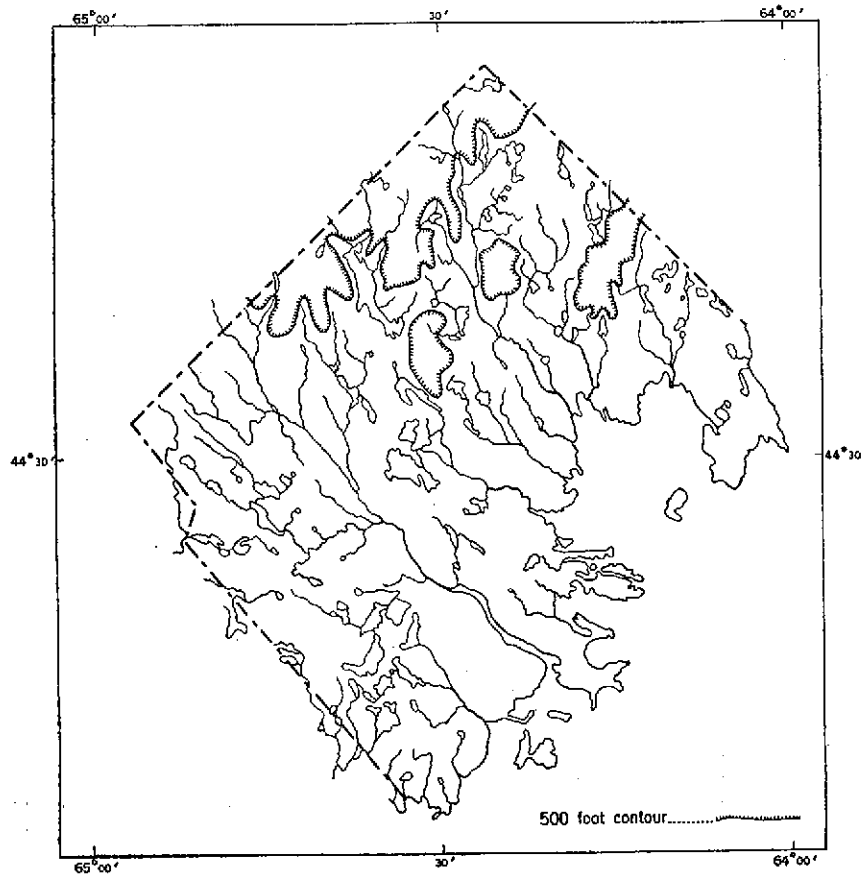

Figure 6. Relief and drainage of Lunenburg County.

topmost beds, were eroded and the valleys between the subsequent quartzite hills were deepened. Later, the northeastern part of the county was intruded by a granite batholith. Weathering and denudation of these rocks resulted in a peneplain in which the granite was a continuous upland surface, the quartzite belts were broad, smooth ridges, and the slate formed somewhat lower subdued swells and broad intervening depressions.

The advance of the ice sheet across this area, transverse to the strike of the folds, resulted in a landscape of hummocky appearance and erratic drainage pattern. Swamps and small ponds are numerous and, where the bedrock supplied little material, the drift is thin and stony. In the slate areas many drumlins were formed which rise 50 to 150 feet above the general level of the district. The pattern of drainage is shown in Figure 6.

The county is drained largely by the Lahave River which flows in a narrow valley across the strike of the stata in an almost straight course to the sea. It descends 500 feet in the 27 miles between the Dalhousie road and the Atlantic Ocean. The principal tributaries on the east are the North Branch and North rivers, and on the west, the West Branch and Ohio rivers. Other prominent rivers are the Petite, Mushamush, Gold, and East rivers which drain the eastern part of the county. This system of rivers is adequate for carrying off excess precipitation. At the same time many of the streams provide excellent fishing. The total area of rivers and lakes in the county is 52,102 acres or about 6 per cent of the area.

Topography and drainage are important factors in soil formation and determine the amount of water that percolates through the soil. On steep slopes, most of the precipitation will run off, sometimes carrying the soil with it. On the level and moderately sloping topography, drainage will vary with the degree of slope and the physical nature of the parent material.

Erosion

A certain amount of erosion occurs as a natural process, but usually proceeds at such a slow rate that soil formation is in equilibrium with it. When land is cleared, erosion is accelerated and generally the soil is removed. The amount of erosion will depend on the type of soil, slope, and the methods of cultivation, but the result is usually the loss of the surface soil that has taken many years to develop. Concurrent with this is the silting of streams, seasonally increased runoff, flooding in the lower areas, and loss of wildlife.

In Lunenburg county much of the cultivated land is on the drumlins where steep slopes are common. Fortunately most of the steeper slopes are under grass or forest and this has prevented the gullying and washing usually found on this type of relief. Soil erosion is less severe in this county than in some other parts of the province, but there is a certain amount of sheet washing going on and the effects of this are becoming noticeable. The cultivation and planting of crops along the contour of the land instead of up and down the slopes would be a useful practice on these drumlins.

Time

Little is known about the time factor in soil formation. The effect of time will vary depending on the nature of the other factors. In Lunenburg county it is believed that the parent materials have been exposed to the other factors for approximately 15,000 to 20,000 years. At the present time, the greater proportion of the soils have reached a fairly mature stage, while others are still in the process of development.

THE CLASSIFICATION AND DESCRIPTION OF THE SOILS

The combination of the various soil-forming factors just described tends to produce soils known as Podzols. Such soils are common where high rainfall, long cold winters, and short, cool summers are prevalent. The process of podzolization involves the accumulation of organic matter on the surface, the removal of soluble bases, clay, and iron and aluminium compounds from the upper part of the profile under the influence of acid percolating water, and their deposition in the lower horizons or subsoil.

In coarse-textured parent materials this process will take place more rapidly than in the finer textured materials. Consequently, the differences in the soils of Lunenburg county are mainly associated with differences in the texture of the parent materials and differences in natural drainage in the area.

Podzol characteristics are most pronounced on well-drained, coarse-textured parent materials, particularly along the coast where precipitation is high. The typical profile has a thin layer of organic matter on the surface underlain by a thick, gray ashy layer from which clay and soluble materials have been removed. Beneath this is a darker colored horizon in which the products of leaching have been deposited. This horizon may vary in color from dark reddish brown to yellowish brown and, in coarse-textured soils, it may be weakly cemented in the upper part. It is usually somewhat finer in texture and darker in color than the parent material on which it rests.

The Gibraltar soil, which is developed from coarse-textured materials derived from granite, represents this kind of profile. A profile of a Gibraltar soil developed under a mixed stand of red maple, birch, hemlock, spruce, and pine is described below.

A_0 — Black semi-decomposed organic matter; 2 to 3 inches thick; pH 4.0.

A_2 0 to 5 inches—pinkish gray (7.5 YR 7/2) * sandy loam; structureless; very friable; pH 4.2.

B_2 5 to 7 inches—dark reddish brown (5 YR 3/4) sandy loam; coarse granular structure; firm; weakly cemented with iron and humus; pH 4.4.

B_3 7 to 22 inches—yellowish brown (10 YR 5/8) coarse sandy loam; structureless; friable; contains granite cobbles; pH 4.6.

C 22 + inches—pale yellow (2.5 Y 7/4) coarse sandy loam; structureless; firm; very stony; pH 5.0.

*Color code numbers as taken from the Munsell Color Chart for soils.

The well-drained soils developed from medium- and fine-textured materials are not so heavily podzolized. The leached layer is usually thin and horizon differentiation is not so marked as in the coarse-textured soils.

Soils that have developed under imperfect natural drainage have a somewhat thicker layer of organic matter on the surface. The lower part of the subsoil, the parent material, and frequently the subsurface are mottled with splotches of gray or yellowish brown due to reduced aeration. The amount of mottling varies with the degree of drainage.

Where soils have developed under poor natural drainage, they are characterized by a thick layer of organic matter on the surface and a thick, dark gray to olive colored, mottled subsurface horizon. This subsurface horizon is developed where organic matter exists under conditions of poor aeration and poor drainage. The process is called gleying and the layer is called a gley horizon. The subsoils in these soils are strongly mottled.

Throughout the county there are numerous poorly drained areas where organic matter has accumulated in the sites of former lakes to form peat bogs. The more recently deposited sediments along the stream channels have not been in place long enough to develop the soil characteristics found in the older parent materials.

Soil Survey Methods

A preliminary reconnaissance was made to determine the nature and characteristics of the soils of the county. From this information a suitable mapping legend was prepared and the soils were mapped.

All roads and accessible trails in the area were traversed and the characteristics of the various soils studied, both in exposures along the highways and in cultivated fields as well as in pits dug in forested areas. Notes were taken regarding the vegetation, soils, crops and suitability for use, for incorporation into this report. In cleared areas it was possible to check the soil boundaries throughout their course. In wooded areas, however, the plotting of boundaries depended on observations made at widely scattered intervals and on knowledge gained from aerial photographs of the area. The information was plotted on base maps on a scale of two inches to one mile.

When mapping was completed, the principal soil types were sampled, by taking a sample from each layer or horizon down to and including the parent material. The samples of profiles were taken under forest and some surface samples were taken from cultivated fields in order to compare the potential fertility of the soil with that under cultivated conditions and to learn something of how the soil developed. Analytical results are presented at the end of this report.

System of Classification

In a given soil zone, soils developed from parent materials that are similar in color, texture, structure, consistency, and lithology form a catena. Thus, soil catenas may be separated from one another on the basis of differences in one or more of these characteristics. Within a catena, differences in drainage produce differences in the characteristics of the soil profile. On this basis it is generally possible in Lunenburg county to separate three members in a catena—the well-drained, imperfectly drained, and poorly drained member. Some catenas may have only one and some more than three members. Each of these members is a soil series. That is, a soil series is a group of soils developed from a particular type of parent material and having similar differentiating horizon characteristics. Variations in surface texture or other properties, such as slope, erosion, or stoniness, within the soil series are frequently of sufficient importance to justify the separation of soil types. The soil type name consists of the series name plus the designation of the variations of properties within the series, e.g. Wolfville stony sandy loam. The soil type was the unit used in mapping the soils of Lunenburg county.

A key to the soil series found in Lunenburg county and their relationship to each other is shown in Table III. The soils are arranged according to differences in texture of the parent material, drainage conditions, and the kinds of profiles

TABLE III. A KEY TO THE SOILS OF LUNENBURG COUNTY

	Podzolic Soils		Gleisolic Soils	Regosolic Soils		Organic Soils
	Podzols		Gleysols	Alluvial Soils		Poor drainage
	Good drainage	Imperfect drainage	Poor drainage	Good drainage	Imperfect drainage	
Parent Materials						
Reddish brown sandy clay loam	Wolfville	Hantsport	Mahone			
Olive gray sandy loam to loam	Bridgewater*	Riverport	Middlewood			
Pale olive sandy loam	Halifax Farmville	Danesville	Aspotogan			
Pale yellow coarse sandy loam	Gibraltar	Bayswater	Aspotogan			
Grayish brown gravelly sandy loam; stratified	Lahave					
Fine sandy loam 15 to 30 inches over gravel				Mossman	Cherryfield	
Organic material						Peat

* Minimal Podzol.

which they develop. The soils in each vertical column develop similar profile characteristics, but differ in properties associated with the various parent materials. Horizontally, the soils are members of the same catena.

This key also serves to summarize some important properties of the soils. The finer textured well-drained soils will have a higher moisture-holding capacity than the coarser textured soils. The coarser materials are more readily leached and therefore, soils developed from these materials are less fertile than the fine-textured, well-drained soils.

The horizontal arrangement of the soils, from well-drained soils at the left to poorly drained at the right, is accompanied by an increase in organic matter which tends to accumulate most under poor drainage conditions. The poorly drained mineral soils are generally also better supplied with nitrogen than the well-drained soils developed from similar materials. The poorly drained soils usually require artificial drainage before they can be used for cultivated crops.

The acreage of the various soils in Lunenburg county is given in Table IV.

TABLE IV.
ACREAGE AND DISTRIBUTION OF LUNENBURG COUNTY SOILS

Soil	Acres	Per cent of Total
Wolfville stony loam	106958.4	13.91
Wolfville loam—drumlin phase	45836.8	5.96
Wolfville sandy loam—drumlin phase	12960.0	1.68
Hantsport sandy clay loam	1318.4	.17
Hantsport sandy loam	3718.4	.48
Mahone sandy clay loam	76.8	.01
Mahone sandy loam	499.2	.06
Bridgewater loam—drumlin phase	51545.6	6.71
Bridgewater sandy loam	190003.2	24.71
Riverport sandy loam	3372.8	.44
Middlewood sandy loam	2886.4	.37
Halifax sandy loam	30418.4	3.96
Halifax sandy loam—drumlin phase	588.8	.08
Danesville sandy loam	1926.4	.25
Farmville sandy loam	28377.6	3.69
Farmville sandy loam—drumlin phase	2758.4	.36
Gibraltar sandy loam	145668.8	18.96
Gibraltar sandy loam—drumlin phase	537.6	.06
Bayswater sandy loam	1958.4	.26
Aspotogan sandy loam	364.8	.04
Lahave gravelly sandy loam	1139.2	.15
Mossman fine sandy loam	620.8	.08
Cherryfield fine sandy loam	358.4	.04
Peat	134.4	.02
Swamp	21696.0	2.82
Salt marsh	211.2	.03
Coastal beach	541.0	.07
Rock land	59097.6	7.69
Lakes	52537.6	6.84
Total	768614.4	100.00

Description of Soils

A. *Soils developed from fine-textured parent materials*

The soils included in this group are the Wolfville, Hantsport, and Mahone series. They are developed from a reddish brown sandy clay loam to clay loam glacial till. The color of the till is derived from reddish colored shales

and sandstones which were picked up by the ice as it moved across the northern part of the province. There are varying proportions of black slate and granite mixed with the till, depending on the nature of the underlying bedrock in different localities. This results in local variations in texture and stoniness.

Good natural drainage.

WOLFVILLE LOAM—DRUMLIN PHASE (45,837 ACRES)

This soil occurs on drumlin topography in the central part of the county and occupies about 6 per cent of the surveyed area. The soil is moderately permeable by water and surface drainage is good, with the result that the soils are well drained. Slopes range from 3 to 15 per cent. Most of the drumlins are cleared, but there are a few small areas included with this soil that have numerous granite boulders on the surface. The parent material is usually deep on the drumlins, but a few cases were observed where the material formed a thin layer over the parent material of the Bridgewater soils. In such cases the Wolfville loam has somewhat better drainage. Where the soils have not been cleared, the vegetation consists chiefly of spruce, hemlock, red maple, birch, and some pine.

A description of a profile of the Wolfville loam is given below.

A_0 3 to 0 inches—semi-decomposed leaf litter; black felty mor; numerous roots; pH 4.0.

A_2 0 to 2 inches—pale brown (10 YR 6/3) loam; weak fine crumb structure; friable to loose; slate and granite fragments; pH 4.2.

B_{21} 2 to 8 inches—yellowish red (5 YR 4/6) loam; fine subangular blocky structure; friable; pH 4.6.

B_{22} 8 to 20 inches—yellowish red (5 YR 4/8) to reddish brown (5 YR 4/3) sandy clay loam; structureless; slate and granite cobbles; pH 5.2.

B_3 20 to 26 inches—reddish brown (5 YR 4/3) sandy clay loam; medium subangular blocky structure; firm; pH 5.3.

C 26 + inches—reddish brown (5 YR 4/4) sandy clay loam; fine blocky to structureless; very firm when dry; faintly mottled with yellowish brown; slate and granite fragments and cobbles; pH 5.4.

In the cultivated soils, the A_2 horizon is invariably incorporated with the plow layer, which becomes a dark brown loam surface soil. In a few places the B horizon may be yellowish brown in color, especially where the soils occur near the Halifax or Gibraltar soils.

Utilization

The Wolfville loam is one of the best agricultural soils of the surveyed area. The soil is fairly fertile and productive, but lime and fertilizer will greatly improve the productive capacity. On the steeper slopes, the soil is easily eroded under clean cultivation and such areas should remain in hay or pasture. The very steep slopes should remain in forest.

The Wolfville loam is used chiefly for mixed farming or dairying, and hay and grain are the principal crops. Garden crops such as potatoes, peas, beans, carrots, and corn are grown by nearly every farmer and some potatoes are

grown on a commercial scale. The rotation commonly followed is hay (2 years), roots, and then grain seeded down. Some hay fields are left for five years or longer.

In general, hay crops are poor unless fertilizer is used, although those farmers who top dress their hay fields with manure get better yields. The general tendency is to apply fertilizer to the grain or potato crop and neglect the hay fields.

The chemical analysis of these soils shows that available magnesium is generally very low and this may have to be remedied through fertilizer applications, especially for potatoes or orchard. The use of lime is beneficial on the Wolfville soils and applications at the rate of 2 tons per acre lowers the soil acidity and promotes better growth of hay and grain crops. For special crops, the recommendations of the Fertilizer Committee or the agricultural representative should be followed. The cultivation of crops along the contour of the land would prove beneficial in cutting down erosion losses and help to maintain soil fertility.

Wolfville Sandy Loam—Drumlin Phase (12,960 acres)

This soil has similar profile characteristics to the Wolfville loam, except that the upper horizons are somewhat more sandy in texture. These soils occur on drumlins on Corkums Island and in the vicinity of Blue Rocks, New Germany, Blockhouse, Maders Cove, and Hermans Island. Internal drainage is more rapid than on the Wolfville loam and the soils tend to dry out faster after a heavy rain.

Utilization

Wolfville sandy loam has about the same uses as the loam. It is perhaps better suited to the growth of hoed crops such as potatoes, corn, beans, and other vegetables since it does not erode so readily as the Wolfville loam. Orchards seem to do well on this soil. Management and fertilization are about the same as for the Wolfville loam.

Wolfville Stony Loam (106,958 acres)

The Wolfville stony loam is the most extensive type of the Wolfville series. It is found chiefly in the northern part of the county on undulating to gently rolling topography. It occupies about 15 per cent of the county area. Most of the type is too stony or shallow to be suitable for agriculture and granite boulders of large size frequently occur on the surface. The soil is moderately well drained except in a few small spots where bedrock restricts the downward movement of water.

The Wolfville stony loam has profile characteristics similar to the Wolfville loam except that considerable stone is found on the surface and throughout the profile.

Utilization

Most of the Wolfville stony loam is unsuitable for agriculture. There are a few areas that are suitable for pasture, but the greater proportion of these soils are best suited to forest.

Imperfect natural drainage

Hantsport Sandy Loam (3,718 acres)

The larger areas of the Hantsport soils occur around Union Square, Scarsdale, Blockhouse, west of New Ross, and south of Levy Settlement, and occupy only a small percentage of the surveyed area. The Hantsport sandy loam occurs on gently undulating to undulating relief. Surface drainage is usually adequate, but internal drainage is moderately slow due partly to the nature of the topog-

raphy and firmness of the parent material. In the early spring, water may stand on these soils in the low positions. On most of the areas there is sufficient stone on the surface to make the cultivation of intertilled crops difficult without considerable effort in clearing. Consequently, much of the Hantsport sandy loam is in forest. Hemlock, red spruce, and red maple form the dominant vegetation on the better drained sites, while black spruce and tamarack are prominent in the poorer drained positions. The soils resemble the Wolfville soils in color, but the surface organic layer is thicker and the subsoil has a mottled appearance. A typical profile of the Hantsport sandy loam is described below.

A_0 4 to 0 inches—black felty mor; numerous roots; pH 4.0.

A_2 0 to 6 inches—pale brown (10 YR 6/3) sandy loam; granular; slightly plastic; mottled with faint yellowish brown mottles; pH 4.2.

B_{21} 6 to 11 inches—yellowish red (5 YR 5/6) sandy clay loam; medium granular structure; slightly plastic; mottled with gray, coarse, distinct mottles; pH 4.6.

B_{22} 11 to 19 inches—reddish brown (5 YR 4/3) sandy clay loam; medium subangular blocky structure; firm; pH 4.8.

C 19 + inches—dark reddish brown (5 YR 3/4) sandy clay loam; structureless; very firm; occasional granite cobbles and boulders, mottled with gray streaks; pH 5.2.

The color of the B horizon ranges from a yellowish red to a faded brown or grayish brown depending on the degree of drainage. Mottling seems to be more pronounced in the lower B horizon than in the C horizon.

Utilization

Where drainage is moderately good and the surface is not too stony, the Hantsport sandy loam, and the sandy clay loam described below, are suitable for hay and pasture. Only small scattered areas are being used for this purpose at present and the remainder is in rough pasture or forest. The Hantsport soils support a good tree growth and proper attention to farm woodlots occupied by this soil will yield good returns. Selective cutting, thinning, and prevention of fire damage will make the forest a profitable farm crop on these soils.

Hantsport Sandy Clay Loam (1318 acres)

The Hantsport sandy clay loam resembles the Hantsport loam, but has a finer surface texture. Areas of the sandy clay loam occur around Blockhouse. The characteristics, utilization, and management of this soil are the same as for the Hantsport sandy loam.

Poor natural drainage

Mahone Sandy Loam (499 acres)

Mahone Sandy Clay Loam (77 acres)

The poorly drained member of the catena developed on fine-textured parent materials is represented by the Mahone soils. They cover only a small area chiefly on the northwest boundary of the county, along the Dalhousie road and around Parkdale. They occur on level to depressional topography and are wet for a good portion of the year. The firmness of the parent

material and the topography restrict the internal drainage and result in a fairly thick accumulation of organic matter on the surface. In addition to poor drainage, the Mahone soils frequently have sufficient surface stone to make clearing impractical. Most of the areas are forested with a growth of black spruce, tamarack, red maple, and alder. A profile of the Mahone sandy loam has the characteristics described below.

A_0 8 to 0 inches—black semi-decomposed organic matter; F layer thick felty and fibrous; pH 4.0.

A_2 0 to 6 inches—light gray (10 YR 7/2) sandy loam; granular; moderately firm; mottled with distinct, pale brown mottles; pH 4.3.

B_2 6 to 20 inches—yellowish red (5 YR 5/6) sandy loam; medium subangular blocky structure; firm; mottled with yellowish brown and gray, coarse, prominent mottles; pH 4.6.

C 20 + inches—reddish brown (5 YR 4/3) sandy clay loam; fine blocky structure; mottled with gray and brown patches; stones and occasional granite boulders; pH 4.8.

The very poorly drained soils have dark gray B horizons with yellowish brown or strong brown mottling. A large proportion of the Mahone soils are very stony and considerable stone is found in the profile. Surface textures range from a sandy loam to a sandy clay loam.

Utilization

The Mahone soils are generally unsuitable for agriculture and should be left in forest. There are a few small areas where clearing and drainage might develop these soils for agricultural use, but it is not practical at the present time.

B. *Soils developed from medium-textured parent materials*

The soils in this group include the well-drained Bridgewater, the imperfectly drained Riverport, and the poorly drained Middlewood series. These soils form a catena developed from an olive gray loam till that is derived principally from the slates which underlie a considerable portion of the county. In some places a small proportion of granite is mixed with the till imparting a sandier texture. The soils occupy nearly one third of the surveyed area. The larger proportion of the soils lie on level to gently undulating relief, but about 25 per cent of the parent material was deposited in the form of drumlins. The parent material invariably contains a considerable quantity of slate material ranging from fine fragments to coarse flags, the larger fragments being found where the till is shallow over bedrock. The depth of till varies from several inches on the more level areas to 50 feet in the drumlins. In general, drainage is more rapid in these soils than in the soils developed from finer textured materials and variations in drainage are usually associated with the depth and attitude of the underlying rock. The characteristics of the soils are described below.

Good natural drainage

BRIDGEWATER LOAM-DRUMLIN PHASE

(51,545 ACRES)

The Bridgewater soils occur chiefly west of the Lahave River although there are a few scattered areas at Middle Lahave, Riverport, and east of Lunenburg. The Bridgewater loam occurs on drumlin topography and is one of the

important soils, both in area and use, in the county. This soil has the same range of slope as the Wolfville loam, but has more rapid internal drainage. Most of the drumlins have been cleared and stoniness is not much of a problem as the slate breaks up rapidly on weathering. In some places there are granite boulders on the drumlins, but these are not so abundant as found on some of the Wolfville loam areas. The virgin areas support a growth of gray birch, sugar maple, red oak, and pine on the drier sites and hemlock, fir, spruce, and poplar where the soil is more moist. The Bridgewater loam described below is typical of the profiles found on the drumlins.

A_0 2 to 0 inches—black felty mor; loose and fibrous when dry; pH 4.0.

A_2 0 to 1 inch —light brownish gray (10 YR 6/2) loam; medium granular structure; very friable; slate fragments; often patchy or absent; pH 4.5.

B_2 1 to 9 inches—yellowish brown (10 YR 5/6) loam; fine crumb structure; moderately friable; pH 4.8.

B_3 9 to 21 inches—light olive (2.5 Y 5/4) loam; fine crumb structure; moderately firm; pH 5.0.

C 21 + inches—olive gray (2.5 Y 4/2) loam; structureless; firm; numerous slate fragments; pH 5.2.

Under forest, there are a few places where an A_1 horizon is developed in this soil. When present, it is a thin, dark grayish brown loam about one inch thick. The A_2 horizon is frequently weakly developed and these soils appear to have resisted the podzolization process to a greater extent than the other soils of the area. The color of the B horizon is frequently darker than that described above, especially on the steeper slopes.

Utilization

The Bridgewater loam when properly managed is capable of producing good yields of most of the crops suitable for the area. In dry years, however, hay and grain crops may not produce as good yields as on the Wolfville loam. The soil is subject to erosion on the steeper slopes when intertilled crops are grown. This sometimes presents a problem in crop rotation as the hay crop cannot be renewed without serious erosion losses, hence, the fertility of these areas must be maintained with fertilizer applications. This problem could be met, in part, through strip cropping or contour farming.

Hay, grain, and potatoes are the principal crops grown on the Bridgewater loam. Some of the rougher cleared areas are used for pasture. Unless manure or organic matter is supplied and fertilizer is used the hay stand is often thin. Liming seems to give marked response in hay yields. Excellent crops of grain and potatoes have been observed on this soil.

Vegetable growing is an important part of the use of the Bridgewater loam. Many farmers grow large acreages of cabbage for the production of sauerkraut. This is an important industry on Tancook Island. This soil also seems to be well suited to orchard. A considerable quantity of fertilizer is used on the soil, the principal varieties being 5-10-13, 3-15-6, 5-10-10 and 6-12-12. Most of the fertilizer is applied to vegetable and grain crops. Hay fields are top dressed with manure when available. Lime could be used to a greater extent on this soil.

The chemical analysis of the Bridgewater loam indicates that available magnesium is low. The use of dolomitic limestone would help to correct this deficiency.

Bridgewater Sandy Loam
(190,003 Acres)

The Bridgewater sandy loam occurs on undulating topography where the till is thin. Many areas are very shallow and the bedrock is frequently exposed. This soil type occupies the largest acreage of any soil type in the county. Usually internal drainage is more rapid than on the Bridgewater loam and the soils tend to be droughty. Due to the shallowness of the parent material large areas of the sandy loam are very stony, but there are some areas where the till is deeper and the soil is suitable for agriculture.

The Bridgewater sandy loam has a profile similar to that of the loam, except that the texture of the surface horizons is somewhat coarser. The B horizons are lighter in color, usually grading from a strong brown through yellowish brown to the olive gray parent material. There are a few areas such as around Martins River, Chester, and Bridgewater where the slates are highly charged with iron pyrites. Some of this iron has been brought into solution by the soil-forming processes and has been reprecipitated as a cement, holding together fragments and slabs of slate in a rock-like formation resembling conglomerate.

Utilization

Most of the Bridgewater sandy loam is too shallow and stony for agricultural use. There are some areas of deeper till where the soil can be used much the same as the Bridgewater loam. In such places, organic matter is important to improve the water-holding capacity of the soil. Some areas are suitable for pasture and the cutting of shrub and weed growth, application of fertilizer, and grazing management would yield profitable returns on these areas. The larger proportion of the sandy loam should be allowed to revert to forest as trees grow very well on this soil. Pine and hemlock seem to be very adaptable to these soils and properly managed farm woodlots would form a constant source of revenue.

Imperfect natural drainage

Riverport Sandy Loam
(3,373 Acres)

The Riverport series occurs where the nature of the parent material or the relief tends to restrict the drainage. The total area occupied by these soils is small and the larger areas occur around Western Shore, New Germany, and east of Pleasant River lake. The topography is gently undulating and the surface is usually covered with sufficient stones to make clearing difficult. In appearance the soils resemble the Bridgewater sandy loam, but have darker colored and somewhat mottled profiles. Variation in the depth of the solum is one of the characteristics of the Riverport soils. The depth varies within short distances accompanied by changes in the drainage and color of the soil horizons. The internal drainage is slow, sometimes impeded by the bedrock, but more often by the nature of the topography. The principal tree cover on these soils consists of red maple, hemlock, spruce, fir, poplar, and wire birch. The following description is typical of the Riverport sandy loam under forest cover.

A_0 4 to 0 inches—black to dark grayish brown semi-decomposed organic matter; felty mor; pH 4.3.

A_2 0 to 4 inches—gray (10 YR 5/1) sandy loam; fine granular structure; very friable; slate fragments; pH 4.4.

B_2 4 to 10 inches—dark yellowish brown (10 YR 4/4) sandy loam; medium granular structure; moderately firm; some dark brown mottles; occasional cobbles; pH 4.8.

B_3 10 to 20 inches—light olive (2.5 Y 5/4) sandy loam; medium granular structure; firm, mottled with dark brown, distinct mottles; pH 4.9.

C 20 + inches—olive (5 Y 5/3) loam; very slaty; structureless; very firm; diffuse gray and brown mottles; pH 5.0.

In places where the bedrock is close to the surface the soil contains many slate fragments and the B horizon has a dark olive color. Granite boulders are more prevalent on the Riverport than on the Bridgewater soils and rock outcrop is more frequent.

Utilization

Only a few small areas of the Riverport sandy loam have been cleared and cultivated. Hay and grain have been successfully grown on these areas, but the greater proportion of the Riverport soils is best suited to forest.

Poor natural drainage

Middlewood Sandy Loam
(2,886 Acres)

The Middlewood soils occur in small, scattered areas throughout the county, where bedrock is close to the surface or topography restricts free drainage. The soils occupy level to depressional relief and drainage ranges from poor to very poor. The surface is frequently stony and flags or slabs of slate are common. The vegetation growing on the Middlewood soils consists of black spruce, red maple, tamarack, and alder. Sphagnum moss sometimes occurs on the surface in the more poorly drained sites. The following is a description of a typical Middlewood profile.

A_0 8 to 0 inches—black, poorly decomposed organic matter; felty and fibrous; pH 3.8.

A_{2g} 0 to 6 inches—grayish brown (10 YR 5/2) sandy loam; structureless; friable; mottled with yellowish brown, fine distinct mottles; pH 4.2.

B_g 6 to 20 inches—olive gray (5 Y 5/2) loam; structureless; firm; mottled with yellowish brown, medium, distinct mottles; numerous slate fragments and some cobbles; pH 4.8.

C 20 + inches—olive gray (5 Y 4/2) loam; structureless; firm; mottled with gray streaks and occasional brown patches; very slaty; pH 5.0.

D ledge (22 inches)

In the very poorly drained positions, the soil has an 8- to 10-inch mucky surface over a thin mottled B horizon that grades into the bedrock at 12 to 15 inches. The more usual profile has a thick A_2 horizon under the surface and a strongly mottled olive gray subsoil. The C horizon is not usually so mottled as the horizons above it.

Utilization

The Middlewood sandy loam is not suitable for agricultural purposes unless drainage can be improved. Small cleared areas are generally used for rough pasture. Forestry is the best use for the Middlewood soils.

C. *Soils developed from coarse-textured parent materials*

Three soil catenas are developed from coarse-textured parent materials in Lunenburg county. The differences in materials are due largely to differences in the rock source, color, texture, and consistency of the drift. The materials have all been deposited as glacial till. Parent materials derived principally from quartzite give rise to the Halifax and Danesville soils, while the Gibralter, Bayswater, and Aspotogan soils are chiefly of granitic origin. The Farmville soils are developed from very sandy material containing a mixture of slate, quartzite, and granite in varying proportions. All of these soils have fairly thick A_2 horizons and brown B horizons, that may or may not be cemented. The characteristics of these soils are described below.

Good natural drainage

HALIFAX SANDY LOAM (30,418 ACRES)

This soil occurs largely in the western part of the county in the vicinity of Voglers Cove, West Clifford, Lapland, Chester Basin, Stanburne, and Sarty. The parent material is an olive gray or pale olive sandy loam in which quartzite is the dominant rock. Occasionally a small mixture of slate and granite is found in the till. The parent material is usually not very thick and the Halifax soils are very stony. Boulders occur frequently on the surface. The topography of the Halifax sandy loam is gently undulating to undulating and there are a few areas that have a hummocky relief. The porous nature of the parent material permits free drainage and the soils have good to excessive drainage. Vegetation consists chiefly of spruce, pine, red oak, red maple, wire birch, and hemlock. A description of a profile of the Halifax sandy loam follows:

A_0 3 to 0 inches—black, felty mor; numerous roots; pH 4.0.

A_2 0 to 3 inches—pinkish gray (7.5 YR 7/2) sandy loam; structureless; very friable; pH 3.8.

B_2 3 to 5 inches—dark brown (7.5 YR 3/2) sandy loam; granular structure; moderately firm; angular quartzite stones; numerous roots; pH 4.5.

B_3 5 to 15 inches—yellowish brown (10 YR 5/8) sandy loam; medium granular structure; friable; quartzite stones and cobbles; pH 5.0.

C 15 + inches—pale olive (5 Y 6/3) sandy loam; structureless; firm; numerous quartzite fragments; pH 5.2.

In the coarser textured soils the upper part of the B horizon may be weakly cemented and very dark in color. The depth of the solum varies and the C horizon may occur at 24 inches. The color of the parent material varies from olive gray to a pale yellowish brown with an olive cast.

Utilization

The general appearance of the Halifax soils is one of low, stony knolls interspersed with numerous hollows and depressions, so that there are no large

areas that might be suitable for agriculture. In most cases stoniness is the chief factor restricting land use and most of this soil type is in forest. Good stands of spruce, birch, and hemlock occur on these soils.

A few of the larger knolls have been cleared and used for hay or garden crops.

Halifax Sandy Loam—Drumlin Phase (588 acres)

There are a few areas where the parent material has been deposited deeply enough to form drumlins and large mounds. Generally these areas are less stony and have a moisture-holding capacity that is somewhat better than on the more level areas. However, even some of the drumlins are exceedingly stony. The profile is similar to that described above except that the B_3 horizon is usually thicker than found on the shallower areas.

Utilization

Where the drumlins have been cleared, hay, grain, and potatoes are grown. The maintenance of organic matter in these soils is very important. Lime and fertilizer are necessary for successful production, since natural fertility is low. Potatoes seem to produce good yields, and the physical nature of the soil makes it suitable for intertilled crops; but where other good soils are available, the Halifax sandy loam should be left in forest.

Farmville Sandy Loam
(28,377 Acres)

The Farmville soils occur chiefly in the area north and west of Mahone Bay and around Indian Point. The parent material of these soils is a loose, pale brown or pale yellow sandy loam till derived chiefly from a mixture of slate, quartzite, and granite. In places the till is roughly stratified or has pockets of sand or gravel in it. Internal drainage ranges from moderately rapid to excessive, depending on the coarseness of the material and the depth and character of the substratum. Most areas of the Farmville soils are very stony and granite boulders are prominent on the surface. Tree cover consists of maple, birch, pine, spruce, poplar, oak, and fir. A description of the Farmville sandy loam under forest is given below:

A_0 3 to 0 inches—black, semi-decomposed felty mor; pH 4.0.

A_2 0 to 3 inches—pinkish gray (7.5 YR 6/2) sandy loam; fine granular structure; very friable; pH 4.2.

B_{21} 3 to 9 inches—strong brown (7.5 YR 5/8) sandy loam to loamy sand medium granular structure; friable; subangular stones; pH 4.6.

B_{22} 9 to 24 inches—yellowish brown (10 YR 5/8) sandy loam to loamy sand; medium granular structure; moderately firm; subangular stones and cobbles; pH 4.7.

C 24 + inches—olive yellow (2.5 Y 6/6) sandy loam to loamy sand; structureless; firm; may be stratified; subangular gravel and cobbles; pH 5.0.

The thick B_{22} horizon is characteristic of this soil. It usually becomes lighter in color with depth. Around Indian Point the solum contains considerable gravel. The parent material is frequently very weakly cemented, but does not form a pan.

Utilization

There are a few areas of this soil that have been cleared and cultivated. One of these areas occurs around Langille and Round lakes. Hay, grain, vegetables, and orchard fruits are the principal crops found on the Farmville soils. The soils are droughty for hay or corn, and considerable organic matter must be added to increase the moisture-holding capacity in order to obtain successful yields with these crops. Lime and fertilizer are necessary for successful crop production. The greater proportion of the Farmville soils are too stony for agricultural use and, in general, they are not so fertile as the Bridgewater or Wolfville soils.

Farmville Sandy Loam—Drumlin Phase
(2,758 Acres)

There are a few areas where the Farmville soils occur on drumlin topography. Here the parent material is deeper and occasionally less stony than on the more undulating topography. Profile development is similar to that described above except that the B_{21} horizon tends to be a lighter brown color. Most of the cultivated areas are on the drumlins and the management and practices described above apply here also.

Gibraltar Sandy Loam
(145,668 Acres)

The Gibraltar soils are also developed from coarse-textured parent materials derived principally from granite. Except in a few places, the till is comparatively thin over bedrock. Internal drainage is rapid to excessive and the soils dry out rapidly after a rain. Topography ranges from undulating to rolling. Stoniness is a marked characteristic of the Gibraltar soils. Large stones or boulders sometimes weighing many tons are scattered on the surface in amounts ranging from 5 to 90 per cent of the surface area. The larger areas of the Gibraltar sandy loam occur in the eastern and northern sections of the county. Many areas have been swept by forest fires and support a growth of small pine and wire birch with blueberry, crowberry, and sweet fern. The more heavily wooded slopes are covered with a mixture of maple, birch, fir, spruce, pine, and poplar. The Gibraltar sandy loam profile is described below:

A_0 4 to 0 inches—black felty mor; pH 4.0.

A_2 0 to 4 inches—pinkish gray (7.5 YR 7/2) sandy loam; structureless; loose and very friable; granite fragments; pH 4.2.

B_{21} 4 to 6 inches—dark reddish brown (5 YR 3/4) sandy loam; coarse granular structure; moderately iron cemented; pH 4.4.

B_{22} 6 to 18 inches—yellowish brown (10 YR 5/8) coarse sandy loam; structureless; friable; granite cobbles; pH 4.6.

C 18 + inches—pale yellow (2.5 Y 7/4) coarse sandy loam; structureless; firm; very stony; pH 5.0.

The dark brown B_{21} horizon is very characteristic in these soils and it is almost invariably cemented to some degree by iron and organic compounds. The surface organic layer is usually thicker where the soils lie near the coast.

Utilization

The greater part of the Gibraltar sandy loam is unsuitable for agriculture. In a few places shallow hillsides have been cleared and the fields contain smoothly rounded rock outcrops or occasional large boulders. If lime and

fertilizer are used, good crops of hay and clover can be obtained on these areas. Organic matter is very important on these soils and a good supply must be maintained. The Gibraltar soils have a somewhat better supply of bases than other soils in the area, but their use is restricted for the reasons mentioned above.

Gibraltar Sandy Loam—Drumlin Phase
(537 Acres)

A few small areas on the Windsor road north of Chester, around Blandford and on Graves Island, have sufficient depth of parent materials to form drumlins, similar to those found on the Halifax and Farmville soils. The till here is slightly finer textured and usually the soil is not quite so stony and most of such areas have been cleared. The soil has the same characteristics as described above except for a slightly better moisture-holding capacity. This soil type is not important in the agriculture of the area.

Imperfect natural drainage

Danesville Sandy Loam
(1,926 Acres)

The soils of the Danesville series occur in imperfectly drained positions in association with the Halifax soils and are developed on similar parent material. The largest area of this soil occurs along the Chester Basin—New Ross road on gently undulating topography. In a few places the Danesville soil occurs on long slopes in positions normally regarded as well drained. The profile features of the soil are similar to those of the Halifax soils except that the lower horizons are mottled. Most of the Danesville soil is very stony and rock outcrop is occasionally seen. Vegetation consists of red maple, spruce, poplar, and hemlock. Black spruce, spiraea, and alder occur on the poorer drained sites. The profile of the Danesville sandy loam described below represents the average appearance of this soil.

A_0 3 to 0 inches—black, semi-decomposed organic matter; felty mor; pH 3.8.

A_2 0 to 3 inches—light gray (10 YR 7/2) sandy loam; granular structure; friable; faintly mottled; pH 4.0.

B_{21} 3 to 11 inches—dark brown (7.5 YR 4/4) sandy loam; medium granular structure; moderately firm; may be weakly iron cemented; mottled with yellowish brown, medium distinct mottles; pieces of slate and quartzite; pH 4.6.

B_{22} 11 to 21 inches—yellowish brown (10 YR 3/2) sandy loam; coarse granular structure; firm; common, distinct, coarse mottles; pH 5.0.

C 21 + inches—olive (2.5 Y 4/4) sandy loam; structureless; firm; coarse, distinct mottles and rusty brown streaks; considerable quartzite fragments and occasional boulders; pH 5.2.

The amount of mottling in the profile is variable and the intensity of the brown and yellowish brown colors varies somewhat with the degree of drainage. Cementation of the B horizon is more common near the coast.

Utilization

The Danesville sandy loam is not generally suitable for agriculture unless drainage is provided and stones are removed. Practically no areas of this soil are under cultivation in Lunenburg county, but several areas are being used

in Queens county for hay and pasture. Once cleared, this soil seems to provide good pasture that responds well to fertilization. Usually the cost of clearing and removing the stone prohibits the use of this soil for agriculture.

Bayswater Sandy Loam (1,958 acres)

The Bayswater soils occur in the imperfectly drained areas associated with the Gibraltar soils. They occupy level to depressional topography or sloping hillsides where drainage is restricted. Usually more than 15 per cent of the surface is covered with granite boulders. The principal vegetation found on the soils consists of black spruce, hemlock, red maple, blueberry, sweet fern, and alder. A description of a profile typical of the Bayswater sandy loam is described below:

A_0 6 to 0 inches—black semi-decomposed organic material; F layer moss; H layer felty mor; pH 3.8.

A_2 0 to 5 inches—light brownish gray (10 YR 6/2) sandy loam; structureless; friable; faintly mottled with yellowish brown; granite fragments; pH 4.2.

B_{21} 5 to 10 inches—dark reddish brown (5 YR 3/2) sandy loam; medium granular structure; weakly iron cemented; firm; mottled with yellowish brown; pH 4.6.

B_{22} 10 to 18 inches—yellowish brown (10 YR 5/4) sandy loam; medium granular structure; moderately firm; numerous yellowish brown and dark brown distinct mottles; pH 4.8.

C 18 + inches—light yellowish brown (2.5 YR 6/4) sandy loam; coarse granular structure; firm; dark brown and yellowish brown mottles; stony; pH 5.0.

Variations in the degree of drainage are accompanied by differences in the thickness of the surface layers and in the color of the underlying horizons. The A_2 horizon may be darkly stained with organic matter. Where the B horizon is not cemented, it is usually thicker.

Utilization

Practically none of the Bayswater sandy loam is under cultivation. Most areas are too stony to make clearing practical and these should be left in forest. Where drainage is better than average, the Bayswater soils support a good growth of hemlock and spruce.

Poor natural drainage

Aspotogan Sandy Loam (364 acres)

The soils of the Aspotogan series occupy poorly drained depressions associated with the Gibraltar, Halifax, and Farmville soils. Although developed chiefly from granitic materials, this soil develops characteristics that are common to all the poorly drained coarse-textured soils in the area and may be regarded as the poorly drained member of all the catenas having coarse-textured parent materials. Only a small area of these soils occurs in Lunenburg county, where they occupy depressional areas or flat hilltops. Internal drainage is restricted by relief and shallowness to bedrock. The vegetation

found on the Aspotogan soils consists largely of red maple, spruce, tamarack, and alders with an undergrowth of sphagnum moss. The characteristics commonly observed in the profile are described below:

A_0 8 to 0 inches—black, semi-decomposed organic matter; often mucky; pH 4.0.

A_{2g} 0 to 8 inches—light gray (10 YR 7/2) to dark gray sandy loam; structureless; moderately firm; distinct, medium, dark grayish brown patches; pH 4.2.

B_g 8 to 14 inches—very dark grayish brown (10 YR 3/2) sandy loam; granular structure; moderately firm; mottled with numerous, distinct, yellowish brown mottles; numerous stones; pH 4.8.

B_{22} 14 to 24 inches—dark brown (7.5 YR 3/2) sandy loam; firm; mottled with dark yellowish brown streaks; stony; pH 5.0.

C 24 + inches—dark yellowish brown to light olive gray (5 Y 6/2) sandy loam; firm; moist; strongly mottled; stony; pH 5.2.

The depth of the solum is often not more than 15 inches. The yellowish brown B_{22} horizon, usually present in the well-drained soils, does not appear under poor drainage and the darker color of the B_{21} horizon carries down through the profile. No cementation of the B horizon was observed in these soils. Gleying of the B is common in wetter areas.

Utilization

The Aspotogan sandy loam is not suitable for agriculture and where drainage is very poor, it is not very suitable for forest. Most areas have a growth of stunted black spruce or tamarack.

D. *Soils developed from gravelly sandy loam stratified parent materials*

Good natural drainage

LAHAVE GRAVELLY SANDY LOAM (1,139 ACRES)

The Lahave series of soils occur chiefly along the valley of the Lahave River, the largest single areas being around Watford and Pinehurst. Lahave soils are developed from stratified outwash sands and gravels that contain a large proportion of slaty material. Both surface and internal drainage are rapid and the soils have a low moisture-holding capacity. Except for an outwash plain at Pinehurst most of the Lahave soils are found on hummocky or kame topography or as gravelly terraces pushed against the sides of drumlins. In a few places, granite boulders occur on the surface, but generally the soils are quite free from large stones. Tree vegetation consists of pine and wire birch. The cleared areas are usually covered with a mixture of poverty grass, sweet fern, spirea, blueberry, and wild strawberry. A profile representative of the Lahave gravelly sandy loam is described below:

A_0 3 to 0 inches—black felty, semi-decomposed organic matter; felty mor; very fibrous; pH 4.0.

A_2 0 to 3 inches—white (10 YR 8/2) sandy loam; structureless; very friable; small slate fragments; pH 4.2.

B_{21} 3 to 10 inches—yellowish brown (10 YR 5/6) sandy loam; fine granular structure; slightly firm; friable; pH 4.4.

B_{22} 10 to 22 inches—brownish yellow (10 YR 6/8) gravelly sandy loam; medium granular structure; moderately firm; slaty gravel and some granite cobbles; pH 4.5.

C 22 + inches—grayish brown (2.5 Y 5/2) gravelly sandy loam; structureless; very gravelly; firm; pH 4.6.

D roughly stratified sand and gravel; shows cross bedding, heaving, and slumping.

The amount of gravel in the upper horizons varies, but generally the surface layers are quite sandy. The coarser gravel contains a major proportion of flat and subangular slate fragments ranging up to 7 or 8 inches in size. In deeper deposits this slate may be cemented with iron, forming a slaty conglomerate.

Utilization

Due to its rapid drainage and unsuitable topography, the greater part of the Lahave gravelly sandy loam is not favorable for crop production. On the more level areas crops may be grown provided that a good supply of organic matter is maintained and fertilizer is used. Under these conditions such areas are suitable for hoed crops such as potatoes, beans, corn, peas, and other vegetables, but are less suitable for grain and hay. Strawberries and small fruits may be grown; and the land is well suited to poultry raising.

In Lunenburg county, areas with favorable topography are small and scattered so that no large-scale production can take place and such areas are mainly used for local gardens.

The Lahave soils will support a good growth of pine, and reforestation of many of the cleared areas is probably the most economical use of these soils.

E. *Soils developed from recently deposited medium-textured parent materials*

This group of soils includes materials that have not had sufficient time to develop profile characteristics. They are immature soils and are separated according to their varying degrees of drainage. The well-drained Mossman and the imperfectly drained Cherryfield soils are included in this group.

Good natural drainage

MOSSMAN FINE SANDY LOAM

(620 ACRES)

The Mossman soils occur along the principal stream courses throughout the county, one of the largest areas lying south of Wentzell Lake. The parent materials of this series consist of sediments washed from the Bridgewater and Wolfville soils and deposited as flood plains. Topography varies from level to very gently undulating. The Mossman soils are free from stone. Most areas are cleared, but there are a few small stands of mixed spruce, red maple, tamarack, and poplar scattered over the area occupied by these soils. The profile described below is typical of the Mossman soil.

1. 0 to 6 inches—dark brown (7. 5 YR 4/2) fine sandy loam; friable; fine subangular blocky structure; slightly plastic; pH 4.3.

2. 6 to 30 inches—brown (7. 5 YR 5/4) fine sandy loam; fine granular structure; friable; pH 4.5.

3. 30 + inches—grayish slaty gravel and coarse sand; pH 4.8.

The depth of the profile over gravel varies from 25 to 35 inches and the color may range from brown to light reddish brown.

Utilization

The Mossman soils are among the most fertile soils of the area, but their use is limited by the small size of the areas and their susceptibility to flooding. Generally they may be used for short season crops, but the principal use at present is for hay, grain, or supplementary pasture. In many places the Mossman soils are intimately mixed with the Cherryfield soils which makes crop growth uneven. In spite of this, more use could be made of these soils than is being done at present. Supplementary pasture would seem to be a good use for these soils in many cases.

Imperfect natural drainage

CHERRYFIELD FINE SANDY LOAM
(358 ACRES)

The Cherryfield soils occur on imperfectly drained sites associated with the Mossman soils. Texture and drainage conditions have a wider range than in the Mossman soils and the amount of mottling in the profile varies over short distances. The soils are stone free and, where forested, have the same vegetation as the Mossman soils. The following description is typical of the Cherryfield fine sandy loam:

1. 0 to 10 inches—dark brown (10 YR 4/3) fine sandy loam; fine granular structure; friable; pH 4.0.
2. 10 to 22 inches—brown (10 YR 5/3) sandy loam; mottled with many gray, medium distinct mottles; pH 4.5.
3. 22 to 28 inches—dark gray (10 YR 5/1) fine sandy loam; finely laminated; slightly plastic; moderately firm; gray and dark brown coarse mottles; pH 4.8.
4. 28 to 36 inches—yellowish brown (10 YR 5/4) fine sandy loam; firm; mottled with dark brown patches; pH 4.9.
5. 36 + inches—gray gravel and coarse sand.

The texture of the 10- to 30-inch layer may range from a sandy loam to silt loam. In the poorer drained positions, the lower layers have an olive cast with dark brown to black mottling.

Utilization

The better drained sites of the Cherryfield soils are usually used and included with the Mossman soils with which they are intricately mixed. The Cherryfield soils are suitable for grain and hay or pasture, but yields seem to vary with the degree of drainage. There are a few areas where artificial drainage would improve the agricultural qualities of the soil, but economic factors do not make this practical at the present time.

F. Organic soils

Poor natural drainage

PEAT (134 ACRES)

There are a few small areas in Lunenburg county where the sites of former lakes have been filled in with decaying vegetation, resulting in peat bogs. These bogs consist of a layer of sphagnum moss, sedges, and reeds 10 to 15 inches thick that overlies a thick semi-decomposed layer of the same material. Decomposition of the material increases with depth. Occasionally there are clumps of stunted black spruce and tamarack growing on the surface, but most of the areas have very little tree vegetation.

These bogs are of no use at present. Two of them—one at Cherryfield and another near Mahone Bay—have been investigated as a source of peat fuel. Both of these areas contain some well-humified peat, but they have not been developed.

G. Miscellaneous Soils

This group includes soils and soil materials that are not suitable for cropping purposes and have little agricultural value. Such areas as swamp, salt marsh, coastal beach, and rock land are included in this group and they occupy about 10 per cent of the county.

Swamp (21,696 Acres)

Areas of swamp occupy depressional topography associated with most of the mineral soils, where water stands for a considerable part of the year. The areas are usually quite stony and granite or quartzite boulders frequently occur on the surface. Vegetation consists of spruce, fir, poplar, and tamarack where the water table is not too high. Other areas are covered with a mixture of sedges, reeds, and cat-tails.

The surface soil in these areas consists of a black poorly decomposed organic layer, often mucky and 5 to 8 inches thick. This is underlain by a grayish brown mineral soil horizon that is strongly mottled with dark patches and yellowish brown streaks. The B horizon varies in color depending on the nature of the parent material, but it is always heavily mottled. The underlying parent material is also strongly mottled and usually firm to compact. In some places the profiles are very shallow over bedrock, particularly in areas where the Bridgewater, Gibraltar, or Halifax soils are predominant.

These soils are not suitable for agriculture. It is usually difficult to improve the drainage or impractical to do so.

Salt Marsh (212 Acres)

A few areas of salt marsh occur along the coast, particularly near Riverport. These areas consist of sediments deposited by tidal waters and are flooded by each recurring tide. The deposits for the most part consist of gray silt or silt loam materials that show some stratification due to deposition. Fragments of reeds and sedges are interspersed throughout the depth of the deposits and the surface is covered with a growth of salt marsh grasses and reeds. At present these areas are not suitable for agriculture.

Coastal Beach (544 Acres)

Areas of coastal beach are found at various places along the coastline of the county. These areas consist mainly of gray sand derived largely from quartzite and granite deposited by wave action. At the inner edges of some of these beaches, ridges of rounded stones and pebbles have been deposited, while on others the sand has been blown into dunes which are now stabilized by the growth of grasses and sedges.

Several fine beaches occur in Lunenburg county among which Crescent Beach on Green Bay is perhaps the best known. This beach and several others are centers of recreation during the summer months and attract many tourists. Such areas are not suitable for agricultural purposes.

53042-8—3½

Rock Land

(59,097 Acres)

The areas mapped as rock land include rock outcrop and thin layers of soil materials over bedrock. Most of these areas occur where granite or quartzite is the underlying rock, but there are some places where slate also occurs. Usually rock outcrop makes up 60 to 90 per cent or more of the land surface. The soils developed in these areas are lithosols. They have a depth ranging from 6 to 10 inches over bedrock and occasionally lack a C horizon. Drainage ranges from good to poor over these areas.

For the most part these areas are not, and never will be, suitable for agriculture. They have some value for forestry and, except where the bedrock outcrops on the surfaces they are generally covered with trees or shrub growth.

AGRICULTURE AND LAND USE

Historical

The first crops in the county were grown by settlers at Lahave in 1632 and wheat is recorded to have been the first harvest. Organized agriculture began with the settlement of Lunenburg by the German and French immigrants in 1753. It was early found that the soils most suitable for crop production occurred on the drumlins and these were cleared in preference to the more level land. The early settlers grew considerable wheat and corn. Flour, cheese, and butter were produced in local establishments. Later, fishing became an important industry and there was a demand for vegetables to supply the fishing fleet, a demand that still exists today. With the coming of better means of transportation and the opening of outside markets, there was a change in the acreage and kind of crop grown and the farmer became dependent on outside sources for many of his needs. The production of crops for direct human consumption gave place to those crops produced for animal consumption, and dairying and livestock farming became the major agricultural industries.

Present Land Use

The census of 1951 shows that about 33 per cent of the land area of the county is occupied by farms. The remainder of the county is largely in forest. Of the land occupied by farms, only about 13 per cent is improved and the remainder is occupied by farm woodlots, natural pasture, and wasteland. The average size farm is 100 acres and the average improved area per farm is 14 acres. Both the size of farm and the improved area vary widely for individual farms throughout the county. In general, the largest acreages of improved land are coincident with the localities where there are the greatest number of farms. Table V shows the area and condition of occupied land as given by the census of 1951.

TABLE V.

AREA AND CONDITION OF LAND IN LUNENBURG COUNTY 1951

Total land area	716,077 acres
Area in farms	234,693 acres
Improved	32,402 acres
Field crops	25,093 acres
Pasture	5,098 acres
Orchard	339 acres
Other	1,872 acres
Unimproved	202,291 acres
Woodland	139,679 acres
Other	62,612 acres
No. of farms	2,271
Average area per farm	103 acres
Average improved area per farm	14.1 acres

The principal field crops grown in the area are listed in Table VI. Hay, oats, and potatoes make up about 98 per cent of all field crops grown in the county. Hay is, by far, the principal field crop and consists of a timothy and clover mixture. Small acreages of alfalfa and clover are also grown. Nearly 67 per cent of the improved land is occupied by hay crops, with oats and mixed grain occupying about 6 per cent and potatoes, roots, barley, and wheat covering 3 per cent of the improved area. Pasture usually covers 15 per cent of the improved area and the remainder is occupied by vegetable crops or orchard.

Several large orchards are found in the county and apples are the principal fruit grown, but other fruits such as pears and plums are grown in small amounts. Small fruits consisting chiefly of strawberries, currants, and cranberries are grown in small acreages.

TABLE VI.

ACREAGE OF FIELD CROPS IN LUNENBURG COUNTY 1941 AND 1951

	1941	*1951*
Hay	21,261 acres	21,404 acres
Oats	2,238 acres	2,121 acres
Potatoes	1,296 acres	732 acres
Roots	611 acres	230 acres
Barley	965 acres	162 acres
Mixed Grain	139 acres	27 acres
Wheat	13 acres	6 acres

Over the ten-year period there has been a considerable drop in crop acreage, although the acreage devoted to hay has slightly increased.

Practically all farmers keep some livestock and many high quality dairy and beef cattle are raised in the county. Lunenburg county ranks fourth in the province in the production of hogs and these are raised in conjunction with dairying. About 28 million pounds of milk were produced in the county in 1951 and approximately 24 per cent of this was used on the farm. Table VII gives the number of livestock found in the area.

TABLE VII.

LIVESTOCK ON FARMS—LUNENBURG COUNTY 1941 AND 1951

	1941	*1951*
Horses	857	1,341
Cattle	14,743	12,040
Sheep	4,661	3,279
Swine	3,463	3,901
Poultry	86,614	118,751

There has been an increase in the swine and poultry population in recent years. Poultry raising utilizes land that is not suitable for crops. There has been a tendency, due to shortage of beef and the high prices paid for dairy cattle, for some farmers to deplete their dairy herds and raise more beef. Many of the farms have tractors but a large part of the farm work is done by horses or oxen. About 97 per cent of the farms are operated by the owners and only a small percentage of the farms have mortgage debts.

Utilization and Management of Lunenburg County Soils

The use of the soil in any area is limited by several factors, among which topography, stoniness, drainage, depth, and natural fertility are important. The management of the soil involves the application of cultural and fertilizer practices to the soil in a manner that will best utilize its natural characteristics and will obtain optimum and economical production over a long period of time.

Nearly 15 per cent of Lunenburg county is occupied by rock outcrop, rivers, and lakes that will never be suitable for agriculture. Within the county, a peculiar combination of soils and topography limits most of the farming to the drumlins, where the soils are deeper and less stony. The remainder of the soils have conditions of stoniness, drainage, or shallowness that make them generally unsuitable for agriculture except in small localized areas.

The texture of the soil is related to a number of other properties that determine its use and management. Consequently, in the discussion of soil management that follows, the soils have been grouped according to texture.

GROUP I. FINE-TEXTURED SOILS

Soil Type	*Acreage*	*Total*
(a) well drained		
Wolfville stony loam	106,958	
Wolfville loam—drumlin phase	45,836	
Wolfville sandy loam—drumlin phase	12,960	165,754
(b) imperfectly drained		
Hantsport sandy clay loam	1,318	
Hantsport sandy loam	3,718	5,036
(c) poorly drained		
Mahone sandy clay loam	76	
Mahone sandy loam	499	575

The well-drained Wolfville loam and sandy loam are the most suitable agricultural soils in this group. They are found on the drumlins where the soil is deep and comparatively free from stone. The Wolfville stony loam covers a large area but usually has a very stony surface. Where it is practical to remove the stone, these soils are equal in value to the soils on the drumlins, but usually such areas are used for pasture.

The imperfectly and poorly drained soils require drainage and usually the removal of surface stone before they are suitable for cultivated crops. Some of the less stony areas are suitable for pasture.

The management practices discussed below apply to the soils on the drumlins, but will apply to the other soils in this group when adequate drainage is provided. Most farmers practice some form of crop rotation, and that most favored consists of roots, grain, and two years of hay. Some prefer to leave the land in hay for five years. On the more steeply sloping drumlins the land on the tops of the drumlins is rotated more often than on the sides. The use of this steeply sloping land presents a problem. Occasionally hay or pasture occupies these slopes, but although this prevents considerable erosion, the fields are usually left in grass too long and tend to run out. Where the slopes are only moderately steep, some form of contour farming might remedy this situation, but the steeper slopes should be left in forest.

The most widely grown hoed crop is potatoes, but turnips and cabbage occupy considerable acreage. The use of lime is not so widespread as it should be, since most of the soils are acid. Hay crops give good response to liming and it is difficult to get a good catch of clover without liming. Commercial fertilizers are applied to grain, potatoes, or garden crops. The principal varieties used are 5-10-13, 6-12-6, 5-10-10 and 3-15-6. On grain these fertilizers are applied at the rate of 500 to 800 pounds per acre and on potatoes or roots, at the rate of 1,000 to 2,000 pounds per acre. Many farmers have found the addition of borax necessary when using fertilizer on turnips, to prevent brown-heart. It would appear from general observation that many farmers would derive more benefit from fertilizer applications if more lime were used on the land in the rotation. Barnyard manure is used on hay fields, usually at the rate of 20 to 25 tons per acre. The maintenance of a good supply of organic matter is necessary in these soils, especially in those of sandy loam texture. The organic matter may be added in the form of manure or as a green manuring crop. This improves the structure and aeration of the soil and increases its moisture-holding capacity, as well as favoring the biological

activity necessary for the production of nutrients. Some good orchards are found on the drumlins and these are usually maintained in sod. There is a possibility that trees may suffer magnesium deficiency on these soils, but none of this trouble was observed. The other soils of this group which lie on undulating to depressional topography have not been used for agriculture to any extent. Some of the areas, now cleared, are suitable for rough pasture and could be improved by fertilization. The stonier areas are best suited to forest.

GROUP II. MEDIUM-TEXTURED SOILS

Soil Type	*Acreage*	*Total*
(a) well drained		
Bridgewater loam—drumlin phase	51,545	
Bridgewater loam	190,003	
Mossman fine sandy loam	621	242,169
(b) imperfectly drained		
Riverport sandy loam	3,373	
Cherryfield fine sandy loam	358	3,731
(c) poorly drained		
Middlewood sandy loam	2,886	2,886

The soils in this group are lighter in texture than the soils in Group I. The soils best suited to agriculture are the drumlin phase of the Bridgewater loam, and the Mossman fine sandy loam which occurs as flood plains along the river courses. The imperfectly drained Cherryfield fine sandy loam is usually cultivated along with the Mossman soils, but frequently requires drainage. The remainder of the soils are generally too shallow or wet for agricultural purposes. Usually shallowness is the limiting factor in use.

The Bridgewater loam—drumlin phase is widely cultivated throughout the county. Its use and management is similar to that described above for the Wolfville loam and sandy loam, except that organic matter maintenance is even more important to increase the moisture-holding capacity of the soil. Some good orchards are found on this soil. The same uses and practices apply to the Bridgewater sandy loam where there is sufficient depth of soil and freedom from stone to make cultivation practical.

The Mossman and Cherryfield soils are generally subject to flooding at certain times of the year and this usually limits production to hay or grain crops. These soils are among the most fertile in the county and if flooding could be prevented the soils would be suitable for all crops grown in the area. They would be particularly suitable for vegetables. Lime and organic matter are needed for successful crop production. Usually the areas of these soils are small and this limits their usefulness.

The Riverport and Middlewood soils are generally shallow. Some areas are suitable for pasture and with fertilization may provide considerable feed, especially where dairy farming is practiced on adjacent Bridgewater loam. Otherwise these soils are best suited to forest. Pine, hemlock, and spruce grow well on these soils.

GROUP III. COARSE-TEXTURED SOILS

Soil Type	*Acreage*	*Total*
(a) well drained		
Halifax sandy loam—drumlin phase ..	589	
Halifax sandy loam	30,418	
Gibraltar sandy loam—drumlin phase	538	
Gibraltar sandy loam	145,668	
Farmville sandy loam—drumlin phase	2,758	
Farmville sandy loam	28,378	
Lahave gravelly sandy loam	1,139	209,488
(b) imperfectly drained		
Danesville sandy loam	1,926	
Bayswater sandy loam	1,958	3,884
(c) poorly drained		
Aspotogan sandy loam	365	365

The soils in this group are, in general, non-agricultural soils. The well-drained drumlin phases of the Halifax, Farmville, and Gibraltar soils are suitable for cultivation if not too stony. Such areas are small. Small areas of the normal types of these soils have also been cleared and cultivated. The Lahave gravelly sandy loam is suitable for cultivation where topography is favorable. The remainder of the soils are limited in their use chiefly by shallowness and stoniness or drainage.

Where the soils are cropped, the maintenance of organic matter is of first importance. The soils are acid and low in natural fertility and require lime and fertilizer for successful crop production. The more level areas of the Lahave soils are suitable for the production of truck crops, provided organic matter and fertility requirements are met. The Danesville soils, where they have been cleared, frequently make excellent pasture as their imperfect drainage provides enough moisture in the summer months to promote growth. All other areas of soils in this group are best suited to forest.

In general, all the soils of the county show a need for liming. Where the soils are, or can be, cultivated they are capable of being built up and maintained in a good state of fertility, but this requires least effort and expense on soils of the Bridgewater, Wolfville, and Mossman series. The application of dolomitic limestone would help to correct acidity and provide magnesium which is deficient in most of the soils. On all agricultural soils of the area there seems to be a marked response to fertilization and particularly to phosphate. More attention could be paid to increasing the carrying capacity of pastures through fertilization, particularly in those areas where dairy and beef cattle are raised. Most of the stony and steeply sloping areas should be allowed to revert to forest or be reforested under a planned program. Many of the soils such as the Halifax, Gibraltar, and Farmville will support excellent growth of pine, hemlock, and spruce. Good tree growth helps to control erosion, favors the development of wildlife, and provides employment and income for many people.

The Suitability of Soils for Crops—Soil Rating

The suitability of a soil for crop production is governed by its ability to produce crops economically. The ability of a soil to produce a crop is best measured by the yield of that particular crop, since this reflects the interaction of the climate, the soil, the crop that is grown, and the soil management.

At the present time it is difficult to obtain accurate figures for crop yields on any particular soil under a given management. Hence, the suitability of a soil for a given crop must be judged from a knowledge of the characteristics of the soil, from information obtained from farmers and agricultural workers, and from observations made during the course of the survey. Such information has been used to prepare a rating of the soils of Lunenburg county as given in Table VIII.

TABLE VIII
SUITABILITY OF SOILS FOR PRINCIPAL CROPS GROWN IN THE AREA

	Hay	Grain	Potatoes	Market Garden Crops	Orchard	Pasture
CLASS I						
Good Crop Land						
Wolfville loam—drumlin phase.	G	G	F	F	FG	G
Wolfville sandy loam—drumlin phase	G	G	G	FG	FG	G
Bridgewater loam—drumlin phase	G	G	G	G	G	FG
CLASS II						
Good to Fair Crop Land						
Mossman fine sandy loam	G	G	G	G	P	FG
Class III						
Fair Crop Land						
Cherryfield fine sandy loam	FG	FG	FP	FG	P	F
Halifax sandy loam—drumlin phase	F	F	FG	FG	F	F
Farmville sandy loam—drumlin phase	F	F	FG	FG	F	F
Gibraltar sandy loam—drumlin phase	FP	FP	F	FP	FP	P
Bridgewater sandy loam	F	F	FG	FG	F	F
CLASS IV						
Fair to Poor Crop Land						
Danesville sandy loam	F	FP	P	FP	P	FG
Riverport sandy loam	FP	FP	FP	FP	P	FP
Hantsport sandy clay loam	FG	FG	FP	P	FP	FG
Hantsport sandy loam	FP	FP	P	P	P	FG
Lahave gravelly sandy loam	P	P	G	G	P	P
CLASS V						
Poor Crop Land						
Wolfville stony loam	FP	FP	P	P	FF	F
Halifax sandy loam	FP	FP	FP	P	P	P
Gibraltar sandy loam	P	P	P	P	P	P
Farmville sandy loam	FP	FP	F	FP	FP	P
Bayswater sandy loam	P	P	P	P	P	P
Mahone sandy loam	P	P	P	P	P	P
Mahone sandy clay loam	P	P	P	P	P	P
Middlewood sandy loam	P	P	P	P	P	P
Aspotogan sandy loam	P	P	P	P	P	P

G—good; F—fair; P—poor; FP—fair to poor; FG—fair to good.

In Table IX below, the factors that limit the use of the soils in each class is presented.

The soils have been grouped into five classes according to their suitability for crop land. Each soil is classed as good, fair, or poorly suited to the selected crop. Such a classification is very general and applies to crops grown in the area under prevailing systems of management. Certain soils will be better adapted to some crops than others and future improvements in crop varieties, new techniques and forms of management may necessitate adjustment in the ratings. Areas of soil classed as good crop land may contain small areas of poor crop land. Similarly, certain soils classed as fair or poor for general crop use may be adapted to some special crop and, in this case, be more valuable than soils classed as good crop land. Economic conditions are usually the limiting factors in such cases.

TABLE IX.

ACREAGE AND USE LIMITATIONS OF THE VARIOUS SOIL TYPES

Class I	*Acreage*	*Use Limitations*
Good Crop Land		
Wolfville loam—drumlin phase	45,836	Susceptibility to erosion; stoniness.
Wolfville sandy loam—drumlin phase	12,960	Susceptibility to erosion; stoniness.
Bridgewater loam—drumlin phase	51,546	Susceptibility to erosion; stoniness.
	110,342	
Class II		
Good to Fair Crop Land		
Mossman fine sandy loam	621	Susceptibility to flooding.
	621	
Class III		
Fair Crop Land		
Cherryfield fine sandy loam	358	Susceptibility to flooding;
Halifax sandy loam—drumlin phase ..	589	Droughtiness; stoniness.
Farmville sandy loam—drumlin phase	2,758	Droughtiness; stoniness.
Gibraltar sandy loam—drumlin phase	538	Droughtiness; stoniness.
	4,243	
Class IV		
Fair to Poor Crop Land		
Danesville sandy loam	1,926	Imperfect drainage; stoniness.
Riverport sandy loam	3,373	Imperfect drainage, shallowness; stoniness.
Hantsport sandy loam	3,718	Imperfect drainage, stoniness.
Hantsport sandy clay loam	1,318	Imperfect drainage; stoniness.
Lahave gravelly sandy loam	1,139	Droughtiness; topography.
	11,474	
Class V		
Poor Crop land		
Wolfville stony loam	108,857	Stoniness.
Halifax sandy loam	30,418	Stoniness; topography.
Farmville sandy loam	28,377	Stoniness; droughtiness.
Gibraltar sandy loam	143,769	Stoniness; droughtiness.
Bayswater sandy loam	1,958	Imperfect drainage; stoniness.
Middlewood sandy loam	2,886	Poor drainage; shallowness; stoniness.
Mahone sandy clay loam	77	Poor drainage; stoniness.
Mahone sandy loam	499	Poor drainage; stoniness.
Aspotogan sandy loam	365	Poor drainage; stoniness.
	317,206	

DISCUSSION OF THE CHEMICAL ANALYSIS OF THE SOILS

The chemical and physical analysis of some of the major soil types is given in Table X. The composition of the soil parent material and the action of the soil-forming factors on this material is reflected in the chemical composition of the soils themselves. The chemical composition of the soils is discussed below.

Loss on Ignition

The loss on ignition represents the loss of volatile material on heating. This gives some indication of the amount of organic matter in the soil. There is a considerable difference between the virgin and the cultivated soil in organic-matter content. Once the forest is removed, organic matter is rapidly depleted. The average loss on ignition of the surface layer of forest soils ranges from 70 to 90 per cent, but in cultivated soils this layer has only 6 to 10 per cent volatile material. Differences in the organic-matter content of cultivated soils are largely due to management practices.

In forested soils the B_2 horizons show a higher loss on ignition than the other horizons, except the surface, indicating the deposition of organic matter as part of the podzolization process. In the coarser textured soils, this organic matter is concentrated in a thin layer in the profile, while in other soils it is better distributed throughout the lower horizons. In general, the Wolfville and Bridgewater soils are better supplied with organic matter than the other soils of the area.

Nitrogen

The nitrogen content of the soils approximately parallels the loss on ignition and the Wolfville and Bridgewater soils are better supplied with this element than the other soils. The nitrogen content of the subsoils in all of the sampled profiles is low.

pH and Lime Requirement

All the soils are acid and require liming for successful crop production. Surface acidity ranges from pH 4.8 to 5.4 and the subsoil ranges from pH 4.6 to 5.5. This acidity can be reduced by liming and preferably dolomitic limestone should be used, since most of the soils are quite low or deficient in available magnesium. A farm-to-farm survey has shown that 50 to 75 per cent of the farms have a lime requirement of 3.5 to 5 tons of lime per acre.

Silica and Sesquioxides

All of the soils show the effect of the podzolization process—the removal of iron and aluminium from the upper horizons and their deposition in the lower part of the profile. The coarse-textured soils, being developed from highly siliceous parent materials, have a high silica and low sesquioxide content. On the other hand, the medium- and fine-textured soils are developed from parent materials that have a higher content of bases and ferromagnesian minerals. Consequently they show a lower silica and higher sesquioxide content than the coarser textured soils.

TABLE X.—CHEMICAL AND PHYSICAL ANALYSIS OF REPRESENTATIVE SOIL PROFILES

Horizon	Depth in Inches	Loss on Ignition %	pH	Lime Req. Tons/ Acre	Total N %	Total SiO_2 %	Total R_2O_3 %	Total CaO %	Total MgO %	Exchangeable Bases me/100 gms. of soil				Gravel %	Sand 2—.05 mm %	Silt .05—.002 mm %	Clay Below .002 mm %
										H	Ca	Mg	K				
Wolfville Loam																	
Cult. Surface	0–6	8.92	5.22	4.6	0.26	68.56	17.80	0.32	0.50	8.46	3.07	0.50	0.13	13.3	49.4	38.8	11.8
A_0	0–2	70.86	4.19	—	1.24	20.82	5.47	0.66	0.34	69.30	12.20	2.50	2.32	.....	.....	.....	.....
A_2	2–3	12.61	4.11	12.7	0.26	66.19	15.64	0.22	0.65	20.76	1.31	0.67	0.38	14.5	46.6	39.2	14.2
B_1	3–9	9.54	4.90	7.4	0.24	65.13	18.50	0.31	0.69	12.33	2.72	1.00	0.22	9.6	44.2	44.2	11.6
B_2	9–18	2.43	5.10	3.1	0.06	76.57	15.06	0.25	0.72	4.60	0.55	0.17	0.06	18.0	67.8	21.0	11.2
B_3	18–26	2.41	5.23	2.4	0.04	72.57	18.29	0.25	0.97	4.03	1.61	1.05	0.10	22.3	54.0	28.8	17.2
C	26 +	2.39	5.45	1.7	0.03	70.06	23.08	0.35	1.20	2.83	5.61	2.72	0.16	15.5	48.0	24.8	27.2
Farmville Sandy Loam																	
A_0	0–3	53.67	3.88	—	0.73	39.12	5.07	0.14	0.14	57.00	1.47	1.60	1.12	.....	.....	.....	.....
A_2	3–6	1.20	3.92	2.4	0.04	88.33	7.02	0.15	0.06	5.07	0.11	0.05	0.05	8.9	72.0	24.1	3.9
B_1	6–14	6.90	4.98	4.2	0.11	73.10	14.91	0.17	0.18	7.86	0.11	0.05	0.06	35.3	75.5	22.1	2.4
B_2	14–28	1.58	5.30	1.4	0.03	78.74	13.38	0.29	0.26	1.93	0.05	0.0	0.01	33.9	81.5	18.2	0.3
C	28 +	0.66	5.58	1.0	0.02	79.61	12.21	0.43	0.21	1.87	0.11	0.0	0.02	26.3	81.4	17.7	0.9
Bridgewater Loam																	
Cult. Surface	0–6	9.83	5.18	6.3	0.29	62.30	24.67	0.29	0.55	8.80	1.91	0.33	0.10	29.3	47.8	40.4	11.8
A_0	0–1	83.73	3.90	—	1.54	10.66	3.01	0.32	0.13	82.70	7.09	3.70	1.51	.....	.....	.....	.....
A_2	1–2	17.33	4.52	11.3	0.37	59.32	17.65	0.24	0.46	13.96	1.11	0.11	0.41	19.1	48.8	37.6	13.6
B_1	2–11	8.07	5.00	4.2	0.19	64.61	21.70	0.18	0.27	9.16	0.08	0.00	0.07	18.2	49.8	36.6	13.6
B_2	11–26	5.99	5.00	3.9	0.12	67.41	20.86	0.31	0.63	6.50	0.14	0.00	0.05	13.0	52.2	33.0	14.8
C	26 +	2.34	5.10	2.1	0.03	68.54	21.80	0.29	0.72	3.63	0.17	0.10	0.04	14.0	47.2	23.0	29.8

CHEMICAL AND PHYSICAL ANALYSIS OF REPRESENTATIVE SOIL PROFILES—*Concluded*

Horizon	CHEMICAL ANALYSIS													PHYSICAL ANALYSIS			
	Depth in Inches	Loss on Ignition %	pH	Lime Req. Tons/ Acre	Total N %	Total SiO_2 %	Total R_2O_3 %	Total CaO %	Total MgO %	Exchangeable Bases me/100 gms. of soil				Gravel %	Sand 2—.05 mm %	Silt .05—.002 mm %	Clay Below .002 mm %
										H	Ca	Mg	K				
HALIFAX SANDY LOAM																	
A_0	0–2	74.47	3.45	—	1.41	17.47	4.11	0.29	0.24	87.00	3.54	2.30	0.97	.....	.....	.....	.....
A_2	2–3	6.24	3.52	4.9	0.10	77.07	11.94	0.24	0.11	3.77	0.22	0.00	0.08	15.8	52.8	39.4	7.8
B_1	3–12	4.74	5.00	2.4	0.09	69.52	18.78	0.31	0.31	6.43	0.08	0.03	0.04	26.0	58.4	35.8	5.8
B_2	12–24	4.74	5.12	2.4	0.08	66.14	21.65	0.31	0.29	5.63	0.05	0.06	0.05	28.3	57.4	37.8	4.8
C	24 +	2.99	5.15	1.7	0.05	70.54	19.09	0.39	0.77	3.63	0.11	0.03	0.06	29.3	55.4	36.8	7.8
WOLFVILLE LOAM																	
A_0	0–1	70.98	4.17	—	1.44	14.59	6.36	0.66	0.28	67.80	10.20	3.50	1.74	.....	.....	.....	.....
A_2	1–2	8.19	4.20	11.0	0.17	69.04	18.10	0.14	0.28	16.40	1.13	0.17	0.21	19.1	37.2	44.6	18.2
B_1	2–7	9.10	4.60	8.4	0.19	63.36	23.59	0.13	0.92	13.60	0.33	0.00	0.16	10.4	37.2	47.4	15.4
B_2	7–19	6.54	4.68	7.1	0.12	66.12	21.55	0.17	1.01	11.63	0.39	0.00	0.13	10.2	37.2	45.0	17.8
C	19 +	3.05	5.04	2.4	0.04	69.41	21.12	0.31	1.22	5.10	3.00	0.40	0.15	28.5	42.4	35.8	21.8
WOLFVILLE SANDY LOAM																	
A_0	0–2	71.56	3.70	—	1.10	22.32	3.88	0.38	0.18	76.00	6.28	1.80	1.12	.....	.....	.....	.....
A_2	2–3	2.38	3.72	3.5	0.08	82.80	8.52	0.13	0.07	6.03	0.22	0.07	0.09	12.7	69.4	22.8	7.8
B_1	3–7	6.36	4.68	7.1	0.14	71.92	18.99	0.11	0.11	10.96	0.56	0.26	0.19	14.7	68.0	28.2	3.8
B_2	7–12	9.92	5.05	7.8	0.18	72.68	18.43	0.17	0.45	13.56	0.48	0.00	0.16	26.9	70.4	25.2	4.4
B_3	12–20	7.45	4.95	6.0	0.14	70.46	17.36	0.17	0.45	11.40	0.37	0.00	0.12	29.5	70.4	24.2	5.4
C	20 +	3.21	5.06	3.9	0.04	74.54	16.09	0.28	0.55	5.73	0.34	0.00	0.07	23.4	66.4	22.2	11.4

Calcium and Magnesium

None of the soils of the area have a high calcium or magnesium content. In general, the Halifax, Farmville, and Bridgewater soils are better supplied with calcium, while the Bridgewater and Wolfville soils have a higher magnesium content than the other soils. The availability of these elements, however, is quite the reverse.

The Wolfville and Bridgewater soils have more readily available calcium than the coarser textured soils. The amount of readily available magnesium is low in all soils and symptoms of magnesium deficiency may occur in the area. Usually this can be remedied by applying dolomitic limestone.

Potash

The available potash is low in all the soils analyzed.

Cobalt

Although none of the samples were analyzed for cobalt, the results of recent research indicate that soils from this area contain only approximately 0.2 to 0.3 parts per million. Since 2 p.p.m. is generally regarded as necessary for adequate nutrition, it will be seen that the soils of the area are deficient in this respect. The present remedy for diseases caused by cobalt deficiency is the application of cobalt salts to the soil at the rate of 2 to 4 ounces per acre annually or, preferably, the feeding of cobalt chloride in mineral mixtures. Further work is being done on this subject.

SUMMARY

Lunenburg county occupies an area of about 1,200 square miles or 768,614 acres. About 17 per cent of this area consists of lakes, rock land, coastal beach, salt marsh, peat, and swamp, which will never be used for agricultural purposes. The county is a broad undulating plain rising from the seacoast to an elevation of 700 to 800 feet about forty miles inland. On this surface numerous drumlins rise above the general level, giving some areas a hilly appearance. The county is drained largely by the Lahave River and its tributaries, but several smaller streams aid in providing adequate surface drainage. The Lahave River is navigable for ocean going ships as far as Bridgewater, about 15 miles from its mouth.

The county was first settled by the French in 1632, but permanent settlement dates from the establishment of Lunenburg town by German, Swiss, and French settlers in 1753. Today numerous prosperous communities may be found in the county. Farming, fishing, and lumbering are the principal occupations.

The climate of the area is humid temperate and annual precipitation averages about 40 inches. Summer temperatures are moderate and many tourists are attracted to the area, which has several excellent beaches and unexcelled scenery.

The soils are developed from materials deposited as glacial drift and they range in texture from sandy clay loam to coarse sandy loam. The maturely developed soils are Podzols. Under forest cover these soils have a gray ashy layer under the thin organic surface mat. This is underlain by a dark brown to yellowish brown horizon that grades into the parent material at a depth ranging from 16 to 26 inches. In general, leaching is more intense near the coast than inland and the soil colors are more intense here. Vegetation consists of hemlock, red and white spruce, black spruce, red and white pine, oak, maple, birch, and beech.

The soils most used for agriculture are the Wolfville loam, Wolfville sandy loam, and Bridgewater loam. These soils occupy the drumlins and make up about 15 per cent of the area of the county. The remainder of the soils have characteristics of stoniness, drainage, or topography that make them generally unsuitable for use, although small local areas are cleared and cultivated.

The principal crops grown in the county are hay, grain, and potatoes. About 67 per cent of the improved land is in hay. Vegetable growing, particularly cabbage, also occupies considerable acreage in the county. Most farmers practise a crop rotation consisting of roots, grain, and 2 to 5 years hay. Commercial fertilizers usually consist of 5-10-13, 6-12-6, 5-10-10 or 3-15-6, applied to potatoes at the rate of 1,500 to 2,000 pounds per acre or to grain at the rate of 500 to 700 pounds per acre. Manure is used to top dress the hay fields.

All soils of the area are acid and would benefit from applications of dolomitic limestone, since analysis shows that many of the soils are deficient in magnesium. Many pasture areas could be greatly improved by proper fertilization and management.

The problem of soil erosion is not too serious in the area since most of the steeper slopes are in forest or hay land, but the steep slopes of the cleared drumlins present a problem in crop rotation. Growing intertilled crops on some of these slopes would result in severe erosion. It would appear that strip cropping and contour farming could be used to advantage in this area.