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SOIL SURVEY OF THE CARIBOU AREA, MAINE.

BY

H. L. WESTOVER AND R. W. ROWE.

[Advance Sheets—Field Operations of the Bureau of Soils, 1908.]

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[PUBLIC RESOLUTION—NO. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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MAP.

Soil map, Caribou sheet, Maine.

SOIL SURVEY OF THE CARIBOU AREA, MAINE.

By H. L. WESTOVER and R. W. ROWE.

DESCRIPTION OF THE AREA.

The survey of the Caribou area, Maine, covers 339,200 acres, or 530 square miles, situated along the eastern border of Aroostook County, the southernmost point extending 9 miles south of parallel 46° 30′, and the northern border to within 3 miles of parallel 47° north latitude. Meridian 68° west of Greenwich divides the area into two unequal parts, that on the east being 9 miles in width and that on the west approximately 6 miles in width. The area extends a distance of 40 miles north and south and has a maximum width of 15 miles. The irregularity of the southwest corner of the area is due to the absence of roads and the thickly forested conditions of the county in this section, which made it impossible to carry the work as far west as was originally intended.

FIG. 1.—Sketch map showing location of the Caribou area, Maine.

The eastern boundary of the area is formed by the Province of New Brunswick and the southern boundary by the township of Monticello, Aroostook County. The western boundary is an arbitrary line that separates the northern half of New Sweden Township into two nearly equal parts and then passes south through the middle of Washburn, Woodland, Mapleton, and Chapman for a distance of 28 miles. It then narrows by successive steps to the east, until at the southern

extremity the area has a width of only 4 miles. The northern boundary, also an arbitrary line, passes east and west through the townships of Caswell and Connor, about one-fourth mile north of the line separating them from Caribou and Limestone townships and continuing west through the eastern half of New Sweden. As completed the survey included the full townships of Limestone, Easton, Mars Hill, and the greater part of Bridgewater; the double townships, Fort Fairfield, Presque Isle, and Caribou; the half township Blaine; and parts of Township 10, Townships D and E, New Sweden, Caswell, Connor, Woodland, Washburn, Mapleton, Chapman, and Westfield.

The larger part of the area is a rolling plain, having an average elevation of about 500 feet and consisting of a series of broad ridges and swells with level tops and with slopes that descend gradually to the streams. With few exceptions the flat country is occupied by swamps, which in many cases probably represent the remains of old lakes that have gradually filled up with accumulations of vegetable matter and with soil washed in from adjoining slopes. These swampy areas are found in all townships, but are more common and of larger extent in the southern part of the area, where, as a rule, the average elevation is somewhat less than farther north.

The hilly portion of the area is found principally west and southwest of Presque Isle. Three miles southwest of this village there is a prominent group of hills known as Hobart Hill, which rises from 200 to 300 feet above the level of the surrounding country. To the south there is a chain of mountains, with an elevation of 300 to 400 feet above the general level of the country, extending several miles in a southeasterly direction. Quaggy Joe (Quaquajo) and Green Mountain are the most prominent points of this chain. The most noted, as well as the highest point in the area, however, is Mars Hill, located just east of the village of that name. This hill has an elevation of 1,695 feet above tide level and is 2½ miles long and 1 mile wide. Knolls of morainal material are prominent surface features in sections of the area.

The area is drained by tributaries of the St. John River, of which the most important is the Aroostook River. This river, with its three main tributaries, the Presque Isle Stream on the south and the Caribou and Limestone streams on the north, drains the greater portion of the area. The southeastern part is drained by Prestile (Presque Isle of the St. John) Stream and the River du Chute and confluent streams.

Many small lakes and ponds occur throughout the area, but they are very shallow and are being gradually filled with soil and vegetable matter. The largest of these are Caribou, in Washburn Township, and Quaggy Joe, at the foot of the mountain of that name.

The settlement of the region now included within the limits of Aroostook County was begun at Fort Fairfield in 1816 by families from New Brunswick. A few years later the settlement of Presque Isle began, and finally about twenty years later the first real settlers found their way to Caribou. It was not until the opening of the military road to Presque Isle in 1837 that people began coming in from the southern part of the State. The building of this road, coupled with the liberal policy of the State in allowing the settlers to take up claims of 160 acres and pay for them at the rate of 50 cents an acre within three years in work on their own roads at $1.50 per day, encouraged immigration and people came in more rapidly. The county was organized in 1839 and enlarged to its present dimensions in 1843. It was made up of portions of Washington and Penobscot counties and the later addition was made from Piscataquis and Somerset counties. At the time of its incorporation the population numbered approximately 9,000 people, mostly French, with a few English traders. After this the settlement was very rapid and the number of English settlers increased rapidly.

In 1870, through the efforts of the commissioners in the settlement of public lands, a colony of Swedes was induced to settle in the county, the section where they took up land being made a township, with the name of New Sweden. Later in the same year and in succeeding years other immigrants came to the colony, and to-day they have one of the finest farming sections in the area. In 1890 the population of the county had reached 49,589 and in 1900 it was 60,744—a most remarkable growth.

Thus, with the Swedes in New Sweden, a large number of French in the northern part of Caribou Township, and with a mixture of French, Irish, and English in other sections, the population is somewhat varied. As indicated by the appearance of the buildings and farms in general, the county is prosperous. Nowhere in New England does one find better farm buildings. The houses are usually large and well built, the barns and potato cellars are substantial, commodious, and warm, and an unpainted building is the exception. The farms are equipped with modern machinery, potato diggers, potato planters, mowers, and reapers. Good driving horses and carriages are found on almost every farm. The greater number of homes have telephones and rural free delivery of mail. In most sections roads are numerous and as a rule kept in excellent repair. Comparatively few of the farms are mortgaged, and on these the debt is being rapidly lifted, while at the same time the land and buildings are being improved.

During the greater portion of the year nearly all the streams afford abundant water power, which in many cases has been developed to run sawmills and grist mills. With possibly one or two exceptions every village in the area has water power.

Caribou, located in the northern part of the area, on the Aroostook River, is probably the most populous town. It is followed closely by Presque Isle and Fort Fairfield, the latter being located in the eastern part of the area, on the Aroostook River, and the former 12 miles south of Caribou, on the Presque Isle Stream, just 1 mile south of its junction with the Aroostook River. Other newer towns which are developing very rapidly are Limestone, Easton, Westfield, Robinsons, Bridgewater Center, Mars Hill, and Blaine.

The transportation facilities are exceptionally good, and no point in the area is more than 8 miles distant from the railroad. The main line is the Bangor and Aroostook Railroad. From Bangor the line runs north to Van Buren, passing through the heart of the potato section of Aroostook County. At Fort Fairfield Junction it divides, the main line continuing north through Presque Isle and Caribou, and finally reaching the St. John River at Van Buren, outside of the area. At Caribou another branch runs to Limestone. In addition to these a branch of the Canadian Pacific Railway enters the area near Fort Fairfield, and follows the Aroostook River to Caribou, terminating at Presque Isle.

Boston is the principal market for all crops except potatoes. The greater part of this crop is sold direct to buyers at the local markets, very few potatoes being shipped out of the area by farmers.

CLIMATE.

As there is no Weather Bureau station within Aroostook County with complete records, no climatic data can be furnished for the area surveyed.

The winters are long and severe, but the cold is less noticeable than in the southern part of the State, where the humidity is considerably greater. January and February are the coldest months, while July and August are the hottest months. There is seldom a winter when the thermometer does not at some time drop as low as $-40°$ F., but at such times the cold is not so noticeable, because the air is very still and dry.

The summers are comparatively short and cool, though brief periods of extreme heat and high humidity occur.

Frosts have been known to occur every month in the year, but they are very rare in July. Light frosts in early June and the latter part of August are not uncommon, and killing frosts have been known to occur in these months.

Snow usually falls before the ground freezes in the fall and remains as a heavy covering throughout the winter. When it melts the following spring the waters drain off rapidly and the land can be worked almost immediately.

The annual precipitation is fairly well distributed throughout the year, although droughts sometimes occur during the summer months.

The soils, however, withstand these droughty periods to a reasonable degree and crops seldom suffer as they do in some other sections of New England.

The prevailing winds are from the northwest. Easterly winds from the coast usually bring rain. The general climatic conditions are said to be very healthful, while the death rate is somewhat less than in other sections of New England.

AGRICULTURE.

Aroostook County at the time of its first settlement was covered with a dense forest of evergreen and deciduous trees. The former included spruce, fir, cedar, and white pine, and the latter a great variety of species, prominent among which were beech, yellow birch, elm, ash, maple, tamarack, white birch, and poplar. The evergreen trees then, as now, were confined principally to the low, swampy lands, while the hardwoods occupied the ridges. Immense white pines, however, were found on all soils; and while the other trees are still abundant, this most valuable tree, which gave to the State the name "Pine Tree State," has become almost extinct within the area surveyed.

The first settlers and lumbermen regarded the white pine as the only tree worth marketing. Later the value of the spruce was recognized, and spruce lumber is now being shipped out of the county in immense quantities. There is no present danger of exhausting the supply, however, as the owners are following a more intelligent system of cutting than was employed in the earlier days of lumbering.

There are records showing that pioneers from New Brunswick settled at Fort Fairfield as early as 1816, and at Presque Isle a few years later. They cleared small tracts of land along the Aroostook River and farmed on a small scale during the summer months, but the greater portion of the year was devoted to lumbering. These settlers were almost entirely dependent on the timber, which they exchanged for the necessaries of life.

At the close of the war of 1812 the boundary line between Maine and New Brunswick was left unsettled, and there were border troubles between the United States and England for several years later, which resulted ultimately in the building of the military road from Bangor to Houlton soon after 1830. Later this road was extended to Presque Isle and Caribou. This was an important factor in the development of the region, as it gave an outlet to the markets of the southern part of the State.

Up to the time of the construction of this highway there were no large areas under cultivation. Small tracts had been devoted to the production of oats, rye, wheat, buckwheat, hay, and potatoes, for local consumption. In fact, practically all the food, as well as cloth-

ing, was produced on the farm. There were, however, a few larger tracts of land which were devoted during the summer to the grazing of cattle and sheep. In the winter these, together with some hogs, were fed from the grain and hay produced on the farm, as it was found much easier to get the hay and grain to the distant markets in the form of beef, pork, mutton, and butter. Mills had already been established where the grain could be ground for the stock and for family use.

The various lumber camps, which were operated in the county during the winter months, furnished a market for a large part of the farm products. The great number of men employed in these camps consumed much of the meat and many of the potatoes and other vegetables, while the horses required almost all the oats and hay produced in the area.

Pioneers were drifting into the area from the provinces and from the southern part of the State all the time, and the population increased from 3,399 in 1830 to 15,527 in 1850.

Just prior to the civil war settlers came into the county in large numbers, and naturally there arose a great demand for a railroad connecting the county with the southern part of the State. To aid in the establishment of such a line, the State gave township after township to the European and North American Railroad, until in 1865, out of 175 townships, only 40 remained to the State. What was still worse, after giving up all these lands the county never received any direct benefit, although it was doubtless intended by the legislature and expected by the people that the line should extend as far north as Houlton.

But the civil war put a stop to these proceedings and at the same time checked the development of the county. However, after recovering from the effects of the war, the inhabitants renewed the clamor for a railroad, but finally despairing of getting a direct line to Bangor, asked the New Brunswick Company, which was constructing a line up the St. John Valley, to extend branch lines to Houlton and Fort Fairfield. This they did, completing the Houlton branch in 1862 and the Presque Isle branch in 1875. In 1876 the line was extended to Caribou, and finally, in 1881, to Presque Isle. This road served the county for twenty years, and although the line of shipment was indirect, it afforded an outlet for the products, and as a result the acreage under cultivation increased. Up to this time the type of agriculture had remained practically the same, the leading crops being oats, wheat, buckwheat, and hay, although dairying was gradually coming into prominence.

The construction of the first starch factory in 1874 marks the beginning of a revolution in agriculture. This industry, organized by Albe Holmes, a New Hampshire man, is probably, though indirectly, the outcome of the building of a branch line of the New

Brunswick Railroad into Houlton and the promise of such a line into Fort Fairfield, thus bringing the region into better communication with the markets. This industry proved a success, and in a short time other factories were established at various points in the area where farmers would contract to grow enough potatoes to justify the building of such a factory, and thus the acreage devoted to potatoes rapidly increased. It frequently happened that more potatoes were grown than could be used at the starch factories, and as a result the farmers began shipping them. In a short time a demand for Aroostook potatoes was created, and under this stimulus the acreage showed a still greater increase, until, in 1891, 1,700,000 bushels of potatoes and 4,500 tons of starch were shipped out of the county.

During this time the population was rapidly increasing and the agricultural products were multiplying. As a result the clamor for a direct route to Bangor broke out afresh. So far all goods that passed over the New Brunswick Railroad, now the Canadian Pacific, had to be shipped under manifest. They were also a long time en route, and the rates were high.

Finally the construction of the Bangor and Aroostook Railroad was begun at Bangor in 1893. That fall it was completed to Houlton, and the following year, 1894, it reached Caribou and Fort Fairfield.

Although the acreage in potatoes showed a gradual increase, owing to the establishment of the starch industry, it was not until the opening of this road, which brought the area into direct communication with some of the southern markets, that the industry entered upon its present era. Since that time the potato has been, still is, and probably will continue to be the most profitable crop in Aroostook County. Each year large areas of new lands are devoted to this crop. It is to be regretted, however, that large areas of good potato soils in the county are held by lumber companies or by individuals, who refuse to sell them at any price, and who are content with the income realized from the lumber that is being removed. Land held in this way is bound to check the agricultural development of the county.

Next to potatoes in importance is the hay crop, the acreage of which is considerably larger than that of potatoes. At one time large quantities of grass and clover seed were produced for sale, but the practice has gradually been replaced by other forms of industry. Clover and timothy are now grown almost exclusively. The first crop from a newly seeded piece of land is principally clover, while the succeeding crops consist chiefly of timothy. Large quantities of the latter are shipped to Boston markets, and the income from this source is a very important item to the farmer. The quality is excellent, and the crop, as a rule, commands a good price. The average yield is from 1 to 2 tons per acre, depending, of course, on the condition of the land.

Oats are grown on almost every farm, but not in sufficient quantities to supply the local demand, and each year large quantities are shipped into the area. There seems to be no necessity for this, as the yield of oats is large, the average being 50 bushels per acre, and they always bring a good price.

Wheat and rye were formerly grown by almost every farmer. At present, however, no crops of the latter are seen, while only small areas are devoted to the former for home consumption. Spring varieties are grown almost exclusively, the White Russian being the standard. The usual yield is from 25 to 30 bushels per acre.

Many of the farmers have small fields of buckwheat and barley. Both crops do well on the soils of the area. Barley yields from 40 to 50 bushels per acre.

Corn is only grown in the garden, as the season is too short for it to reach maturity.

In the early days the climate was thought to be too severe for the growing of apples and small fruits. About thirty-five years ago, however, when the farmers began in a small way to raise a few of the hardier varieties of applies, this idea was found to be erroneous. The Fameuse became a favorite, and as it was early and matured rapidly its successful culture was assured. The varieties that have proved the hardiest and best suited to Aroostook County are the Duchess, the Wealthy, the Fameuse, and Dudley's Winter. The townships which produce the larger proportion of the apples are Presque Isle, Mapleton, and Washburn. Blackberries, strawberries, raspberries, currants, and plums can also be successfully grown, but the climate is too severe for pears.

Vegetable and truck crops, with the exception of potatoes, do not receive the attention they should, and practically all the vegetables consumed in the towns are shipped in from Boston. That such crops can be successfully grown is shown by the excellent family gardens, where all kinds of truck products are found. The sandy areas along the Aroostook River should be especially well suited to such crops, and on the muck areas, if properly drained, onions and celery should do well.

More attention is being paid to the production of eggs and poultry than formerly, and there is ample opportunity for success along this line. Except for a short time in summer, not enough eggs are produced to supply the town trade, and in the late winter and spring many chickens and turkeys are purchased from outside markets for home use.

Dairying, which was at one time an important industry in the area, has gradually declined. Formerly several cheese factories, producing an excellent quality of cheese, were in operation, but at present none of these are in existence. Among the causes that have oper-

ated to bring about these changes may be mentioned the increased interest in potato growing, which has been found more profitable and less confining than dairying. At present the only town in the area supporting a milk route is Caribou, where there are two successful dairy farms. Almost every farmer, however, keeps at least one or two cows, which furnish the family with milk and butter for a part of the year, and give a surplus for sale during a part of the summer. During the winter months creamery butter is shipped in from southern points. Many of the farmers, too, buy butter for family use. With milk selling at 6 cents a quart and good butter bringing 25 to 35 cents a pound, it would seem that a few well-regulated dairy farms in the area would pay handsomely.

The production of beef and mutton has fallen off considerably, although many farmers still have some excellent sheep, and there are one or two fine herds of beef cattle in the area. Enough mutton is produced to supply the home trade and leave some for export. The towns, however, depend principally on the West for their beef supply.

Special attention is paid to the raising of horses, and it is doubtful if any section in New England produces finer work and driving horses than are found in the area.

The value of forest products, while not large for the area surveyed, is of importance to the county as a whole, the total value in 1900 being $258,087. Considerable lumbering, however, is carried on in the area during the winter months, the lumber being chiefly obtained from the swamp land. At this time of the year many of the farmers take their teams to the large lumber camps.

Potatoes and grass are grown on nearly all the soils, except the swamp lands, but it is a generally recognized fact that while the black soils are especially well suited to grass, they are not so well adapted to potato production. It is also claimed that the river soils are the best grass lands in the area, and that potatoes do better on the hardwood ridges.

No single system of crop rotation is followed. The general practice is to have a three-course rotation involving three, four, five, or six years. With this end in view three general systems have developed, as follows: (1) Potatoes two years, grain one year, grass two years; (2) potatoes one year, grain one year, grass two or three years; (3) potatoes one year, grain one year, clover one year. Each of these systems has its advantages. While a smaller yield of potatoes is apt to result from the use of the first system, many farmers have resorted to it in order to kill out the couch grass. The first and second systems have a distinct advantage over the last where it is intended to sell large quantities of hay. There is not much demand for clover hay in the Boston market, and as very little timothy can be secured the first year from seeding, it is necessary to leave

the land in grass two or three years. The third system and least used should be the one most generally followed. In order to do this successfully, since, as has been stated, there is not much demand for clover hay outside of the local markets, the farmers should keep more sheep and dairy cattle and feed the greater part of the crop on the farm.

The farmers all claim, however, that there is more money in potato production than in dairying, and practice the other rotations for this reason. There is no apparent necessity for any decrease in the acreage annually devoted to potatoes where dairying is followed, as the two industries need not interfere with each other. Under such a system of farming the fertilizer bill could be greatly decreased, for with the large amounts of stable manure used as a top dressing and by plowing under the aftermath that always springs up where a crop of clover is removed, the productivity of the land would continually increase, and the same production of potatoes could be secured from much smaller areas.

Another distinct advantage this system has over the others is that the farmers would not be so entirely dependent on the potato crop, and in years of poor crops, which are bound to come occasionally, they at least would have the income from the dairy.

The absence of bowlders and the rolling though not hilly topography makes possible the use of all kinds of farm machinery, such as diggers, planters, mowers, hay loaders, and manure spreaders. The preparation of the land is deep and thorough, the two-horse sulky plow being used in most cases, although some farmers still use the walking plow. After plowing in the fall the small stones are picked up and thrown into heaps or used for filling swampy holes.

In clearing new land the trees are cut and the timber removed during the winter, and the following spring the brush is burned and the land plowed and seeded to clover and timothy. It is then left from two to five years, being used largely as pasture, although some farmers cut the grass with a scythe. At the end of this time the stumps have rotted sufficiently so that the smaller ones can be pulled by horse power, while the larger ones are blown out with dynamite. The land is then planted to potatoes. The cost of clearing land in this way varies from $10 to $15 an acre, and can usually be paid for by the returns from the timber removed. It is generally estimated that on the hardwood ridges there is from 1,000 to 2,000 feet per acre of spruce, which is the most valuable timber. In addition there is a ready market for a limited amount of the beech and birch for firewood, and some of the mills use large quantities for various purposes.

Commercial fertilizers are applied only to the potato fields, and large amounts are used on this crop. Very little attention is given to

stable manure, and by the time it reaches the field it has lost much of its strength as a fertilizer. Thus the productivity of the soil depends almost entirely upon the use of commercial fertilizers. It is claimed, however, that under this treatment the productivity of the land has gradually increased, but whether this will continue indefinitely or not is an unsolved problem.

As a rule little difficulty is experienced in securing efficient labor when needed. By the use of all kinds of farm machinery the farmers with large families have need of little hired help, except during the potato-harvesting season, when large numbers of laborers come in from the Provinces. The average wage paid at these times ranges from $2 to $2.50 a day with board. By the month laborers command from $20 to $30 with board.

According to the census of 1900 the average size of farms was 114.3 acres, and 91.7 per cent of these were operated by the owners, the remainder being rented. On the rented farms the share and cash tenants are about evenly divided. Where land is rented on shares the owner and tenant each receive one-half the crop. Cash rents run from $10 to $25 an acre, depending on the nearness to market and the condition of the farm.

The value of farm lands has tripled in the last twelve or fifteen years, and instances are not uncommon where farms have sold for ten times what they brought twelve years ago. The greater part of the cleared ridge land, with improvements, sells for about $100 an acre.

It is recommended that better care be taken of the stable manure. If it were kept under cover until hauled to the field, and if the straw and rubbish, instead of being burned, as is commonly done, were incorporated with the manure, the fertilizing value of the manure would be greatly increased. The adoption of a three-year rotation and the keeping of more live stock would doubtless prove a very satisfactory system of farming. Under such a plan the fertilizer bill could be greatly reduced. This could also be accomplished to a certain extent if the home mixture of fertilizers were more generally practiced.

THE POTATO INDUSTRY.

The crop of paramount importance in this area, and the one to which more and more attention is being given, is the potato. From a very small beginning, when the first settlers planted a few for home consumption, the production has increased until in 1908, after a lapse of a period of eighty years, the estimated crop of the county is 16,000,000 bushels, a large proportion of which was produced in the area surveyed. As has been stated, the introduction of the starch factory gave the first great impetus to this industry. This brought the farmers to a realization of the fact that large yields of an excellent quality were obtainable. The small shipments at first

made gradually increased, and with the opening up of a direct railroad line in 1894 the acreage in potatoes was rapidly extended.

The prominence of this area as a potato section is due to the fact that the farmers have taken advantage of natural conditions and improved the opportunities for growing this particular crop. Here the soil in every way is especially suited to potatoes. It consists of a hazel-brown silty loam containing many small fragments of shale and other rocks. At a depth of 3 to 6 feet this is underlain by a calcareous shale which has been mingled more or less with the other soil material. The soil has excellent underdrainage, so the crop seldom suffers from an excess of moisture, while on the other hand it will stand a long period of dry weather with little if any injury to the crop. Furthermore, the climate is conducive to a quick and healthy growth of the crop; but with everything that is desirable in the way of soil, drainage, and climate it would be impossible to produce large crops unless properly managed, and the farmers as a rule practice up-to-date methods in cultivation, harvesting, and handling of the crop. No systematic rotation is closely adhered to, but the general plan is as follows: Potatoes, one or two years; grain, usually oats, one year; and grass, one, two, or three years. Owing to the short growing season it is essential that the land be plowed in the fall in order that planting may be done at the first opportunity in the spring. On account of the deep covering of snow there is little if any frost in the ground, so it is possible to start farm work almost as soon as the snow melts in the spring. The land is then harrowed two or three times with a spring-tooth harrow. The potatoes are planted as soon as the weather will permit, which is usually about the 10th of May, with some improved type of planter. They are always planted in drills 2 feet 10 inches apart, the seed being 1 foot apart in the drill. Even with the most thorough preparation of the land the yield from machine-planted fields is from one-fourth to one-third less than the same field planted by hand. This is due to the number of skips caused by the failure of the seed to sprout for one reason or another. However, where large areas are planted hand work is not practicable. For seed the potatoes are nearly always cut, the rate of seeding being from 4 to 5 barrels per acre. The varieties planted vary with the section, but the three most generally grown are the Green Mountain, Red Bliss, and Irish Cobbler.

Large amounts of high-grade fertilizers are used, the applications ranging from 1,200 to 1,500 pounds per acre. Special mixtures of fertilizers are used, 4–6–10,[a] 5–7–10, and 6–8–10 being the usual formulas. The entire amount is applied at the time of planting, although experiments have shown that the yield can be increased by

[a] In this and the following formulas the ingredients are given in the order N, P_2O_5, and K_2O.

applying a part of this fertilizer at the time of planting and the remainder at the first two cultivations. Home-mixed fertilizers are never used, as the farmers claim that they have not the time to do the mixing and that there is frequently difficulty in securing the ingredients.

Very little account is taken of stable manure for the potato crop. It is very important where manure is used that it be applied as a top dressing to the grass land after the hay crop has been removed, as it is almost certain to produce rot if used directly on the potato land. If the land becomes too weedy before the potato sprouts appear above ground a weeder is used. As soon as the plant breaks through the surface the double-shovel plow is brought into use. This throws the dirt over the young plants, covering them to a depth of 1 inch, thus protecting them against late frosts and at the same time killing the weeds. After this the crop receives three or four cultivations with a walking or riding cultivator, and immediately following such cultivations the land is gone over with a double-shovel plow, throwing the soil in ridges around the plants. Level cultivation has been tried with success, but most of the farmers claim that diggers will not do satisfactory work unless the potatoes are ridged.

The only weed that gives any trouble is couch grass. In dry seasons this weed bothers very little, but in wet seasons persistent and judicious cultivation is required to keep it down.

As is the case in most other sections, the greatest problem that the farmers have to contend with in growing the potato is the blight, which, unless kept in check, greatly reduces the yield. As a rule, however, the farmers are able to control the disease, and almost all the growers spray the vines. Bordeaux mixture is used, the usual formula being 5 pounds of lime and 5 pounds of copper sulphate to 50 gallons of water. The solution is put on with a power sprayer which covers six rows at a time and is applied every two or three weeks until the tops stop growing. About 50 gallons is required for an acre. Some of the smaller farmers still use the barrel spray hauled by horse and worked by manual labor. As a rule the Colorado beetle does not give much trouble, but when they do appear they are killed by mixing 2½ pounds of Paris green to 2 barrels of Bordeaux. Many farmers apply the Paris green in powder form with a blower, but the method first mentioned is more satisfactory and at the same time saves considerable labor.

The harvesting of the early varieties begins as soon as the potatoes have attained a marketable size, which is usually about the 20th of August, and continues with the later varieties through September and well into October. All the digging is done with a mechanical digger drawn by two or three horses. With this machine from 4 to 6 acres can be dug in a day and from 8 to 16 hands are required to pick up.

The cost of producing a barrel of potatoes varies from 55 to 75 cents. The yield of course depends somewhat on the soil, but the average is probably about 75 to 85 barrels per acre. In good years, however, 100 to 125 barrels is not an uncommon yield on the better farms, while 150 and 160 barrels are frequently reported.

A part of the crop is sold directly from the field, but at the time of harvesting many of the farmers are too busy to haul their potatoes to market, so they have constructed potato cellars in which the greater part of the late crop is stored. These cellars are made with cement walls; only the roof is above ground and special attention is given to ventilation. The potatoes may be kept here without danger of freezing except in the coldest weather, when small fires are built. Later in the season, when the fall work is done, the potatoes are carted to the towns, where they are sold to buyers who ship them directly or else store them in the large warehouses with which each town is supplied. Taken together, these storehouses hold thousands of bushels, and here the crop is held and distributed whenever and wherever the dealer sees fit. Through the introduction of the Eastman heater car it has become possible to ship potatoes even in the coldest weather without danger of freezing. These dealers buy only the merchantable tubers which are sold for table use or for seed purposes. The former comprise by far the larger proportion of the crop. The price ranges from $1 to $2 a barrel, depending on the quality of the crop and the supply in other sections.

The production of potatoes for seed purposes is quite an important industry in some sections of the area, and each year a number of buyers from Virginia, the Carolinas, New Jersey, Long Island, and other potato-growing sections to the south come here to obtain seed stock. Many of the farmers grow potatoes with this end in view and sell direct to these buyers. In many cases the dealers contract with the farmers to raise a certain number of barrels at a stated price, the dealers often furnishing the seed for the crop in order to keep it pure. The price obtained for these potatoes is about the same as for table potatoes.

All the unmerchantable and, in times when the market price is exceptionally low, many of the merchantable tubers are disposed of at the starch factories, of which there are a large number operating in the area. The average capacity of a factory is 75,000 bushels during the usual working season, which is from the middle of September to the middle of November. On the average, 200 bushels of potatoes make a ton of starch. The process is quite simple. The factories are located on a clear stream of water and consist of storehouses, a building with steam power machinery for washing and grating the potatoes, and a building for drying. The potatoes are washed thoroughly, then grated, the pulp falling on large wire sieves.

Clear water is turned on and washes the starch out of the pulp, carrying it through the sieve into a large vat. When the vat is full of water holding starch in solution, it is allowed to stand twenty-four hours, when the starch has settled to the bottom. Only a portion of the starch is clear. This clear starch is removed, while the residue undergoes a second washing. After two or three washings the starch is taken to the drying house, where it is dried by means of steam pipes. It is then barreled and sold to cotton manufactories, where it is used in the manufacture of cotton cloth. The average price paid for the potatoes that are convertible into starch is 40 to 50 cents a barrel.

SOILS.

During the Glacial epoch all of Maine was covered with a slowly moving sheet of ice of great thickness. This mass, by crushing and grinding, rounded off the ridges and filled in the valleys with transported material. As the ice melted it left an unassorted mass of coarse and fine material over the entire region. The lower till, or that carried beneath the ice, remains as a very compact grayish silty layer containing many rounded stones in great variety, with some coarse gravel and shale fragments. Resting upon this is a stratum which was carried upon and within the ice sheet, and this is known as the upper till. This in places contains a large number of small, rounded stones, while in others it is comparatively free from them. It is much darker in color and more friable than the lower till, the difference probably having been brought about by differences in degree of oxidation and by the greater amounts of organic matter in the upper till, as a result of the growth and decay of plants. The depth of the upper till varies from 1 to 3 feet, although in a few cases it is apparently absent. At the close of the Glacial epoch the land is believed to have subsided, and the climate to have become warmer. At this time the Aroostook Valley was partly filled and swift flowing streams laid down the second terraces. Then followed an elevation of the country and the stream continued cutting its channel until the present level was reached, where the first bottoms or last terraces are still in the process of formation. These two terraces are the only ones that show along the Aroostook River.

The soils in Aroostook County are thus of glacial origin, being derived from glacial debris as originally deposited or from similar material modified to some extent by water agencies. Since deposition these soils have undergone some very important changes through the influence of weathering and as a result of the growth and decay of plants. These processes have in most cases changed the surface 1 or 2 feet from a compact gray soil to a friable yellow loam.

Unlike most glacial soils, these soils give evidence of having been transported but a short distance and have in most cases been derived

from the underlying rock or from a similar rock a short distance to the north. The rock from which the most of these soils are derived is the shaly Aroostook limestone. This rock is found at depths ranging from a few inches to 25 or 30 feet, the average being from 2 to 6 feet, although small areas of outcrop are frequently encountered. There are, however, small bodies in the Aroostook volcanic area, underlain by other rocks of which small outcrops also occur. Such rocks are the conglomerate and diabase of Mars Hill, the Mapleton conglomerates, sandstones, and granites; the Chapman sandstones; the trachytes of Edmund and Hobart Hill; and the quartz-trachytes of the Quaggy Joe region. Of these the only ones that have influenced the character of the soil to any noticeable degree are the sandstones and conglomerate, which, where they are near the surface, not only change the texture but also the color of the overlying material. In addition, there is a small area in Chapman and Mapleton townships underlain by arenaceous limestones, a belt of which extends nearly north and south just outside and to the west of the area. The area as a whole is remarkably free from large glacial bowlders, although occasionally one may be found in any part of the survey, while in the immediate vicinity where outcroppings occur bowlders are very abundant.

Twelve distinct soil types have been recognized and mapped in the area. According to topography, these may be divided into two general groups—those derived from unmodified drift, or upland soils, and those derived from modified drift, or lowland soils. Of the latter four types were recognized. The other and the most important group includes all the other soils. When classified according to origin, the soils fall into three groups—alluvial soils, including those which are at present in the process of formation and those formed before the river had cut its present level; glacial soils, representing the sheet of unmodified drift which covers the greater part of the area; and, finally, the organic soils, which have resulted from the accumulation and decay of plants and trees. In most cases these groups have been subdivided into classes, such as silts, loams, silt loams, and sandy loams, according to their texture as determined by mechanical analyses of typical samples. These classes have further been divided into types and grouped in series where the similarity in origin, color, topography, and agricultural value was sufficient to warrant such a grouping.

Following such a plan, those soils derived from unmodified glacial drift have been separated into eight distinct types. The similarity in four of these types was sufficient to warrant the grouping of them in the Caribou series. These are the Caribou loam, Caribou stony loam, Caribou gravelly loam, and Caribou silt loam. The other four types—Easton loam, Mapleton gravelly loam, Washburn loam, and Chapman loam—were placed in separate series.

Those soils derived from modified glacial drift have been separated into three types representing the Aroostook series. These are Aroos-

took silt loam, Aroostook sandy loam, and Aroostook loam. Of these the Aroostook silt loam is the most important type. None of them, however, cover any great area.

Under the organic soils there is one type—Muck. This type has resulted from the decay of vegetable matter which has become mixed with soil washed in from adjacent slopes.

The larger number of these types are very productive, and with the exception of the Caribou stony loam and Muck areas admit of the use of any kind of labor-saving machinery.

The following table gives the actual and relative extent of each of the soil types:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Caribou loam	220,672	65.1	Caribou stony loam	3,328	1.0
Muck	55,296	16.3	Aroostook silt loam	2,432	.7
Chapman loam	27,648	8.1	Aroostook sandy loam	960	.3
Caribou silt loam	10,176	3.0	Mapleton gravelly loam	192	.1
Easton loam	9,024	2.6	Aroostook loam	64	.1
Washburn loam	5,504	1.6	Total	339,200	.....
Caribou gravelly loam	3,904	1.1			

CARIBOU LOAM.

The Caribou loam, to an average depth of 10 inches, consists of a hazel-brown silty loam. Beneath this is a yellow silty loam of about the same texture, which ranges in thickness from a few inches to 2 feet, where it rests on the gray or grayish-yellow silty loam of the lower till. In places this lower till comes within a few inches of the surface, in which case the yellow stratum is lacking. Small rounded stones, consisting of sandstone, gneiss, granite, and quartzite, are found in both the soil and subsoil, but are more numerous in the latter. In many cases, especially in the northern part of the area, these stones are so numerous that it is impossible to bore to depths greater than 15 to 20 inches. Along many of the stream slopes small stones are so abundant as to give the soil the appearance of a gravelly loam, although the texture of the interstitial material is little different from the rest of the type. Almost the entire type is underlain at a depth ranging from a few inches to several feet by a calcareous shale, many small fragments of which are distributed throughout the soil and subsoil. These fragments are especially numerous in the southern part of the area, where the rock as a rule is somewhat nearer the surface. Small outcropping areas of these rocks have been designated on the map by symbol. In virgin forests there is usually a thin layer of a white floury silt just beneath the covering of the leaf mold.

As mapped the type includes many small depressions of Easton loam and Washburn loam. That part of the type along the slopes of the northern half of Mars Hill is somewhat darker in color and contains more moisture. A freshly plowed field of Caribou loam presents a mottled appearance, showing white, brown, and black areas.

As a rule the soil is friable, free from large bowlders, well drained, and seldom bakes, thus rendering the use of all kinds of improved farm machinery both easy and profitable.

The Caribou loam occurs in all parts of the area as practically one continuous body, dissected by strips and small areas of other types. In the low country around Mars Hill it gives way to the Caribou silt loam, a similar soil in every respect, though containing about 10 per cent more silt. The townships containing the greatest proportion and the most typical bodies of the type are Limestone, Presque Isle, Easton, Fort Fairfield, and Caribou.

This is an upland type occupying the swells and ridges and extending down the stream slopes nearly or quite to the streams. Its position insures good surface drainage, while the compactness of the subsoil aids in making the soil retentive of moisture. The type withstands long dry periods to a remarkable degree.

The Caribou loam is glacial in origin, having been derived from unmodified drift. The soil gives evidence of having been transported but a short distance and has originated from the underlying Aroostook limestone. The upper bright-yellow layer is that part borne in and on the ice, while the grayish compact material was carried beneath the ice.

The native vegetation consists of hardwoods, as maple, ash, yellow birch, and beech, with a scattering growth of spruce and fir. At one time white pine abounded on this type, but this has long since disappeared.

All farm crops do well on this soil, and it produces by far the greater part of the potatoes grown in the area. It seems especially adapted to potatoes, and to grass and all kinds of grain, vegetables, and fruits. The yield of potatoes depends on the variety grown and the attention given the crop. The average probably runs from 80 to 85 barrels. In good years, however, as many as 150 barrels per acre have been reported, while 100 barrels is not at all uncommon. Hay yields from 1 to 1½ tons, oats 50 bushels, wheat 25 to 30 bushels, and barley 40 to 50 bushels per acre.

Cultural methods do not differ from those given other soils. The rotation is potatoes one or two years; oats one year; grass one, two, or three years. If this rotation were shortened and more stock kept, the soil could be improved and the fertilizer bill reduced. The fertilizer application is 1,200 to 1,500 pounds per acre.

The best farms in the area are located on the Caribou loam. The greater part of the type is under cultivation and the remainder is being rapidly cleared. Timbered areas sell for $12 to $15, while the cultivated land brings from $75 to $100 an acre with improvements, the price depending somewhat on nearness to market.

Average results of mechanical analyses of fine-earth samples of soil and subsoil are given in the following table:

Mechanical analyses of Caribou loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18688, 19609, 19611...	Soil.....	3.0	8.5	4.6	11.0	10.0	50.9	16.5
18689, 19610, 19612...	Subsoil....	4.2	8.9	4.1	10.0	9.4	46.9	15.8

CARIBOU SILT LOAM.

The Caribou silt loam consists of 10 inches of a yellowish-brown to hazel-brown silt loam, underlain by a brighter yellow silty loam which may continue throughout the limits of the soil profile or else pass into the grayish silty loam of the lower till in the lower depths. This in turn is underlain at depths ranging from 1 to several feet by a calcareous shale. Many small shale fragments and a few small stones are found in both soil and subsoil, but the latter are much less abundant than in the other soils of the area. Unlike the condition in the other soil types, nearly all of the stones in the silt loam subsoil are fragments of Aroostook limestone. Similar fragments occur in the surface soil, but there are also a few fragments of foreign origin. The type is so similar to and changes into the Caribou loam so gradually that at times the separation of these types becomes very difficult. The Caribou silt loam, however, contains fewer stones and runs a little higher in silt content. As the type is well drained and contains comparatively few stones, it is very easily cultivated.

The type occurs in four bodies, ranging in size from one-fourth to several square miles in extent, in the townships of Easton, Mars Hill, Blaine, and Bridgewater. The largest body is found in that part of the valley of the Prestile Stream and its branches lying between the villages of Mars Hill and Bridgewater Center. It occurs on ridges, slopes, and as flat areas. The elevation as a whole is somewhat less than that of the Caribou loam.

At present practically all of the type is under cultivation. The virgin forests consisted of such hardwoods as beech, yellow birch, and maple, with a sprinkling of spruce and fir.

Like the Caribou loam, this soil is noted for the yield and quality of its potatoes. The yields range from 75 to 85 barrels, although in exceptional cases as high as 140 barrels per acre may be secured.

Grass, grain, fruit, and vegetables do well. Hay yields from 1 to 1½ tons and oats about 50 bushels. The cultural methods do not differ from those employed on other types, and the fertilizer application is about 1,200 to 1,500 pounds to the acre.

As most of the type is conveniently located as to markets, the land with improvements sells on the average for about $100 an acre.

The following table gives the average results of mechanical analyses of fine-earth samples of the soil and subsoil:

Mechanical analyses of Caribou silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19320, 19619.....	Soil.....	2.8	6.7	2.7	6.3	8.5	52.4	20.9
19321, 19620.....	Subsoil.....	3.4	7.5	2.6	6.4	12.2	46.4	21.3

CARIBOU STONY LOAM.

In its typical development the Caribou stony loam consists of 8 inches of a yellowish-brown silty loam, underlain by a yellowish-gray silty loam which persists throughout the limits of the soil profile or until the underlying rock is encountered. That part of the type found on Mars Hill is somewhat more gravelly than the typical soil and has a reddish cast. Small areas of a similar soil were also encountered on Hobart Hill. On Green Mountain the soil consists of a shallow mantle of the yellow till, covered by a deep vegetable mold and underlain by quartz-trachyte. As mapped, the type includes small rock outcrop areas of conglomerates and diabase on Mars Hill, andesite on Hobart and Edmund hills, and of quartz-trachyte on Quaggy Joe and Green Mountain. In all cases the slopes are strewn with large glacial bowlders of granite, gneiss, trachyte, andesite, and conglomerates. Because of the large number of glacial bowlders, the shallowness of the soil, and the steep slopes, the type is rather difficult to cultivate.

The Caribou stony loam is found in bodies varying in size from a few acres to 1 square mile or more, and is confined entirely to that part of the survey south of Presque Isle in what is known as the Aroostook volcanic area. The largest area, 2½ miles long by 1 mile wide, is just east of Mars Hill village and comprises the greater portion of the hill of that name. The next most important area occurs as a narrow belt along the range of mountains, of which Quaggy Joe and Green Mountain are the most important peaks. This body is about one-fourth mile wide and extends in a nearly north and south direction for 3 miles. In addition there is a smaller area on Hobart Hill in Chapman and Mapleton townships and one in the western part of Bridgewater. All other areas mapped are of minor importance.

As the type, without exception, occupies high ridges, peaks, and steep slopes, the drainage is very thorough and would probably be excessive if the forest growth were removed.

The Caribou stony loam is derived from glacial till, but in some cases has since been changed by the decomposition of the underlying rock or by accumulations of organic matter. The characteristic forest growth consists of yellow birch, beech, and maple, with a sprinkling of spruce and fir.

None of the type is under cultivation. While the glacial bowlders might easily be removed from most of the area, yet owing to the shallowness of the soil and steepness of the slopes, it is best that they remain in forest as at present or else be used for pasturage.

The value of the Caribou stony loam depends almost entirely on the timber growth and ranges from $2 to $8 an acre.

CARIBOU GRAVELLY LOAM.

The soil of the Caribou gravelly loam consists of a gravelly loam containing a high percentage of silt and varying in color from a yellowish brown to a dark-chocolate brown, being much darker when wet than when dry. At 10 inches this grades into a bright yellow gravelly loam containing somewhat more gravel and small stones than the soil. Underlying this at a depth of about 20 inches there is usually a dark-colored coarse gravel, although in a few cases there is a compact yellowish-gray gravelly loam, which corresponds to the lower till of the Caribou loam, overlying the gravel. Sectional exposures show this dark gravel stratum to vary in depth from 1 to 3 feet, beneath which are several distinct though somewhat irregular strata of coarse sand, gravelly sand, and medium sand. Both soil and subsoil contain from 40 to 50 per cent of rounded and angular glacial gravel from one-fourth of an inch to 4 inches in diameter.

A freshly plowed field has a decidedly mottled appearance, having small patches of blackish and whitish soil mingled with the various shades of brown and yellow as the predominating colors. The soil is very mellow, and although there are many small stones only a few are large enough to offer any resistance to the plow or cultivator.

The Caribou gravelly loam is found in all parts of the area in bodies varying in size from 1 acre up to 1 square mile, the largest occurring on the east and southwest slopes of Mars Hill. Usually the type occurs as morainal knolls or as larger bodies in which the morainal knolls are a prominent feature. It is, however, necessary to make some exceptions to this general rule, as the largest body mapped, namely, the area at the east foot of Mars Hill, is conspicuously devoid of these hummocks. Frequently small areas are found along the streams, but the type is of more general occurrence in the larger bodies of the Caribou loam. Many small knolls of the gravelly loam

are included in the Caribou loam, as they are too small to be mapped separately.

On account of the loose, porous nature of the soil and subsoil one would expect the crops grown to suffer from drought, but although the type does not withstand long dry periods as well as the more retentive soils the crops are seldom injured by lack of moisture.

The Caribou gravelly loam is of glacial origin, and though the underlying gravel shows the effect of swift-flowing waters the surface soil indicates little if any such effect, with the possible exception that some of the finer material was carried by waters from the melting ice.

Practically all of the type is under cultivation. The characteristic timber growth consists of beech, birch, and maple, with some scattered spruce, fir, and cedar. All these have replaced the white pine with which this country was once forested.

The Caribou gravelly loam is well suited to potatoes, the yield varying from 70 to 90 barrels per acre. Grass, buckwheat, and oats do fairly well, but usually show the effects of too thorough drainage. As a whole the type is better suited to potatoes than to any other crop. The soil requires somewhat larger applications of fertilizers than the Caribou loam in order to maintain its productivity. Like all other soils of a porous nature, it is very probable that the Caribou gravelly loam would be greatly benefited by heavy applications of barnyard manure.

The value of this type is dependent on the nearness to market, but as a rule it sells for $90 to $100 an acre with the improvements.

The results of mechanical analyses of typical fine-earth samples of soil and subsoil are given in the following table:

Mechanical analyses of Caribou gravelly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19615	Soil	7.5	11.5	4.4	8.3	8.4	43.1	16.5
19616	Subsoil	9.6	20.9	6.6	10.5	7.8	29.4	14.4

Sample No. 19615 contained 52.1 per cent of coarse gravel, and No. 19616, 72.3 per cent.

MAPLETON GRAVELLY LOAM.

The soil of the Mapleton gravelly loam is a rather coarse gravelly loam 12 inches or less in depth and containing a rather high percentage of silt. When wet the soil is a very dark brown with a reddish cast, but when dry it becomes a purplish color. Below 12 inches it is a reddish-yellow gravelly loam of uniform texture throughout the soil profile. As a rule, the rock is encountered anywhere from 6 to 20 inches below the surface, while in some cases small outcrops occur.

The gravelly material in both soil and subsoil consists of angular and waterworn fragments of sandstone and quartz.

The Mapleton gravelly loam is of very limited extent. Only four bodies were mapped, their combined area being less than one-half square mile. With the exception of one small body in Presque Isle Township, near Sprague ville, all the type is confined to the northeast corner of Mapleton Township, occurring as long, narrow ridges on what is known as Creasy Ridge. These ridges, which mark places where the underlying conglomerates come near the surface, in many instances are only a few feet wide. As it was impossible to show the smaller areas on the map, they were included with the Caribou loam. Since the type occupies ridges and slopes, and is of a loose texture, it is usually well drained. Except in those cases where the rock is exposed or else covered with a thin layer of soil, there is nothing to interfere with cultivation.

The Mapleton gravelly loam, partly glacial and partly residual in origin, owes its present characteristics to the underlying red conglomerates and sandstones, from which it has been derived through glacial and weathering agencies. It is undoubtedly true that at one time some of these areas consisted of the same soil as the Caribou loam, but through the decomposition of the coarse conglomerates, where near the surface, the original texture and color of the soil have undergone a decided change, while, as a result of the breaking down of the conglomerate rock, the type has become a gravelly loam.

The native vegetation consisted principally of such hardwoods as beech, birch, and maple. At present, however, all the type is cleared and under cultivation. Potatoes, grass, and grain are grown, and where the soil covering is not too shallow very good yields are secured, although perhaps not quite equal to those on the Caribou loam. This soil seems to be well adapted to fruits, and especially apples. The fertilizer applications are the same as for all the other soils in the area.

No areas made up exclusively of this type are on the market. Its value is largely determined by the value of surrounding bodies of the Caribou loam.

Results of mechanical analyses of fine-earth samples of the soil and subsoil are given in the following table:

Mechanical analyses of Mapleton gravelly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19625	Soil	9.6	25.0	8.2	12.9	11.7	15.2	18.2
19626	Subsoil	11.2	16.9	5.7	9.1	12.6	13.4	13.2

Sample No. 19625 contained 46.7 per cent of coarse gravel and No. 19626, 52.0 per cent.

EASTON LOAM.

The Easton loam consists of 10 inches of ashy-gray or nearly white silty loam, underlain by a mottled gray and yellow silty loam or silt loam in which there is a gradually increasing amount of yellow soil until at 36 inches only slight mottlings of the gray material are discernible. Very frequently a layer of sticky yellow clay is encountered at 20 to 30 inches. As a rule, both soil and subsoil contain a large number of angular glacial bowlders and rock fragments up to 1 foot in diameter, seldom larger, and a noticeable quantity of fine sandstone and shale gravel. When very dry the surface has a whitish appearance and a floury texture, indicating the presence of a large proportion of "rock flour," the result of the grinding up of the rocks by glacial action. The rock and shale fragments have a white coating which, in the newly plowed field, increases the whitish appearance of the soil.

In its natural state the type has a thin coating of leaf mold, but under cultivation this becomes incorporated with the white soil and in a short while all traces of it disappear. On account of the poor drainage and stiff nature of the type it is a rather difficult soil to handle until artificially drained.

The Easton loam occurs in bodies of varying sizes, from a fraction of an acre up to three-fourths of a square mile in extent, the largest being found in the northern part of the area in the townships of Caribou, Presque Isle, and Limestone. Only a few areas large enough to map were found south of Easton and Presque Isle townships. The type occurs as flat or depressed areas in larger bodies of Caribou loam and presents a very marked contrast to the dark-brown color of the latter type. Not infrequently it occurs as narrow strips bordering larger areas of muck. Because of its position the soil is inclined to be poorly drained and good crops can not, as a rule, be grown until artificial drainage has been established.

The Easton loam is of glacial origin and owes its strikingly light color either to a less advanced stage of weathering or to an alteration of the upper till. It is possible that these areas may have been covered by water or may have been subject to wet and dry stages, conditions hindering oxidation by preventing aeration.

The characteristic native vegetation consists of a thick growth of small tamarack, spruce, fir, cedar, poplar, and white birch. Where the growth is not too thick there is a heavy covering of moss over the soil. Old pine stumps are frequently encountered, showing that this most valuable tree at one time grew on this soil.

When properly drained fair yields of potatoes are secured, although nothing like the yields obtained on adjoining areas of the Caribou loam. There is some difficulty in securing a good stand, as the soil is inclined to be cold and wet, conditions which prevent or

hinder the sprouting of the tubers. Potatoes produced on this soil are somewhat inferior in quality, as there is a tendency toward scabbiness. Oats and grass do fairly well, although the latter is inclined to winterkill.

What this soil needs is a thorough system of drainage. This, together with the incorporation of organic matter in the form of barnyard manure, would improve the texture of the soil and increase the productivity. The fertilizer application is about the same as that for other soils of the area.

The agricultural value of this individual soil type can not be given, as it is always included in larger areas of the Caribou loam and other types.

Results of mechanical analyses of fine-earth samples of the soil and subsoil are given in the following table:

Mechanical analyses of Easton loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19621	Soil	6.0	9.5	4.0	11.3	9.0	40.8	19.4
19622	Subsoil	6.3	10.6	4.9	14.7	14.5	35.3	13.7

CHAPMAN LOAM.

The Chapman loam is an extremely variable soil, and no general characteristics of texture and color hold for the entire type. For this reason it is necessary to consider the different phases separately. The type as a whole has a very hummocky surface, the hummocks being 4 or 5 feet in diameter and a foot or two above the intervening depressions. For the most part the soil of these hummocks consists of a bright-yellow to brown, rather coarse loam, sometimes gravelly, and frequently containing pockets of fine white silt or medium-textured dark-colored sand. At or about 12 inches this gives place to a sticky loam, somewhat lighter in color and containing appreciable amounts of clay. The subsoil becomes heavier with depth, until at 24 to 30 inches it grades into the compact silt loam or silty loam of the lower till. In some places this phase grades into a bright-yellow silt loam, in which there is enough clay to make the soil decidedly sticky. On other mounds the unweathered white or light-gray till is found at the surface; while in still other cases the soil may consist of a light-gray or yellowish-gray silty loam mottled with brown iron stains. This phase usually contains considerable clay, and it is because of this characteristic that the different phases of the type have received the local name "clayey lands."

In the hollows the type may consist of a grayish silt loam, similar to the lower till, covered with 6 to 8 inches of vegetable mold or muck,

or it may be merely a mass of rock, while as a rule few stones are encountered in the hummocks. All these phases were frequently found in an area of 200 square feet, but in all cases they were underlain by the grayish-white silty loam or silt loam of the lower till.

The type as mapped includes many bodies and strips of Muck, some of which were too small to outline and others it was impossible to locate because of the dense forest. A field of this type plowed for the first time shows the various shades of yellow, white, greenish-gray, and black, and usually contains some small angular bowlders. When the stumps and stones have been removed the soil is easily cultivated, although in wet seasons it is more difficult to handle than the Caribou loam because of its sticky nature.

The areas of the Chapman loam range from a few acres to several square miles in extent. They are found in every township included in the survey, but the largest occurs in the northwest corner of Limestone, and also another large body in the northeast corner of this same township. Both of these are termed "blueberry bogs," from the fact that they support a growth of blueberry bushes. Other large bodies are found in the eastern part of Chapman, the southeastern corner of Mapleton, and along the Easton-Fort Fairfield line. In addition to these, there are many smaller bodies scattered throughout the area. As a rule, the larger bodies of the type occupy a low plain country at the source of several streams or along stream courses. Some of the smaller areas, however, have a more sloping topography. That part of the type occurring as plains is inclined to be poorly drained.

The Chapman loam is of glacial origin, but its original characteristics have been changed through the influence of several agencies. The hummocky surface has probably been produced in three ways: First, by the upturning of trees, leaving mounds of dirt; second, by burning out of old stumps, leaving depressions; third, by heaving of the soil through the action of frosts.

The native forest growth, which in many cases is still standing, consists of spruce, fir, cedar, tamarack, white birch, poplar, and alder, with a sprinkling of other hardwoods. The vegetation on those areas known as "blueberry bogs" consists of blueberry bushes, alders, dwarf cornel, and moss, while many of the hummocks are bare. This difference is undoubtedly due to the fact that every year or two the bogs are burned over to increase the yield of the blueberries, of which thousands of bushels are sold each season.

On account of the cold, wet nature of the soil and the hummocky topography, the greater part of the type is still uncultivated. When once cleared, however, the better drained portions produce fair yields of grass and grain but are not so well suited to potatoes. Other areas will require artificial drainage before crops can be successfully grown.

The value of the type depends on the timber growth and the nearness to market. Where the growth is light from $6 to $10 an acre is the usual price, but where there is a good stand of spruce and fir on areas near the railroad the value may run as high as $25 an acre.

Because of the variability of the type no samples were taken for mechanical analyses.

AROOSTOOK SILT LOAM.

The Aroostook silt loam to a depth of about 10 inches is a dark-brown friable silt loam. Beneath this there is found a lighter brown silt loam, slightly mottled with gray and chocolate brown, which usually becomes sandier as the depth increases. The sandy material is underlain at 3 to 5 feet by a stratum of dark-colored gravel. When wet, the surface soil has a very dark appearance, but the dry surface becomes grayish. The soil in slight depressions is a heavy silt loam, underlain by a mottled gray and yellow silt loam, the proportion of gray color increasing with depth until at 36 inches the color becomes nearly solid gray, slightly mottled with brown. In the higher lying areas and near the river the soil contains a greater percentage of fine sand. Pockets and thin strata of fine sand are not infrequently found in the subsoil, while small mica flakes occur in both soil and subsoil.

A phase which occurs to a limited extent along Presque Isle Stream is darker in color and has a slightly higher content of silt and clay.

The soil as a whole being very mellow, free from stones, and, with the exception of the phase just described, well drained, presents no obstacles to the plow or cultivator.

Excepting a small area of a few acres found along the Prestile Stream just as it leaves the county and some narrow bodies along the Presque Isle Stream just west of the village, all the Aroostook silt loam mapped occurs along the Aroostook River. Narrow strips are found on one or both sides of the river along the greater part of its course through the area, but there are frequent breaks where high bluffs rise directly from the stream bed. The largest bodies, however, occupy a chain of islands extending from a point in the river directly north of Presque Isle to a point about 1½ miles east of Crouseville. The smallest of these covers only a few acres, while the largest comprises nearly one-half square mile. These islands are really a part of the first bottoms of the river, but have been separated from adjoining bodies of land by the cutting of new channels in times of high water. At all other times the water moves very slowly through these old channels.

Without exception the type occupies the first bottoms, which are from 8 to 10 feet higher than the river. The surface is flat or gently

undulating and, being underlain by gravel, the drainage is as a rule good, although not excessive.

The Aroostook silt loam is of alluvial origin and represents the most recent flood plains of the streams along which it occurs. The type is subject to overflow, but this seldom happens except during the spring freshets, and by the time it is desirable to cultivate the land, the waters have drained away sufficiently and do not retard planting to any great extent, though farm work may be delayed a few days.

That phase which occurs along the Presque Isle Stream is, however, very poorly drained and, unlike the rest of the type, owes its occurrence to artificial rather than natural means. Across the Presque Isle Stream at Presque Isle there is a dam which has been in existence many years. This dam backs up water for 4 miles and it is along the pond thus formed that this phase occurs. During high water the streams, bearing loads of fine soil in suspension, enter this pond and encountering the quiet waters are compelled to dispose of this material. The deposits thus formed gradually increase in thickness until they reach a point just above the normal level of the water. In times of high water, however, the soil is overflowed.

The characteristic vegetation of this phase is a coarse swamp grass. It is very doubtful if a successful system of artificial drainage could be installed under present conditions. If, however, the dam should be removed, it is very likely that these areas would become naturally well drained. On all other parts of this type the original forest growth was ash and elm, but at present nearly every acre is under cultivation.

Because of the annual addition of fresh soil and decayed humus brought down by the spring floods, this is one of the most fertile types of soil in the area. Large crops of potatoes of excellent quality are secured, the yield not infrequently running more than 100 barrels per acre, although the average is considerably less than this, and the yield and quality are, as a rule, somewhat lower than on the Caribou loam. It is especially well suited to grain or grass and any other farm crop that will grow in this section. Oats yield from 40 to 60 bushels per acre, while 1 to 2 tons of hay is not an unusual crop. The fertilizer application is about the same as for the other types, being from 1,200 to 1,500 pounds, although larger increases in yield result from the same application than on the other soils.

At present none of the type is on the market. It is doubtful if any of this land with the improvements could be purchased for less than $100 an acre, while the price for the greater part of it would run somewhat higher. As is the case with several other soils of limited extent, no farms are made up entirely of this one type, so it is a difficult matter to get at the actual value.

Average results of mechanical analyses of fine-earth samples of the soil and subsoil are given in the following table:

Mechanical analyses of Aroostook silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19603, 19607.....	Soil.....	0.1	0.7	0.4	6.1	15.7	62.7	14.6
19604, 19608.....	Subsoil.....	.0	.7	.8	6.7	13.8	63.7	14.4

AROOSTOOK LOAM.

The soil of the Aroostook loam consists of a dark-brown or sometimes yellowish-brown heavy loam 8 to 10 inches deep, containing perceptible amounts of medium to fine sand with a percentage of clay high enough to give the soil a sticky texture in wet weather. For the first 10 inches the subsoil is a mottled gray and brown silty loam to silt loam. At about 20 inches it changes to a mottled gray and brown very compact silt loam in which the gray color predominates. Owing to the fact that the type contains more clay than the other soils in the area it has received the name "clayey land" from many of the farmers. Very few stones occur and these are small. The type as a whole is easily handled, although it is somewhat more sticky than most of the soils.

Only three bodies of the type were mapped and the combined area of these is not over one-fourth square mile. Many bodies, however, too small to map were encountered. All of the type is found along the Aroostook River, and those areas mapped occur about 3 miles northeast of Presque Isle. The type occupies terraces and indistinctly developed terraces at the foot of slopes bordering the Aroostook River and is usually well drained, although, owing to the compact nature of the underlying layer of silt, it is somewhat more retentive than the other river-bottom soils.

The Aroostook loam belongs to the group derived from modified glacial drift. The underlying silt was laid down in quiet waters, but the surface soil has been influenced to some extent by washings from the adjoining slopes of the Caribou loam. Though all the type is now cleared and under cultivation, it is very probable that at one time it was covered with a thick forest of spruce, fir, poplar, and white birch, mixed with a few other hardwoods. Grain, grass, and potatoes are the crops grown, and while all do well it is generally acknowledged that this soil is not quite as well suited to potatoes as the more loamy and gravelly soils. Grass yields from 1 to 1½ tons of hay and oats from 40 to 50 bushels per acre. The fertilizer practice is about the same as for the other river soils.

On account of the small extent and the variability of the type no samples were taken for mechanical analyses.

AROOSTOOK SANDY LOAM.

The soil of the Aroostook sandy loam to a depth of 6 to 12 inches consists of a brown or yellowish-brown medium to fine sandy loam

containing a perceptible amount of silt. The subsoil to a depth of 36 inches is a grayish-black or greenish-gray medium sand, containing small particles of quartz, calcite, and mica, but consisting principally of dark-colored shale, slate, and sandstone fragments. Pockets of a light-colored silty sand are of frequent occurrence in the subsoil. At about 36 inches the soil as a rule is underlain by a more or less impervious stratum which in the low-lying areas is a compact yellowish-brown clay or sometimes a bluish-gray silty clay, while in the more elevated portions the compact silty lower till is often found at a depth of less than 36 inches. On the upland side the type may grade into the Caribou loam, the line of demarcation in some cases being very indistinct. On the other hand a steep bluff marks the boundary between the two types. Immediately after a rain the soil has a very dark brown appearance, but as it dries the surface becomes lighter in color and approaches more nearly a yellow. As is usually the case with sandy soils, the type is loose and friable and therefore easily cultivated.

The Aroostook sandy loam occurs only along the Aroostook River and almost invariably occupies the second terraces, although in one or two cases it is found on what is apparently a first, though really a second terrace. The largest bodies of this type are found a few miles northwest of Presque Isle and across the river from Fort Fairfield.

As a rule, the type occupies comparatively level areas. In a few of the smaller bodies, where the soil occurs as long narrow ridges, as is the case near Beans, the surface is slightly rolling.

Notwithstanding the structure is rather loose and incoherent and the soil is underlain by a stratum of sand, it retains water to a marked degree and cultivated crops seldom suffer from drought to any great extent. This can probably be accounted for, in a measure at least, by the presence within 3 feet of the surface of the compact stratum which retards the water in its downward course, while the surface mulch that results from thorough cultivation prevents rapid evaporation. Such crops as oats and grass, however, which can not be cultivated, are apt to suffer to some extent from drought during dry seasons.

The Aroostook sandy loam is derived from modified glacial drift. The terraces which this type forms were the old flood-plains of the Aroostook Valley, along which the reworked glacial material was deposited.

Elm and ash were the native tree growths. At present practically all of the type is under cultivation, and like all other soils of the area it is devoted to the production of potatoes, oats, and grass. The yield of potatoes is from 70 to 80 barrels. Oats and grass produce fair yields, but the soil is not so well adapted to these crops as the heavier soils. The drainage is thorough and the soil warm and early

for this locality, and for this reason it would probably make a good trucking soil. At present nearly all the vegetables consumed in the area are shipped from Boston and other southern points. As most of the Aroostook sandy loam lies near the larger towns, it would seem to offer good opportunities for the production of market-garden crops to take the place of the imported products.

From 1,200 to 1,500 pounds of commercial fertilizer is the usual application on this type. There is a slight tendency toward leachiness in this soil, and the effects of this fertilizer are not as lasting as on other soils. The addition of organic matter in some form would doubtless prove very beneficial to the type.

Since the areas are small, it is difficult to estimate the individual value of the soil type. When included with other soils and with such improvements as fences and buildings the land sells for $100 an acre.

Average results of mechanical analyses of fine-earth samples of the soil and subsoil are given in the following table:

Mechanical analyses of Aroostook sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19599, 19601	Soil	0.6	6.1	11.6	35.8	13.1	11.4	12.0
19500, 19602	Subsoil	.6	10.8	20.7	48.0	9.8	6.1	3.7

WASHBURN LOAM.

The soil of the Washburn loam is a very dark brown or black silty loam 12 inches deep. The subsoil is a grayish-yellow silty loam, mottled with brown and yellow, becoming a yellowish sandy clay at or near 36 inches. In a wet condition the soil is much blacker than when dry. In general the dark color is due to a high content of organic matter. The surface is strewn with granite, gneiss, and sandstone rocks, varying in size from 6 to 18 inches, and a few larger glacial bowlders. In fact, this one characteristic distinguishes it from the other soils of the area.

Like all other glaciated soils in the area, the type contains many small shale and slate fragments, thus giving a gravelly effect to the soil, the gravel as a rule being more abundant in the subsoil than in the soil. The covering of soil over the underlying calcareous shale is deeper than in the case of the Caribou loam. After the larger bowlders have been removed the type is not a difficult one to cultivate, although the poorly drained areas are not so easily managed.

The Washburn loam, which is found in every township, is of more common occurrence in the southern part of the area in the towns of Easton, Presque Isle, Mars Hill, Blaine, and Bridgewater, where it is closely associated with large swamp or muck areas. There are no

large, continuous bodies, but it is found as narrow strips along some of the smaller streams and branches and in the hollows through which the drainage waters flow as small, isolated depressions and as narrow areas bordering bodies of Muck. In the last case the areas mark what was at one time Muck, but after the removal of the forest growth the soil dried out sufficiently to make cultivation possible. As cultivation continued the amount of organic matter gradually decreased, while there was a proportionate increase in the amount of earthy material, resulting in a gradual change from Muck to Washburn loam. In every case the type is found in those places where the conditions were favorable to heavy accumulations of humus, which gives the type its chief characteristic. In position and origin, as well as in texture, the type is intermediate between the Caribou loam and Muck, and to a certain extent has the characteristics of each.

As a rule, the type is fairly well drained, although the drainage is not as thorough as in the case of the Caribou loam, and in a few places artificial drainage would undoubtedly prove very beneficial.

The Washburn loam is of glacial origin, but the true characteristics of the glacial material have been marked to a large extent by the accumulation of organic matter and by the washing in of the soils from the surrounding areas.

The native vegetation of the type is what is locally known as "black growth" and consists of a dense forest of spruce, fir, cedar, and tamarack, with a few beech, birch, poplar, and white birch.

The Washburn loam is especially adapted to the production of grass, of which large yields are obtained. Oats and buckwheat also do well. Large yields of potatoes are secured, but in quality they are inferior and usually scabby, so it is not advisable to grow them on this soil. Hay yields from 1½ to 2 tons, oats 40 to 50 bushels, and potatoes 70 to 90 barrels per acre.

The fertilizer application is about the same as for other types of the area. At present there is no need for the addition of organic matter.

The type as a rule is not much in demand for general farm purposes, and where $10 to $12 an acre is paid for uncleared hardwood soils this type brings only $2 to $5, the value depending largely on the timber growth.

The results of mechanical analyses of fine-earth samples of soil and subsoil are given in the following table:

Mechanical analyses of Washburn loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19627	Soil	1.4	5.5	3.4	11.7	10.4	50.3	16.8
19628	Subsoil	3.2	7.2	4.4	21.1	19.7	40.1	12.9

MUCK.

The Muck consists of black, thoroughly decomposed vegetable matter, mixed with soil that has washed in from adjacent uplands and ranging in depth from 8 inches to 3 feet or more. The subsoil is quite variable, depending somewhat on the position in which the type occurs. Along some of the smaller streams, and where the covering of muck is shallow, it consists of a grayish silty material resembling the lower till, while in other cases the top soil may be underlain by a very stony loam, so stony in fact that it is seldom possible to bore into it with the soil auger. The larger flat areas may have either one of these subsoils, or, as is more often the case, they may be underlain by a bluish clay. When properly drained the type is easily cultivated.

The Muck is found in bodies ranging in size from a few acres to 1 square mile or more. It occurs as strips of varying width along nearly all the streams, except the Aroostook River, and from all of the larger bodies narrow projections extend into the adjacent upland, indicating the source of a small branch which may be dry the greater portion of the year. In addition to this there are many large flat areas in which several streams have their sources and others where several small streams unite.

The type is of very common occurrence throughout all of the townships in the area, but the largest and most numerous bodies are found in Easton, Mars Hill, Blaine, Bridgewater, and the southern part of Presque Isle, while Caribou, Limestone, Fort Fairfield, and the northern half of Presque Isle have the least. The type as a whole is low and level, and during a part of the year, at least, is covered with water. Streams flowing through it have no well-defined channels, and during high water spread out over the adjoining Muck areas.

The subsoil of the Muck is of glacial origin and consists of both modified and unmodified drift. The soil, however, is of more recent formation, and where it occurs along streams and in the smaller depressions is the result of decaying vegetable matter which has become mixed to a greater or less extent with soils washed in from adjacent uplands. Many of the large, flat areas probably represent old lake basins, filled with organic remains and soil wash. This same process is gradually extinguishing many of the existing lakes, and, as the water is usually very shallow, the encroachment is relatively rapid. The vegetation on these newly formed muck areas along the lakes consists of a coarse swamp grass, pitcher plants, and a few tamarack trees. All other areas are covered with an almost impenetrable growth of cedar, spruce, tamarack, and fir.

On account of its poorly drained condition and the difficulty encountered in clearing the type comparatively little of it is under

cultivation, although the farmers are making clearings of narrow strips on the outer edges from time to time. In addition to the thick growth of evergreen the ground is usually covered to a depth of 2 or 3 feet with old cedar bogs buried under decaying organic matter and overgrown with moss. When the trees are cut, the rubbish removed, and the muck exposed to the sun many of the areas dry sufficiently to permit cultivation without drainage and produce excellent hay. Many areas, however, lie so low that the land can never be used for agricultural purposes until artificial drainage has been established. Most of these areas are so situated as to make the drainage problem a rather simple one, as there would be little difficulty in finding an outlet for the water.

The yield of grass, to which crop the soil is especially adapted, is from 1 to 2 tons of hay per acre, and the quality excellent. It is very probable that celery would do well, and it is advised that experiments be made along this line, as excellent results have been obtained from growing celery on similar soils in other parts of the United States. The type is not suited to potatoes, as they are almost certain to be scabby and of inferior quality.

None of these lands are sold for agricultural purposes. The price they bring depends entirely on the timber growth and ranges from $2 to as high as $25 an acre, the latter price applying where there is a good stand of pulp woods near the market.

SUMMARY.

The Caribou area is situated in the eastern part of Aroostook County and extends north and south along the New Brunswick line for a distance of 40 miles. Its greatest width east and west is 15 miles. The total area is 530 square miles, or 339,200 acres.

The three largest towns in the county are Caribou, Presque Isle, and Fort Fairfield. Other important and growing towns are Mars Hill, Blaine, Robinson, Bridgewater Center, and Westfield.

The surface of the area is neither level nor hilly, though there are some high hills. There are many ridges and swells, and along the Aroostook River there are two distinct terraces. With the exception of the southeastern corner, all of the area is drained by the Aroostook River and its branches. The small streams furnish fine water power, which in many cases has been developed.

The transportation facilities are very good. Besides the main line of the Bangor and Aroostook, there are branch railroads extending to Limestone and Fort Fairfield and a line of the Canadian Pacific following the river to Presque Isle. No point in the area is more than 10 miles distant from the railroad.

The winters are long and cold, while the summers are comparatively short and hot. Frosts have occurred every month in the year, but

are rare in July. Light frosts frequently occur in June and August. The rainfall is distributed throughout the year. Snow falls before the ground freezes and remains throughout the winter. As there is no frost in the ground and as the waters drain off rapidly, the land can be worked almost as soon as the snow melts.

The first settlement was made at Fort Fairfield in 1816 by pioneers from New Brunswick. Later on Dutch, English, Irish, Swedish, and French immigrants came into the county through the Provinces and settled at Caribou, Presque Isle, and New Sweden. After the construction of the "military road" in 1830, settlers began coming in from the southern part of the State. The first settlers grew some hay, oats, wheat, buckwheat, and a few potatoes for home consumption, but depended principally on forest products.

Introduction of starch manufacture in 1874 resulted in increased attention being given to the potato crop, and some potatoes were shipped over the Canadian Pacific. Not until the opening of the Bangor and Aroostook road in 1894 did potato growing begin in earnest. From that time grain and beef production and dairying declined and potato production became the leading industry. In 1908 the estimated crop of Aroostook County was 16,000,000 bushels. The greater proportion of this immense output is used for the table and for seed. The inferior tubers are sold to starch factories. The leading varieties grown are Irish Cobbler, Green Mountain, and Bliss Red. Large quantities of hay are shipped to Boston. These are the only money crops. Not enough grain is produced in the area to supply the home demand.

Potatoes, grass, and grain are grown on all the soil types. No single system of rotation is adhered to closely, but the general plan is a three-course rotation embracing four to six years, made up as follows: Potatoes one or two years, grain one year, grass one, two, or three years.

The price of ridge land with improvements and cleared of hardwood is about $100 an acre. Land is rented to share tenants for one-half the crop and to cash tenants for $10 to $25 an acre. About 91 per cent of the farms are operated by owners. The rented lands are about evenly divided between share and cash tenants.

Exclusive of Muck, eleven soil types have been mapped in the area. These vary in texture from sand to heavy silt loams, but the greater proportion of the area is made up of a friable silty loam. The absence of large glacial bowlders makes the use of farm machinery practicable.

The topography of the Caribou loam is rolling and the type is well drained. It withstands long dry periods to a remarkable degree. It is suited to all farm crops, especially to potatoes.

The Caribou silt loam is similar in many respects to the Caribou loam and is adapted to the same crops. It contains a somewhat higher percentage of silt.

The Caribou gravelly loam occurs as piles of morainal material in strips along streams and in one case as a large and comparatively level area. The type is well drained and produces excellent potatoes, but is not quite so well suited to grass and grain.

The Caribou stony loam contains many large bowlders and is marked by small areas of rock outcrop. None of the type is cultivated. It is better that it remain in forest, although some areas would probably afford good pasturage.

The Chapman loam, as a rule, occupies low, plain country and is inclined to be cold and poorly drained. This type is poorly adapted to the production of potatoes, but on the better-drained areas grass and grain do well.

The Easton loam occurs in depressions and as narrow strips along swamp areas. It is not, as a rule, well drained, and while grass and grain do well the type is not suited to potatoes.

The Washburn loam is found in depressions and along stream slopes. This type produces large crops of grass and oats, but the potatoes are inclined to be scabby.

The Mapleton gravelly loam is of very limited extent. It is well drained, and where the rock is not too near the surface fair crops of grass, grain, and potatoes are produced. The type is well suited to apples.

The Aroostook silt loam is the most extensive of the river soils, and though of level topography and subject to overflow during the spring freshets is well drained. This is an excellent grass and grain soil, and potatoes do fairly well.

The Aroostook sandy loam is found on the second terraces and is well drained. Potatoes do well, but the yields of grass and grain are not quite equal to those of the heavier soils. Vegetables should do well on this type.

The Aroostook loam is of very limited extent. It is well drained and suited to general farm purposes.

Muck represents large accumulations of vegetable matter mixed with soil. Where drained, good crops of grass are secured. Celery should do well on this type.

The farmers are in general very prosperous. They have substantial dwellings, warm barns, and good horses. As a rule they practice up-to-date methods of farming. They could, however, improve their land and decrease their fertilizer bills by keeping more live stock and by following a three-year rotation of potatoes, grain, and clover.

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