

Issued October 24, 1912.

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF WINDHAM COUNTY,
CONNECTICUT.

BY

W. E. McLENDON.

J. E. LAPHAM, INSPECTOR IN CHARGE NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1911.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

BUREAU OF SOILS.

MILTON WHITNEY, *Chief of Bureau.*
ALBERT G. RICE, *Chief Clerk.*

OIL SURVEY.

C. F. MARBUT, *In Charge.*
G. W. BAUMANN, *Executive Assistant.*

COMMITTEE ON THE CORRELATION AND CLASSIFICATION OF SOILS.

C. F. MARBUT, *Chairman.*
HUGH H. BENNETT, *Inspector Southern Division.*
J. E. LAPHAM, *Inspector Northern Division.*
MACY H. LAPHAM, *Inspector Western Division.*
J. W. MCKERICHER, *Secretary.*

Issued October 24, 1912.

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF WINDHAM COUNTY,
CONNECTICUT.

BY

W. E. McLENDON.

J. E. LAPHAM, INSPECTOR IN CHARGE NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1911.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., March 21, 1912.

SIR: During the field seasons of 1910 and 1911 a soil survey was made of Windham County, Conn. The selection of this area was made because of urgent requests of citizens of the county, duly indorsed by Hon. Edwin W. Higgins, within whose congressional district the county lies.

The work in 1910 was carried on by Mr. Frank Bennett, but as a result of a revision in classification a resurvey of the area was made in 1911. The latter was in charge of Mr. W. E. McLendon.

The accompanying report and map cover this survey and are submitted for publication as advance sheets of field operations of the Bureau of Soils for 1911, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
SOIL SURVEY OF WINDHAM COUNTY, CONNECTICUT. By W. E. MCLENDON.....	5
Description of the area.....	5
Climate.....	9
Agriculture.....	10
Soils.....	15
Gloucester loam.....	17
Gloucester fine sandy loam.....	19
Gloucester stony fine sandy loam.....	21
Rough stony land.....	22
Merrimac gravelly sandy loam.....	23
Merrimac fine sandy loam.....	24
Podunk fine sandy loam.....	25
Muck.....	26
Meadow.....	27
Summary.....	27

ILLUSTRATIONS.

	Page.
FIGURE.	
FIG. 1. Sketch map showing the areas surveyed in Connecticut	5
MAP.	
Soil map, Windham County sheet, Connecticut.	3

SOIL SURVEY OF WINDHAM COUNTY, CONNECTICUT.

By W. E. McLENDON.

DESCRIPTION OF THE AREA.

Windham County occupies the northeastern corner of the State of Connecticut, being bounded on the north by Worcester County, Mass.; on the east by Kent and Providence Counties, R. I.; and on the south and west, respectively, by New London and Tolland Counties, Conn.

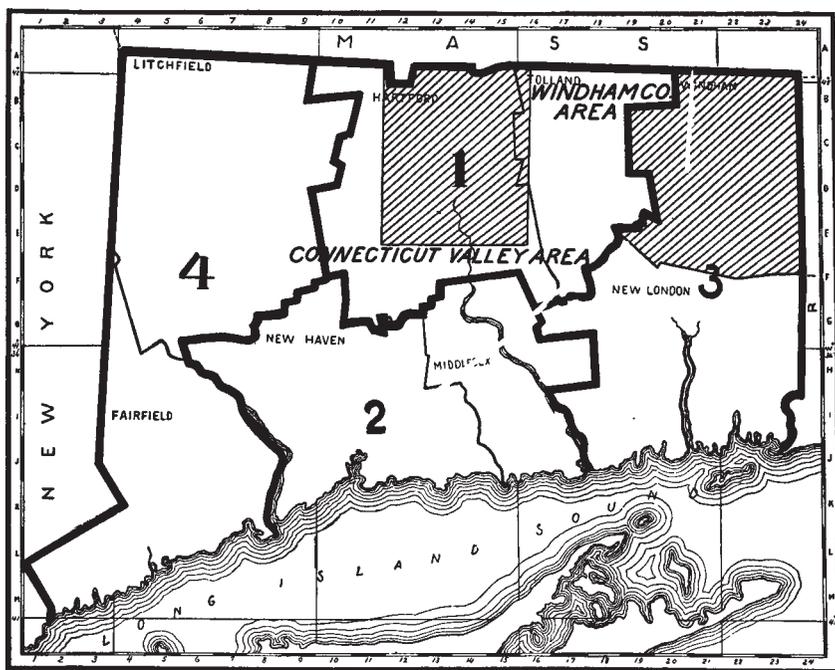


FIG. 1.—Sketch map showing areas surveyed in Connecticut.

It is composed of 15 towns¹ and contains an area of 337,280 acres, or 527 square miles.

If all valleys and depressions existing in Windham County were filled up to the level of the sky line the resulting topography would be that of a plain. Its elevation would be greatest in the north-western corner of the county, where it would reach a height of about

¹ The word "town," as used throughout this report, is synonymous with "township."

1,100 feet above sea level, and least in the southeastern corner of the county, where its elevation would be about 500 feet. The south-eastward slope of this plain would be essentially uniform.

This simple and somewhat ideal topography could be produced only by filling all valleys and depressions up to the sky-line level. It could not be done by merely filling the valleys to the tops of the adjacent uplands. The latter only in relatively rare cases rise immediately from the valley levels to this ideal plain level. From practically any point at which the county is overlooked the upland surface, except the distant sky line, is uneven. The highest points, or the average of these points, trace a smooth boundary line on the latter only when enough of them are projected onto the distant sky to form an unbroken continuous mass.

In detail there are innumerable deviations from this simple plain surface. Only a relatively small part of the country or even of the upland country stands at sky-line level. The watershed ridges are not level on top. The river and creek valleys are not sharply cut gashes in the level upland. In other words, the prominent and striking features of the topography are not simply a plain with valleys. In fact, while both of these are present and constitute ideally the fundamental features of the topography, they are the least striking of the existing features. The universal and striking impression made on the observer is that of an uneven, hilly country, without any systematic or orderly arrangement of valleys, lowlands, or ridges. The greater part of the land lies below the high plain level and above the river valley levels. The valleys, however, are but very slightly more noticeable than many of the other depressions.

Like all areas of many different kinds of rocks with complex structure, there is very little system in the distribution of the features of topographic detail. Areas of both soft and hard rock occur in apparent disorderly array, yet they have their effect on topography to the same extent as if they were distributed in perfect order. The result is an uneven upland, and the degree of unevenness is merely a function of the vigor of the erosive agencies and the stage in the cycle of erosion in progress. It happens that the erosion cycle now in progress in Windham County is not a vigorous one and the cycle has not yet reached the stage of maximum relief. The relief is not strong, therefore. The proportion of land that is too steep to cultivate is very small. At the same time, the proportion that is as smooth as a western prairie is still smaller.

Windham County was entirely glaciated during the glacial period. The effect on the topography, however, seems to have been slight. It seems to have rounded some of the hills and it undoubtedly deposited a considerable quantity of material both in the valleys and on the uplands, yet the modification of the upland topography is

barely perceptible, partly on account of the moderately strong topography beneath the glacial deposits. The glacial deposits seem to occur on the upland mainly as a veneer. They have modified the soils to a considerable extent, but the topography very little.

The valleys are, with the exception of those occupied by the two largest streams, narrow, though the river basins are broad, irregular depressions. The larger valley floors are at present rarely more than a quarter mile in width and usually considerably less. If, however, the width of the bordering terraces be included as parts of the valleys they are often miles wide.

The terraces or filled-in valley areas, which for the most part are level to gently undulating and leveler than the uplands proper, lie intermediate in elevation between the highlands and the present stream bottoms. Such areas occur in all sections of the county, but the largest are in Thompson, Woodstock, Putnam, Killingly, Plainfield, and Windham towns, where they extend in narrow to broad strips, mostly along the rivers and their tributaries. The large area in the lower Quinebaug Valley was called by the early settlers the "plains," and from this originated the name of the village and town of Plainfield.

The general direction of the drainage of the county is southward. The Quinebaug River, the largest stream in the county, with its tributaries, the French, Five Mile, and Moosup Rivers, and Muddy, Mashamoquet, Whetstone, and Blackwell Brooks, drain most of the eastern half of the county. The Shetucket River, formed by the junction of the Willimantic and Nachaug Rivers and flowing along the southern boundary for some 7 miles, receives the drainage of the south-central and western sections of the county, through Mount Hope, Nachaug, and Little Rivers and a few smaller streams. None of the streams are navigable, but the larger ones are very important in that they are dammed in many places for the development of power for manufacturing purposes.

The greater proportion of the present population, especially of the farming districts and villages away from the railroads, are American born and to a very large extent the direct descendants of the early English settlers. The movement away from the farms to the manufacturing districts and to the West, which went on steadily from about 1840 until recent times, is now being offset to a certain extent by immigrants moving in and taking up many of the old abandoned farm holdings. Between 1850 and 1880 there was a continuous influx of immigrants to the county, consisting of Irish, French Canadians, Italians, Swedes, Norwegians, and Poles. Most of these went into the mills and shops, but lately a considerable number of Irish, Poles, and Swedes have gone to the farms. There are only a very

small number of negroes in the county, and these live in the cities and villages.

The county was established in 1826, and Putnam, in the northeast-central part, is the county seat. The total population of the county in 1910 was 48,361.

The largest city in the county is Willimantic, with a population of 11,230, and next after this is Putnam, with a population of 6,637, and Danielson, with a population of 2,934. These are important manufacturing centers, with a number of mills each. Some of the other more important manufacturing centers are Central Village, Plainfield, Moosup, Wauregan, Killingly, Attawaugan, Mechanicsville, Grosvenor Dale, and North Grosvenor Dale, all being along the Quinebaug River and its tributaries. Among the villages away from the railroad may be mentioned Thompson, Pomfret, Woodstock, and East, North, West, and South Woodstock, Eastford, Ashford, Westford, Chaplin, Hampton, Canterbury, Scotland, Windham Center, Brooklyn, and Sterling. Thompson, Pomfret, and Brooklyn especially are beautiful villages and have gained considerable note as summer resorts.

The transportation facilities of the county are good, with the exception of parts of Eastford and Ashford Towns, in the northwestern corner, which are anywhere from 8 to 16 miles from the railroad. All of the steam roads passing through the county are operated by the New York, New Haven & Hartford system, except the Central Vermont, which crosses the extreme southwestern corner of the county along the Willimantic and Shetucket Rivers, passing through Willimantic. One line extends north and south through the Quinebaug Valley, giving a direct route south to Norwich and New London and north to Worcester and other points. The main line between Boston and New York crosses the county centrally from southwest to northeast, passing through Willimantic and Putnam and on out of the county near the northeastern corner. In the northern part of the county a line extends in a northwesterly direction from the main line at East Thompson to Webster, Mass., thence turning to the south and west again, it extends a short distance along the northern boundary of Windham County. A line between Willimantic and Providence extends along the Shetucket River in the southwestern corner and across the southeastern corner, passing through Plainfield, Moosup, and Oneco.

Besides steam transportation the majority of the towns in the eastern part of the county are connected by electric lines. One of these extends south from Worcester and Webster, Mass., through Putnam, Killingly, and Danielson, to Central Village and Moosup, and connecting with it at Elmville just above Danielson is another line to Providence. South of Central Village the New York, New

Haven & Hartford, in addition to its regular service, maintains an electric-car service to Norwich. Another line extends through Willimantic and South Windham. A good express service is in operation over all of the electric railroad.

The county has an extensive system of roads, but the majority of them are poor, some being abandoned and others receiving very little attention. There are a number of roads constructed by the State that are good, and these are being extended every year. Each town is also manifesting an increasing interest in road improvement and doing some good work. The best roads are macadamized and graveled, and in many places they have been oiled. The best traveling is along the valley roads, which have no very difficult grades. Many of those across the higher ridges are too steep to allow heavy hauling.

The principal products of the county marketed are hay, milk, poultry, eggs, and apples. The local markets are good, and a large proportion of the county's farm products are consumed within its limits. Boston, 62 miles from Putnam, is the principal outside market. Some of the products, though, are shipped to Worcester, Providence, Hartford, and other places.

CLIMATE.

The climate of Windham County is typical of the inland regions of southern New England, being characterized by long, cold winters, with a heavy snowfall, and short, cool summers. From the first of May, or even in April, until the latter part of September the weather is pleasant, except for occasional cool, wet spells, and during the months of July and August there may be one or more brief periods of intense heat, with humidity. Sometimes hard winter weather sets in the latter part of October, and again it may be rather mild until in December.

The Weather Bureau does not have a station in Windham County, but there is one at Storrs, where the conditions are very much the same. The tables below are compiled from the records of the station at Storrs. From this it will be seen that January and February are the coldest months, each with a mean temperature of 24° F., an absolute maximum of 46° F. and 57° F., respectively, and an absolute minimum of -13° F. July and August, with mean temperatures of 69° and 68° F. and absolute maximums of 96° and 93° F., respectively, are the hottest months. The extreme range in temperature between the summer and winter months is 109° F. The average annual precipitation is 47.2 inches, which is well distributed throughout the year, being heaviest as a rule in March and July. The average date of the last killing frost in the spring is May 8,

and of the first in the fall is October 10. Hence the average growing season is five months long.

Normal monthly, seasonal, and annual temperature and precipitation at Storrs.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	30	63	- 9	4.2	4.3	9.6	8.9
January.....	24	56	-13	3.3	2.2	2.2	10.2
February.....	24	57	-13	4.3	3.1	1.0	14.1
Winter.....	26			11.8	9.6	12.8	33.2
March.....	36	70	2	5.0	1.2	7.2	4.6
April.....	46	85	15	3.6	2.7	9.5	2.0
May.....	56	90	25	3.5	3.6	6.3	0.0
Spring.....	46			12.1	7.5	23.0	6.6
June.....	64	92	39	3.1	0.6	2.0	0.0
July.....	69	96	45	5.0	2.1	5.5	0.0
August.....	68	93	42	3.9	2.4	7.6	0.0
Summer.....	67			12.0	5.1	15.1	0.0
September.....	61	93	32	3.4	3.0	4.3	0.0
October.....	50	86	20	3.9	4.2	2.0	0.0
November.....	38	70	5	4.0	4.0	3.0	3.3
Fall.....	50			11.3	11.2	9.3	3.3
Year.....	47	96	-13	47.2	33.4	60.2	43.1

AGRICULTURE.

Agriculture was practiced to a limited extent in the area covered by Windham County prior to its organization in 1726. Most of the settlers made their homes on the ridges, partly on account of the supposed more healthful conditions and partly better to protect themselves against the Indians. Small communities were then formed which became the nucleus of the many villages now found throughout the region. The type of farming practiced in the early days has never undergone any radical changes. The first crops grown were rye, buckwheat, oats, hay, and potatoes. The products put on the market consisted for the most part of hogs, poultry, and eggs. Now the chief crops are hay, corn, oats, potatoes, and apples, and the products marketed are principally apples, milk, butter, poultry, and eggs.

The region continued to develop slowly until 1840, when the first railroad was built into the county. There being no near-by towns

or water transportation facilities, most of the products were hauled to Providence, R. I., to be marketed. With the coming of the railroad conditions were improved and from then until 1875 occurred the most successful period in the county's agriculture. Later, farming began to decline, and continued to do so until between 1890 and 1900. The trouble was not that the farmers were unable to make a fairly good living; the decline was due to a rapid depletion of the rural population. The result was that many farms were abandoned outright and others did not have the necessary labor to keep them going in good shape. There had been a gradual movement away from the farms prior to 1870, some of the younger generation going West and others into other lines of endeavor, but several causes contributed to make the movement much more rapid after 1870. Among these may be mentioned the opening up of cheap western lands, the allurements of the younger element to the cities, and the rapid development of the manufacturing industries.

Many of the farms that were abandoned years ago have grown up in forest, and, except for the stone fences, they appear as if they had never been under cultivation. The more recently abandoned places, where the houses are still good, are now finding considerable demand again, both among the native Americans and recent immigrants. Very few places near the railroads are now found unoccupied, but in the more remote sections, as to the west of Eastford and Ashford, a number of houses have no occupants.

Conditions have improved wonderfully in the last 15 years. Dairying has developed rapidly and has added much to the farmers' income. This represents the greatest change that has taken place in agriculture since the early days. Formerly the milk was used almost altogether to make butter and cheese; now it reaches the market in the form of fresh milk and cream. The greater proportion of the successful farmers have at least a small herd of dairy cattle. Most of the milk is shipped to Boston, although some goes to Worcester and other points. The principal breeds of dairy cattle are the Jersey, Guernsey, Holstein, and Devon. A number of oxen, principally Devon, are still used as work animals in the county.

Apples have been an important crop for a great many years, but the industry was badly crippled during the period when the farms were abandoned or neglected. Trees that were healthy and bearing well soon became diseased and dwarfed, and the fruit became inferior and ceased to bring a profitable price. In 1860 the value of the orchard products was \$52,320. In 1870 it was \$33,250, and in 1880 it was \$14,138. Undoubtedly there was a marked decrease in the output of orchards covering this period, but no definite conclusions can be drawn from these figures. The fact that the value of orchard products was \$45,455 in 1909 indicates the revival of interest taking

place in this line of horticulture, though here again the important fact of season influence may mask the true increase in productive orchards. In 1890 practically all of the farm products show a loss in acreage. Corn dropped from 5,775 acres in 1879 to 3,877 acres in 1889, while in 1899 there were 4,662 acres and in 1909 4,311 acres in corn. The census of 1880 shows 3,002 acres in potatoes in 1879. In 1889 there were only 2,112 acres in this crop. The acreage increased to 2,278 acres in 1899, but sank to 1,636 acres in 1909.

Good crops of hay continued to be gathered from many of the farms for several years after they had been practically abandoned. So this crop was the last to show such a marked decrease in production. The yields for the county amounted to 63,605 tons in 1879, to 46,626 tons in 1889, and to 55,496 tons in 1899. In 1909 the yield was 43,794 tons from an acreage of 40,891 acres.

The acreage in buckwheat dropped from 1,856 acres in 1879 to 531 in 1899 and 341 acres in 1909. Rye dropped from 1,800 acres to 335 acres in the same period. The acreage of grains cut green was 1,171 acres in 1909. Among the minor crops of 1899, 210 acres were in beans, producing 4,232 bushels; 28 acres in onions, producing 8,329 bushels; 118 in clover, producing 150 tons.

Live-stock valuations dropped from \$1,548,925 in 1870 to \$1,007,197 in 1880. Since then there has been a slight increase, the value being \$1,019,108 in 1900 and \$1,060,406 in 1910.

From the 1900 census we find the value of all farm property was \$8,538,308, of which \$3,584,720 represented value of buildings. In 1910 the corresponding figures are \$9,305,969 and \$3,846,991.

The total acres in farms in 1890 was 248,519, of which 151,117 acres were improved. The census of 1900 shows 270,711 acres in farms, with only 102,739 acres improved, a decrease of 48,378 acres in improved lands in 10 years. There has apparently been a further decrease in the land in farms and in the proportion of improved land, the figures as returned by the census of 1910 being 241,277 and 88,485, respectively. A difference in the opinion of the farmers making the returns as to what constitutes improved land may in part account for the marked decrease in this item. In 1890 the average size of the farms in the county was 99 acres, while in 1900 it was 106 acres and in 1910, 102 acres. The increase in the size of the farms indicates that some of the abandoned places have been bought and are being operated in connection with other farms. The owners of the farms operated 88 per cent of them in 1890, 81.9 per cent in 1900, and 85 per cent in 1910.

Better farming practices, the use of fertilizers, systematic rotation of crops, dairying, and the raising of hogs have added wonderfully to the farmer's profits. Scientific methods are coming more into favor each year.

While a large proportion of the lands of the county will not permit the use of labor-saving machinery, there are thousands of acres suitable for its use. Much of the cultivation of crops is intensive and done by hand. A few corn and grain binders are in use, and the improved types of cultivators are found, but much greater use could be made of these and other horse-drawn implements.

During the last few years renewed interest has been taken in the growing of apples, and many young orchards have been started. Only one of these has come into full bearing as yet. Some of the old orchards, neglected for so many years, are now being pruned and otherwise cared for. The better price paid for apples during the last few years accounts for the increase of interest in this industry. There are excellent opportunities along this line. The climate and most of the soils are well adapted to apples, and the position of the county in reference to the great markets is particularly favorable. The Baldwin forms about 50 per cent of the apple production of the county, with 25 per cent russets and the remainder mainly Fall Pippin, Northern Spy, Rhode Island Greening, Limber Twig, and Ben Davis. Most of the apples are shipped to Boston and Providence, and from there distributed to other markets. The price ranges from \$1.50 to \$3 a barrel.

There are some peach orchards in the county, a few of which are doing well. The principal varieties are the Elberta and the Crawford.

Truck crops are grown to some extent, but considering the demand for these products in the local as well as the large city markets, they do not receive near the attention they should. The better areas of the light soils are well suited to this industry, as they warm up early in the spring.

The wet, mucky areas now lying idle are peculiarly adapted to the growing of cranberries, and if properly drained would also grow good crops of onions and celery. The growing of alfalfa has been commenced in the county, although only in small patches thus far. In many instances it has not proved a success, but it is safe to say that it should thrive on the best areas of the Gloucester loam and Gloucester fine sandy loam. Lands intended for this crop should be in a high state of cultivation, well fertilized, and heavily limed. The seed bed should be thoroughly prepared, otherwise the stand is likely to be poor. Most areas will give better results with alfalfa if a good application of well-rotted barnyard manure is made when the land is being prepared. Inoculation of the soil may be necessary in order to get the plants properly started.

With the average farmer clover does not succeed well, and it is not grown to nearly the extent it should be. In fact, it should have a place in any well-planned rotation of crops. It is one of the best

legumes of the region for the purpose of building up the soil. That it does not succeed is in all probability due in most instances to a deficiency of lime in the soil.

Beans, now grown on a limited scale, should become a more important crop. The smoother areas of the Gloucester loam and of the Gloucester fine sandy loam are well adapted to this crop.

Sheep raising, formerly an important industry, is again coming into favor. The rougher stony areas, which are not suitable for cultivation but make good pastures, can be used profitably in this way. Hog raising, too, has shown some increase in the last few years. Every farmer should keep at least a few, as they often can be raised almost entirely on the waste products of the farms. The favorite breeds of hogs are the Chester White, Berkshire, and Poland-China.

Poultry furnishes an important source of income, there being a great demand for all kinds of poultry and eggs, and generally at high prices. Nearly every farmer has some poultry to sell and some have gone into the industry on an extensive scale and are realizing good profits. Many of the standard breeds are raised, but the Rhode Island Red is the most plentiful.

Increasing interest in forestry is being manifested. Such of the rough areas as can not be used for farming purposes are being planted, particularly to white pine. The natural method of reforestation is followed, the small growth and some seed trees being left and protected from forest fires and stock. The system of transplanting the small seedlings has also been followed to some extent.

Commercial fertilizers are more extensively used from year to year. They are usually high-grade mixtures of varying formulas for the different crops. The applications range from 200 to 600 pounds or more per acre. The land being otherwise in good condition, the larger applications usually give the most satisfactory results. The expenditure for fertilizers in Windham County in 1900 was \$44,910. As in many other sections of the county, the tendency is to place too much dependence upon fertilizers as a means of securing profitable crops. An increased yield may often be obtained more cheaply by the rotation of crops. Nitrogen may well be added to the soil in this way by plowing under clover and other legume crops.

There is a scarcity of farm labor in the county, which makes it difficult to operate large farms. With the farmers operating on a small scale the labor problem is less serious, as he depends almost entirely upon his family for the necessary help. The wages paid farm labor range from \$20 to \$30 a month, with board, or from \$1.25 to \$2 by the day.

A comparatively small proportion of the farms are rented. Where they are the prices paid are quite variable. It is usually for so much in cash per farm, being cheaper, as a rule, where the tenant feeds most of his corn and hay on the farm.

The price of farm land varies very widely, depending upon the location in reference to the towns and railroads, whether cleared or not, the nature of improvements, and the general character of the land. Areas of Rough stony land have scarcely any value except for the timber they support, and the Gloucester stony fine sandy loam areas, occurring so extensively, may be bought for \$5 to \$15 an acre. The cleared lands are worth anywhere from \$20 to \$50 an acre when bought as farms with the buildings.

Considering the comparatively low price of farming land, the adaptation of the soils to a number of different crops, and the high prices commanded by all of the products, the opportunities in Windham County for scientific farming are good. Satisfactory profits can be made in dairying and hog and sheep raising. The production of some other live stock is practicable. There is a market for well-broken yokes of oxen and for fresh cows. Poultry raising may be specialized to advantage. The apple finds congenial soil and climatic conditions here, and may be made very profitable. The skilled specialist should aim to produce only the finest fruit for the barrel or box trade. There are a number of other crops that may be specialized.

SOILS.

Windham County lies in a region of metamorphic and highly crystalline rocks. A very large proportion of the county is underlain by massive to schistose gneiss, with intrusions of other highly crystalline rocks, such as syenite. The only other rocks of importance are dark, slaty schists underlying most of the towns of Woodstock and Pomfret and a narrow belt through the towns of Killingly, Brooklyn, and Plainfield, and a quartzite schist or sandstone extending from the northeastern corner in a narrow belt across the county and passing about 2 miles east of Danielson. To the east of this are other extensive areas of massive gneiss or gneissoid granite.

Before the glacial epoch these rocks had been undergoing disintegration and decomposition over a long period of time, shallow to deep soils had formed over them, and erosion had gone on to the extent of producing a generally rolling topography with well-defined valleys. Then the ice sheet advanced over the region and produced a different order of things. The glaciation, however, was not severe enough to remove entirely from the surface all the preglacial ma-

terial and deposit in its place new material of a different kind. The previously formed topographic features were not greatly modified and the soil material in most places was not moved far from its parent rock, there being more generally a mixing of the soil material with varying quantities of rock fragments. Where the weathering had gone to the greatest depth, as in the lower lying schist areas, the glacial till is deepest, while over the more resistant rocks it is usually thin, or may be entirely absent.

A more modified condition is represented in the outwash plains or terrace areas referred to in the description of the area. These were laid down by the floodwaters issuing from the glacier upon its retreat, and consist to a very large extent of stratified sand and gravel deposits from 3 to 50 feet deep. When the ice was advancing no doubt similar areas formed, but these were subsequently covered over by till. Although here a sandier condition is found in the deep subsoil, the soil is essentially the same as that of deeper till areas. Of more recent origin still are the narrow strips of alluvial and colluvial bottom lands found along most of the streams.

Classing the bottom lands and the roughest stony areas as miscellaneous material, the soils fall naturally into two general groups, the Gloucester to include the rolling till uplands and the Merrimac series to include the terraces. The greatest difference in the upland soils is in the amount of stone they contain, although there is considerable difference in the texture of the soil material. The slaty schists occurring through the center of the county are covered deeply in most places by till and the soil is a very fine friable loam to light silt loam, with a smaller content of stone than found elsewhere. The gneiss is overlain by a layer of more sandy till, which gives a mellow fine sandy loam, and in the southeastern part of the county, where the quartz schist stratum has had a modifying influence, the soil is a light fine sandy loam. The loam areas are classed as the Gloucester loam and the fine sandy loam areas as the Gloucester fine sandy loam, Gloucester stony fine sandy loam, and Rough stony land, depending upon the stoniness of the soil. The lightest sandy areas give rise to light phases of the fine sandy loam and stony fine sandy loam types. In all of the types of the Gloucester series, the soil is prevailingly a rather dark brown and the subsoil is light or yellowish brown to a depth of 2 to 2½ feet and brownish gray beneath.

Terraces and other areas of similar origin give rise to only two types. The most level areas, with but a small quantity of gravel in the soil, constitute the Merrimac fine sandy loam, while those of a more gravelly nature and ranging from level to irregular in topography give rise to the Merrimac gravelly sandy loam.

The rivers and some of the smaller streams following the terrace lands have narrow but well-defined overflow bottoms, consisting in

most places of a fine sandy loam. Where sufficiently uniform to be given a type name they are classed as the Podunk fine sandy loam. The smaller stream bottoms, which are of a more mixed character and generally wet, are all classed as Meadow, except some areas in a swampy condition where a mucky soil a foot or more deep has accumulated. These are classified and mapped as Muck.

Including Muck, Meadow, and Rough stony land, nine types of soil are recognized. Their names and extent are given in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Gloucester stony fine sandy loam.....	93,952	27.9	Meadow.....	12,672	3.8
Gloucester fine sandy loam.....	93,440	27.7	Podunk fine sandy loam.....	9,280	2.7
Merrimac gravelly sandy loam.....	56,896	16.9	Merrimac fine sandy loam.....	7,360	2.2
Gloucester loam.....	41,216	12.2	Muck.....	4,544	1.3
Rough stony land.....	17,920	5.3	Total.....	337,280

GLOUCESTER LOAM.

The soil of the Gloucester loam, to a depth of 7 to 10 inches, is a light-textured brown loam to silt loam, with most of the sand content of the fine and very fine grades. The subsoil is a light-brown loam, grading somewhat sandier with depth. Beginning as a light-brown loam similar in texture to the soil, it passes rapidly into a yellowish-brown, light friable loam and this at a depth of 2 to 2½ feet into a brownish-gray light loam to fine sandy loam. Some gravel and stone are scattered through both soil and subsoil of most areas. All of the type originally was strewn with angular stones, ranging from small fragments to large boulders, but practically all of the land has been cleared and the stone picked up and used to build fences around the fields. Small areas, generally on the steeper slopes, are quite stony, with large boulders, and occasional outcrops of the bedrock occur in places, but on the whole the type is freer of stone than any other of the upland soils. Under cultivation the soil is mellow, a good retainer of moisture, and naturally productive, there being usually enough organic matter present to give a dark-brown color.

The Gloucester loam is an important type, occurring through the central part of the county. Its most extensive development is in the towns of Woodstock and Pomfret, where the type forms a broad belt, extending from the Massachusetts line to beyond the railroad south of the village of Pomfret. A number of smaller areas occur west of this and farther south through Killingly, Brooklyn, and Plainfield towns.

The surface features range from gently sloping to steeply rolling and hilly. In the larger bodies of the type it extends over an irregular rolling country, consisting of a series of rounded ridges and hills, with deep, narrow intervening valleys, while in the smaller areas it is found either occupying smooth, rounded ridges and the gentler slopes of some of the rougher ridges, or simply forming smooth knobs on the crests of the hills.

The natural drainage is good, except in small, comparatively flat areas that sometimes occur at the heads of drainage swales and along the lower gentle slopes, where there may be more or less seepage. The soil of such areas is dark brown to almost black, owing to the accumulation of large quantities of organic matter, and the subsoil is a browner gray than characterizes the typical subsoil. By tile draining these areas they would become valuable lands, whereas now they are fit only for pasture.

The Gloucester loam is confined very largely to areas underlain by dark, slaty schists and it is derived from glacial till which has been to a large extent influenced by the character of these rocks. Here and there probably the soil is wholly residual from the schists, as in places through the northern part of Woodstock town. Here in places are small knolls or low elevations where bedrock comes within a few feet of the surface and considerable quantities of it in a partially crumbled state occur through both soil and subsoil, as well as on the surface. The depth of the till ranges from 3 to 50 feet or more, although whether deep or shallow its stone content consists very largely of slabs of the schists. In marginal areas and others lying beyond the bodies of schist rock a greater proportion of granites or gneiss boulders is strewn over the surface, and here is found a slightly lighter phase of the type.

The type is now nearly all cleared and a very large part of it is under cultivation. Originally it supported a heavy growth of oak, chestnut, hickory, maple, ash, etc. It is considered the best soil in the county for general farming and many of the best improved farms are found on it, including a number of well-kept dairy farms. The steeper slopes, which as a rule are the most stony, are used to a very large extent for pasture lands, cultivation being confined to the gentler slopes and ridges. It produces good crops of corn, oats, hay, and potatoes. Very little clover and alfalfa are grown, but these crops should do well if the soil were heavily limed and properly prepared. Apples do exceptionally well, the largest commercial orchard in the county being on this type.

Corn yields from 45 to 75 bushels per acre, although as much as 100 bushels is not uncommon. Oats yield from 40 to 80 bushels, hay from 1 to 2 tons, and potatoes from 150 to 250 bushels per acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Gloucester loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
25051.....	Soil.....	3.2	4.1	3.5	10.5	14.9	47.8	15.7
25052.....	Subsoil.....	1.7	3.9	3.4	10.6	12.8	54.3	12.9

GLoucester FINE SANDY LOAM.

The soil of the Gloucester fine sandy loam to a depth of 6 to 9 inches, or an average of 7 inches, is a brown, mellow, fine sandy loam, containing a comparatively high percentage of silt. The sand content of the soil is very largely of the fine and very fine grades, although in places through the western half of the county there is enough medium and coarse sand present to give a somewhat gritty feel. The subsoil grades from a light-brown fine sandy loam immediately below the soil through a yellowish-brown fine sandy loam into a brownish-gray fine sandy loam or sandy loam at a depth of 2 to 2½ feet. The change from soil to subsoil is gradual in most places, both the texture and color becoming lighter as the depth increases. Generally where the soil is somewhat gritty in its properties a corresponding difference occurs in the subsoil. The type in its original condition has a considerable quantity of stone strewn over the surface and some stone and gravel scattered through the soil material. In clearing, and a very large portion of the type has been cleared, it was necessary to remove a great deal of stone from the surface, and then in the stoniest phases some of the largest boulders were left here and there over the fields. The best areas are almost stone free in soil and subsoil, while at the other extreme are scattering small areas that approach a true stony, fine sandy loam. The chief differences in the type are in its stone content, surface features, and the depth to bedrock, which varies from 3 to 25 feet or more. The soil is easily kept in good tilth, and it is fairly productive.

The Gloucester fine sandy loam occurs extensively in the western half of the county and in a number of areas east of the Quinebaug Valley. The surface features range from gently rolling to hilly. In places the type extends to rather steep slopes and again over extensive irregular rolling areas, with a number of rounded hills and ridges. As a rule a narrow strip along the crests of the ridges is comparatively flat, and here some of the best areas of the type are found, as on Chestnut and Pudding Hills and several other hills

of long, smooth contours. The natural drainage is good, except in small spots in the flatter stretches and slight depressions.

This type is derived from glacial till overlying gneiss and other highly crystalline rocks. The material forming the soil is very largely of local origin and bears a close relation to the underlying rocks. This is indicated in the small quantity of gravel, the large quantity of angular stone, consisting almost altogether of gneiss, and the angular character of the sand. In the rougher areas the type grades into the Gloucester stony fine sandy loam and Rough stony land.

The original timber consisted of a good growth of oak, chestnut, hickory, maple, ash, and other hardwoods. About 75 per cent of the area of this soil has been cleared, although not over half of it is under actual cultivation. Some areas that were cleared and farmed years ago have been abandoned and are now grown up in trees. A number of the more recently abandoned farms are on this type. A large proportion of the improved land is in grass for pasture and hay. Corn is the next most important crop, and a number of others are grown in a limited way. Corn yields from 30 to 50 bushels, oats from 35 to 60 bushels, hay from one-half ton to 1½ tons, and potatoes from 125 to 250 bushels per acre. Small apple orchards are found on nearly all the farms, and where the trees are given attention the fruit is fair to very good. The type is especially adapted to commercial apple growing. Pears and peaches also do well if given good attention. Clover does not thrive as a rule, but this seems due to the fact that the farmers do not lime the soil. Some of the most level and least stony areas could be made to grow profitable crops of alfalfa.

A lighter phase of the Gloucester fine sandy loam occurs in the southeastern part of the county, extending south from East Killingly in a large area to the Moosup Valley. The glacial till here is largely from gneiss, but has been influenced considerably by material from a quartz schist, and as a result it is sandier than that giving rise to the typical Gloucester fine sandy loam.

The soil, to a depth of 6 inches, is a brown fine sandy loam, containing more fine sand and less silt than the soil in typical areas. The subsoil is a pale yellowish-brown fine sandy loam, grading at a depth of 2 to 2½ feet into a gray or brownish-gray medium sand, which may or may not be somewhat loamy in its properties. Some gravel and considerable quantities of stone occur through both soil and subsoil of most of the type, and wherever it has not been cleared the surface is strewn with angular fragments of gneiss or gneiss and quartzite schist.

This phase of the type is derived from till overlying a massive granite gneiss, and no doubt the soil-forming material is largely from

this rock, but modifications have been brought about by the thin stratum of quartz schist lying to the west of the gneiss.

The surface is rolling, the same as in typical areas, and the natural drainage is good. The original timber growth consists principally of oak and chestnut.

About all of the stone has been removed from cleared areas, and the soil is easily handled and gives fair yields of corn and hay. The yields of all of the crops grown are somewhat lighter on the whole than those of the typical soil. The type is well adapted to the growing of apples and probably will grow good peaches, pears, cherries, and many of the smaller fruits.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Gloucester fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
150203.....	Soil.....	4.5	8.0	5.0	15.1	18.6	39.2	9.5
150204.....	Subsoil.....	4.0	9.8	6.4	19.4	22.3	32.8	5.1

GLOUCESTER STONY FINE SANDY LOAM.

The Gloucester stony fine sandy loam consists of 6 to 8 inches of brown fine sandy loam, underlain to a depth of 2 to 2½ feet by a yellowish-brown light fine sandy loam and to greater depths by a brownish-gray sandy loam to loamy sand. Large quantities of stone occur through the soil material, and the surface is strewn with numerous angular fragments of gneiss ranging up to several feet in diameter.

A lighter phase of the type consists of 5 to 7 inches of brown fine sandy loam, underlain to a depth of 2 to 2½ feet by a pale yellowish-brown light fine sandy loam and at greater depths by a gray fine or medium sand.

Very little attempt has been made to clear this type for cultivation. After all of the stone is removed that can be carried off, the field still will be studded with large boulders, making cultivation difficult and unsatisfactory. In most places to clear the land of stone entirely would cost more than it is worth.

The Gloucester stony fine sandy loam is the most extensive type in the county. It occurs in all sections of the county, generally occupying rough, rolling to hilly, and broken topography. The light phase occurs only in the southeastern part of the county, where it is associated with the light phase of the Gloucester fine sandy loam. All areas are naturally well drained.

The Gloucester stony fine sandy loam is of the same origin as the Gloucester fine sandy loam—that is, from thin glacial till overlying gneiss and other highly crystalline rocks—and owes its difference to the greater quantity of stone in the soil and on the surface. The light phase bears the same relation to the light phase of the fine sandy loam as the other areas do to the typical fine sandy loam. Numerous areas too small to be shown on the soil map are the same as the Rough stony land.

Small areas here and there have been cleared. These are used mostly for pasture, although patches without much stone are used in the production of corn and other crops. The best use to which the type can be put is for pasture and growing apples. It should make good grazing lands for sheep, and could be used to advantage in connection with the less stony soils as pasture for dairy and beef cattle.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Gloucester stony fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
150207.....	Soil.....	2.5	6.7	5.3	16.6	21.9	39.1	7.6
150208.....	Subsoil.....	4.3	6.2	4.5	17.4	26.0	36.6	4.8

ROUGH STONY LAND.

The roughest very stony upland areas are classed as Rough stony land. From the stoniest condition, which is little else than rock outcrop, there is a gradation into a very stony fine sandy loam, the surface being thickly strewn with large fragments of gneiss and other massive crystalline rocks. In the best areas the soil is shallow. It consists of 6 to 8 inches of brown fine sandy loam, underlain by yellowish-brown lighter fine sandy loam. This may extend to a depth of several feet or give way within 3 feet of the surface to bedrock.

The Rough stony land is not a very extensive type in Windham County, although a number of areas were mapped. Some of the largest areas are found to the north of Putnam, between the Quinebaug and French Rivers, near East Thompson, east of Danielson and Sterling Station, and through the central-western part of the county.

The characteristic growth is chestnut and oak, although in places it supports some white pine. Practically all of the original timber has been cut off.

The Rough stony land is almost worthless for agriculture. Small areas are suitable for pasturage, and limited areas might be used to

advantage in growing apples. The rougher portions should be left in forest, and wherever possible reforested. White pine should be encouraged, as it makes a quick growth and is a very valuable tree.

MERRIMAC GRAVELLY SANDY LOAM.

The soil of the Merrimac gravelly sandy loam consists of 6 to 9 inches of brown light gravelly loam to sandy loam, grading below into a yellowish or light-brown gravelly sandy loam. At a depth of 12 to 18 inches the loamy material gives way to beds of gravel irregularly stratified or sands of the different grades interstratified with gravel. Where the material has not been completely assorted, as in some of the rougher, ridgy, and hilly areas, some rather large rounded bowlders occur on the surface and throughout the soil, but most of the gravel fragments are less than 3 inches in diameter. The character and agricultural value of the soil vary with the topography. The most rolling areas, usually being also the most gravelly and droughty, have little value for farming, while as the surface becomes more level the gravel disappears and the agricultural value increases. Scattered through the more level stretches of the type are found small patches, usually less than 2 acres in extent, that have scarcely any gravel on the surface or in the soil and are of essentially the same character as the Merrimac fine sandy loam.

The Merrimac gravelly sandy loam is found in all sections of the county, where it borders all streams of any importance. In places it extends to the highlands. About one-third of its area is found along the Quinebaug River, covering roughly what is known as the Quinebaug Valley. This strip is narrow in the northern part of the county, but widens gradually southward to about 3 miles in the vicinity of the village of Plainfield. Another comparatively large area is found in the northeastern part of the county along Five Mile River and its upper tributaries. Other important areas occur in the southern and western parts of the county along the Moosup, Nachaug, Mount Hope, Willimantic, Little, and Shetucket Rivers, besides several of the larger brooks.

The type for the most part occurs as terraces along the streams, intermediate in elevation between the present overflow strips and the highland proper. The surface features range from level to slightly undulating to irregular, hilly, ridgy, and broken. In places the terrace feature is well developed, and although in others considerable irregularities occur, the higher points usually have about the same elevation.

The material from which this type is derived was deposited by running water during glacial times. Locally the sands and gravel are shallow and underlain by till or bedrock at a depth of 3 feet,

but more generally they extend to depths of 5 to 50 feet or more. The gravel includes an assortment of rocks, but most of it, as well as of the finer soil material, is derived from various kinds of gneiss.

The area extending south from Thompson is somewhat different from the general run of the type. Here the glacial flood waters rushed across the uplands and deposited the sands and gravel in a series of low knolls and hillocks, leaving the glacial till exposed in many of the intervening depressions. So while the dominant soil is a true gravelly loam without any large fragments of stone, enough stone has been picked up in the depressions to build fences around a number of the fields.

All of the type is naturally well drained. Its textural and structural properties are such as to favor leaching, and, except in the more level areas, it does not have the capacity to maintain sufficient moisture to meet the needs of rapidly growing crops, the roughest very gravelly areas being very droughty.

The characteristic tree growth consists of white pine, white birch, and oak, with occasionally some chestnut and pitch pine. The white pine thrives on all phases of the type and grows large enough to be used for lumber. Blueberries are a characteristic native growth and produce good yields of excellent fruit.

The greater proportion of the type is not under cultivation, only the better areas being farmed. It is used for corn, oats, buckwheat, and the other general crops of the region. It is better suited to potatoes and other light truck crops, as it warms up early in the spring and is easily cultivated. Fair yields of corn and buckwheat are secured if the seasons are not unusually dry. Where it has been heavily manured and had the best of attention the yields in favorable seasons are about as good as on some of the heavier soils.

MERRIMAC FINE SANDY LOAM.

The surface soil of the Merrimac fine sandy loam is a brown fine sandy loam 6 to 10 inches deep, containing small quantities of medium and coarse sand and fine gravel. The loamy properties of the soil are due to a comparatively high percentage of silt rather than to clay, which does not run much above 5 per cent. The subsoil is a brownish-gray sandy loam or loamy sand, becoming gradually coarser and less coherent downward and passing into beds of coarse sand and fine gravel at a depth of 18 to 24 inches. Small gravelly areas, usually less than an acre in extent, are scattered through the type. These occur either as slightly elevated knolls or along narrow slopes between areas of 2 to 6 feet difference in elevation, being the same as the best phases of the Merrimac gravelly sandy loam.

This is not an extensive type, but it occurs in a number of areas, mostly in the eastern part of the county. It is associated with the gravelly sandy loam, and the two types are of the same origin. It is confined to the level to slightly undulating areas which have little or no gravel in the soil or upon the surface.

Owing to the open structure of the subsoil to a depth of several feet, the natural drainage is good, being effected very largely by percolation through the subsoil. Were it not for the level topography of the type it would not be capable of maintaining a suitable moisture supply for most crops. As it is it is not very droughty and can be kept in a good state of cultivation.

The forest growth on this type is white pine, white birch, oak, and chestnut, the predominating growth being white pine and birch. The greater proportion of the type is under cultivation, and only a small percentage is covered with forest. It is the easiest soil in the area to cultivate, as it is practically free of stones and level enough to permit the use of machinery.

It is well adapted to truck farming and some of the general crops. Corn yields on the average from 40 to 60 bushels, oats from 45 to 65 bushels, and potatoes from 125 to 250 bushels per acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Merrimac fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
25059.....	Soil.....	2.1	7.2	10.2	29.2	15.2	27.2	8.7
25060.....	Subsoil.....	2.2	6.3	6.4	26.8	24.6	29.3	4.8

PODUNK FINE SANDY LOAM.

The soil of the Podunk fine sandy loam consists of 8 to 12 inches of dark-gray to black fine sandy loam, with a high percentage of organic matter. Most of the sand content is of the fine and very fine grades, but there is enough medium and coarse sand present to give the soil somewhat gritty properties and an open structure. The subsoil to an average depth of 2 feet is a light brownish-gray sandy loam, which becomes gradually coarser and less coherent downward. Below a depth of 2 feet the material consists of coarse sand and fine gravel interstratified.

This type occupies narrow alluvial bottoms along the streams bordered by the gravelly terrace lands. Some of the most important areas are found along the Quinebaug River and its larger tributaries,

in the western part of the county, and the Mount Hope, Nachaug, and Shetucket Rivers, in the western part. All areas mapped are well defined in outline, level to slightly irregular in surface features, and subject to occasional overflows. The type lies so low that the soil is kept very moist the year round and some areas are in a semi-swampy condition. Some of the smaller areas, occurring similarly, but quite wet and very mixed in texture, are classed as Meadow.

Birch is the principal tree growth on this type. Where the timber is thin or has been entirely removed, coarse water-loving grasses thrive and afford some pasturage during the summer months.

Very little attention has been given to the drainage of this soil, but when drained it would produce heavy crops of corn and hay, and could be used profitably in growing onions, celery, and cabbage. Small areas least subject to overflow are now being used for corn and grasses, and if the seasons are not very wet the yields are good.

MUCK.

Muck consists of accumulations of vegetable remains in an advanced stage of decomposition, dark-brown to black in color, usually finely divided and mellow. With this there may be a small admixture of fine mineral material, mostly fine sand and silt. Answering this description are a number of areas scattered about through Windham County, although the majority of them are too small to be shown in the soil map. The muck extends to a depth of 1 foot to 3 feet or more, being underlain by a gray sandy loam or more rarely by sand and fine gravel.

The areas mapped vary from 10 to over 100 acres in extent. Several areas occur northeast of Putnam. Others are found farther south in the towns of Killingly, Sterling, Brooklyn, and Plainfield, and in the central and western parts of the county in the towns of Pomfret, Woodstock, Eastford, and Ashford. The smaller areas not shown are included in areas of Meadow.

The type is confined to depressions and strips along streams and around ponds where a condition of true swamp has prevailed over a very long period of time. The swampy condition has favored rank growths of grasses, the accumulation and decay of which has given rise to the mucky soil. Birch and other trees have secured a foothold in some of the areas and produced a dense growth.

No attempt has been made to drain and cultivate the muck lands. In most areas they offer ideal conditions for growing cranberries, being naturally wet and at the same time lying in a peculiarly favorable position for the necessary drainage and irrigation. With good drainage provided they would grow good crops of corn and forage and several special crops, including onions, cabbage, and

celery. It is possible, also, that they could be used to advantage in growing peppermint, as is now being done with similar lands in Michigan and other sections.

MEADOW.

The term "Meadow" is used to designate such of the low-lying, poorly-drained lands found in the depressions and along streams as are not classed as the Podunk fine sandy loam and Muck. The areas occupied, as a rule, are very narrow and the soil is quite variable in texture. In general, the soil to a depth of 6 to 8 inches is a dark-gray to black, medium to fine sandy loam, underlain by either a gray light sandy loam or a sand. In all areas the soil contains a high percentage of organic matter, but in small spots it approaches the condition of true Muck.

Areas of Meadow occur in all sections of the county. It is found along some of the smaller streams through the gravelly terrace lands and along practically all of the streams and in the depressions through the uplands. It is the result of poor or insufficient drainage, being semiswampy in the wettest areas.

Along the larger streams, where it is subject to frequent overflow, the principal tree growth is birch, while in the smaller depressions there is a mixture of aspens, birch, and other trees. Some areas not timbered support a growth of coarse grasses.

Scarcely any of the type is under cultivation and little or no attention has been given to its drainage. With good drainage established, and in most areas this can be done at a very reasonable cost, it would prove well adapted to corn and grasses, and possibly some other crops, as onions and cabbage. Partially drained it would afford fairly good pasture during the summer months.

SUMMARY.

Windham County lies in the northeastern corner of the State and includes 15 towns, with a total area of 527 square miles, or 337,280 acres. The census of 1900 gave the county a population of 46,861, while in 1910 it had 48,361 inhabitants. Willimantic, population 11,230, is the largest city. Putnam, with 6,637 inhabitants, is the next largest place; and Danielson, with 2,934 inhabitants, is the third place in size and manufacturing importance. There are numerous small manufacturing towns along the railroads, and back from the railroads are a number of typical New England villages, one or more in each town.

The surface features for the most part are rolling to steep, hilly, and broken, with local differences in elevation ranging up to 500 feet and a general elevation of 120 to 1,100 feet above sea level.

Comparatively level areas intermediate in elevation occur through most of the wide valleys. The broadest of these runs through the east center of the county, along the Quinebaug River, which forms the main drainage outlet for the area and contains many excellent power sites. All of the streams are bordered by narrow overflow strips, and some of these are in a swampy condition.

The county has good railroad facilities and an extensive system of public roads.

The climate is marked by long, cold winters, with a heavy snowfall, and short, cool summers, with occasional short periods of extreme heat.

Since 1905 more interest has been taken in farming and a great many of the farms more recently abandoned are now being improved again.

Land values have advanced. Apple orchards are being planted, neglected orchards pruned and cultivated, and conditions have improved generally.

Dairying has made rapid strides in the last few years and is an important feature of the agriculture.

The leading crops are hay, corn, potatoes, oats, rye, buckwheat, and beans.

The county offers good opportunities for stock raising. Extensive areas too stony for cultivation could be put in grass and used advantageously for sheep. Hogs may also be profitably raised.

Nine types of soil are mapped. These are grouped in three series and the three miscellaneous types, Rough stony land, Meadow, and Muck.

The Gloucester series comprises the high upland soils, the Merri-mac series includes the terrace soils, and the Podunk the alluvial material, where sufficiently uniform to be mapped as a type.

The Gloucester loam is an important type, occurring in the central part of the county. It is the least stony of the upland soils, easy to till, except on the steeper slopes, and naturally productive. It is used principally for dairying and the production of hay, corn, and potatoes. It gives good yields of all of the crops grown. It is a good apple soil.

The Gloucester fine sandy loam is an extensive upland type, easy to till and nearly as productive as the loam. A large proportion of the type is under cultivation. Grasses, corn, oats, and potatoes are the most extensive crops. Rye, beans, and buckwheat are minor crops.

The Gloucester stony fine sandy loam is also an extensive type, but it is not farmed to any extent on account of its stony character. It can best be used for pasture.

The Rough stony land has very little value except for the timber it supports. The best areas are suitable for pasture. The rougher areas should be used for forestry.

The Merrimac gravelly sandy loam includes most of the terrace lands and outwash plains. The least desirable areas are not suitable for farming and should be planted to white pine. The more level areas produce fair yields of corn and buckwheat. It is best adapted to potatoes and early truck crops.

The Merrimac fine sandy loam is not an extensive type, though important agriculturally, about all of it being under cultivation. It is used principally for general crops, which give good yields. It is best adapted to early truck crops.

The Podunk fine sandy loam is an alluvial type—wet and subject to overflow. If drained it would produce heavy yields of corn and hay and prove well adapted to onions, celery, and cabbage.

The areas of Muck are swampy and no effect has been made to farm them. They are well adapted to the growing of cranberries. If well drained they would produce good crops of corn and hay. Onions, celery, and cabbage are special crops that would do well.

Narrow strips of Meadow occur along most of the streams, especially through the uplands. These are not suited to agriculture in their present condition, but can be drained and converted into good land for corn, grass, and some special crops.



[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 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.]

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at <http://offices.sc.egov.usda.gov/locator/app>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.