1952

A study of the town forest of Russell, Massachusetts, with particular reference to the economic, educational, and recreational aspects.

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A STUDY OF THE TOWN FOREST OF RUSSELL, MASSACHUSETTS WITH PARTICULAR REFERENCE TO THE ECONOMIC, EDUCATIONAL, AND RECREATIONAL ASPECTS.

by

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Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science.

UNIVERSITY OF MASSACHUSETTS

Amherst, Massachusetts

May, 1952

ACKNOWLEDGMENTS

The writer wishes to express his thanks for the encouragement and guidance given by Dr. William G. Vinal in the undertaking of this work before Dr. Vinal's retirement from the University staff.

Grateful acknowledgment is given the members of the thesis committee, Professor Charles P. Alexander, Professor Robert P. Holdsworth, and Professor Sargent Russell for their helpful suggestions and consideration.

The officials of the Town of Russell have been of great assistance in making information available, and Mr. Elmer Foster gave generously of his time and energy for which the writer here extends his appreciation.

Dr. Paul Sears, commenting on the orderly balance of undisturbed nature, urges man to apply the findings of science to the uses he makes of his land so that a stable efficient equilibrium can be established. Continuing, Sears summarizes man's relationship to his environment,[1]

> Thus good land use planning might be defined as the attempt of a human culture to adjust itself to the landscape which it occupies by observing the principle of the balance of nature. We can go further and say that a culture is good or bad according to the way it observes or disregards this principle. For any culture that disregards this principle will diminish, if it does not destroy its own means of survival.

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1. Sears, Paul. "Man and Nature in the Modern World," Education for Use of Regional Resources. p. 36.

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CHAPTER I.

INTRODUCTION.

The idea of a community forest has become increasingly popular in the past two decades in the United States. Responding to pressures set up by various needs, the device of a locally administered group-owned forest area has developed a wide range of specialization. Some community forests are small and intensively used for picnicking, playgrounds and gathering places for organized groups. This small intensively used area is labeled by many as a park, but the terminology is less important than the factor of quality and quantity of use.

A community forest is often divided into compartments, each with recognized purposes for satisfying special needs and managing the forest resource in such a way as to match the need most effectively. Thus, for example, there may be an easily accessible picnicking area, with the most highly developed facilities, then a scenic spot or pathway for limited distances, all of which territory is utilized primarily for beauty and recreation. The balance of the so-called community forest may be devoted to sections of more or less wild land, managed for intensive wood production. Forest management operations often proceed along with hiking trails, educational demonstration areas, or watershed pro-

tection. The concept of conservation as it has matured today does not call for non-use, but wise use, and this feature is becoming more prominent in bringing about intelligent use of wild or wooded public areas.

The technique of compartmentalizing areas according to uses is less apparent in some categories of community forests, for instance in those forests where watershed protection is paramount, all the land may be devoted to purity of water and production of timber, or some community forests may be considered as just another block of timberland to which the town happens to have title.

Reasons for the Establishment of Community Forests

The infinite variety of difference which separate this community from the next one are responsible for providing scores of mixed reasons for actions taken by members in a community. The joint actions taken by community members in setting up a community forest may have resulted from one chief need or many complementary needs. Among the important reasons given for having a local community forest are the following:

1. The ownership of a certain local forest land by the community allows the making of long term plans for wise development, whereas private ownership may result in poorer land use practices because of high

taxes and interrupted ownership. With appropriate state help, most towns have less cash hunger than individuals.

2. By demonstrating the favorable economic possibilities through good land use and forestry, a public agency can appeal to the practical selfish interests of private landowners so that a wide spread improvement can be initiated.
3. Community forests are a very present going concern in a locality so that people have continuing education in conservation thinking.
4. As a method of taking depressed submarginal land out of private circulation, local forests can serve the health of the local economy.
5. Well-managed community forests can mean a direct and an indirect stabilizing effect on the employment and permanency of the homes of wood processing workers.
6. As an aid in various teaching programs, the permanent local public forest is a good laboratory for most of the natural sciences.
7. The community forests are usually large enough to provide helpful refuges and habitats for small game depending on local situations. Numerous scattered areas are effective supplements to large blocks of state or federal refuges for this type of game.

8. Because of the nearness to the consumer the local forest can market a relatively high proportion of its products. Lower grades and diverse specialized products can be disposed of.
9. From two to five times as high a price for timber stumpage is available for eastern community forest lands compared with western national forest stumpage prices.
10. Unemployed labor can be utilized effectively in well planned silviculture. The work may not be immediately self-liquidating, but long term results could prove the superiority of this type of relief work expenditure over certain others.
11. By utilizing otherwise idle waste lands for forest growth, a local government can increase the value of local resources.
12. With a strong local forest program the adequate protection of local shade trees, parks, and private forest lands from insects and forest fires is made more feasible.
13. Where unemployed men are used as a labor force in a community forest, they can live at home, saving the cost of maintaining the type of camps used by Civilian Conservation Corps.
14. The sale of leaf mold, greens, planting stock, and

other miscellaneous natural produce may help pay for forestry operations. Some communities rent part of their forest lands to resort cottagers for revenue.

15. The surface reservoir water supply is most popular in the east where forest products are scarce and forest growing conditions are excellent, so the growing of forests for timber and by-products, in effect, is able to reduce the cost of water to the consumer. Water supply lands frequently occupy low-lying, fertile, well-watered areas with relatively deep soil structure. Such first quality sites gives the greatest spur to quality timber growth of many species of tree.

16. From the desire to stabilize watershed land, and surface run-off and erosion, many water boards have purchased extensive areas for forest management.

17. The opportunities for good recreational areas near the public which needs these facilities is a great advantage. Multiple use local public forestry makes available cheap, year-round recreation.

18. Certain organizations such as churches and 4-H Clubs have found it rewarding to have a piece of woodland to work with or to play in.

Definition of Terms

For purposes of this study, the word "forest" in connection with community forests, is used in the broad sense of that term. By that it is meant that even a brushy field which the sponsoring group controls and plans to use and develop as a forest is to be called a community forest. Similarly, a leveled burn or swampy area incapable of producing commercially marketable wood, may make up part of a so-called community forest. This broad concept of the word "forest" is in keeping with the practice of the United States Forest Service whose administrative areas include vast sections where little but grass, sage, flowers and rock are to be found.

The word "community" itself is intended to embrace groups ranging from incorporated political units, such as towns, and counties, to other non-profit educational, religious or philanthropic organizations. Neighborhoods, clubs, fire districts, schools, water departments, park commissions, recreation departments, may all be in any given case the sponsors of a community forest. Thus the word "community" here signifies groups with recognized public duties and also groups bound together with a common purpose who do not necessarily have to live in the same town or watershed. The scope of the word "community" has grown enormously in the last half century with the changes in transportation and communication. Many

problems such as erosion and flood control, fire protection or insect control have become recognized as requiring coordinated group effort on a regional basis. This regional thinking and planning has resulted in numerous forward-looking efforts some of which in part involved the establishment of a community forest and will be discussed in the body of this study.

The term "town forest" has in Massachusetts, where Russell is located, been defined in legislation as "only those forest lands to which towns or sub-divisions of towns such as water districts or schools have title."[1] These lands may be acquired by purchase, gift or bequest and must be for the purpose of forestation. The Commonwealth "may upon application in such form as the (state) forester may prescribe, furnish such towns free of charge with seedlings for the planting of their lands."[2] The power of eminent domain was given the towns for acquiring watershed areas or land for forestation. Educational and recreational uses are provided for in other parts of the legislation, and municipalities were privileged to incur debt for the purchase of public domain for these purposes including reforestation.[3]

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1. Massachusetts General Laws, Chapter 132, Section 35.
2. Ibid., Chapter 45, Section 19.
3. Ibid., Chapter 44, Section 7.

Purpose of the Study

The community forest movement has been promoted by many special interest groups such as forest and wildlife conservationists, recreationists, school groups, and water supply agencies. These groups have publicized the benefits of the community forest device by countless articles and reports which are frequently fragmentary in nature and based on inadequate consideration of many important factors. The Russell Town Forest in Massachusetts has had considerable publicity not only in Massachusetts but throughout the nation. Hailed as a successful economic unit in the literature, the Russell Town Forest was selected for comprehensive study so as to determine in what ways this forest unit served the community and, more precisely, in what ways the device was a success or a failure.

In order to evaluate the Russell Town Forest adequately it was necessary for the author to examine thoroughly the background of the community forest movement. This study involved an examination of the historical elements in Europe and in the United States, how in this country public lands are purchased, zoned, or controlled by state or local agencies.

Since Russell and many American community forests were started as water protection units, the author found it was necessary for a valid study to explore the public health

aspects of uses of the watershed forests. To control watershed land, water supply agencies had a real problem in deciding what liberties should be allowed to the public within the confines of the watershed forest.

In order to make the establishment and maintenance of a community forest acceptable to the taxpayers, one of the biggest factors to be established is what economic results of a community forest program could be expected. The many factors of forest management and yield in watershed forests and other types needed to be analyzed so that some basis for comparison for Russell would be available. The present and anticipated net income from the Russell Town Forest had to be found.

Since the educational and recreational benefits are commonly listed as uses for community forests, one aim of this study was to examine the basis for the validity of these assertions. This involved a study of educational philosophy and methodology. The Russell Town Forest is to be examined as to its uses for education and recreation.

The part that the Russell Town Forest plays in the land use situation in the general Russell area will be examined to understand its relation to the State Forests and Park programs and to the broad underlying principles of conservation of soil, water, and wildlife.

The controlling purpose of this thesis then is to determine how the Russell Town Forest helps meet the needs of the community which controls it with particular reference to the economic, educational, and recreational aspects.

Method of the Study

Review of the Literature

1. The examination of the literature on the community forest movement in general and the Town Forest development in Massachusetts in particular took the writer into many fields of land use. Public reports and records of the state and the Town of Russell were studied in detail.

Interviews

2. Interviews were held with town officials in Pittsfield, Northampton, Amherst, Westfield, Brattleboro, Vt., Sunderland, Conway, and Russell in matters of community forestry, to establish the social uses and financial aspects of the local forests.

   Interviews were held also with leaders in conservation, forestry, and public health organizations to determine technical matters of forest management and public health.

Forest Surveys

3. Surveys were made of the Russell Town Forest by visiting all sections of it on foot. One-the-spot surveys were

also made of the Town Forests in Greenfield, Pittsfield, Westfield, Conway, Brattleboro, Vt., Northampton, South Hadley, and North Adams. Other forests inspected were those of the South Deerfield Fire District, the Bridgeport, Connecticut Hydraulic Company, the Cobble Mountain Watershed of the City of Springfield, Massachusetts, the Yale Experimental Forest, Swanzey, New Hampshire, and the Harvard Forest, Petersham, Massachusetts.

Experimentation on Woodlands Owned by the Writer

4. On four pieces of woodland owned by the writer in southern Vermont, it has been possible to study the effect of previous pasturing of woodland on several different types of site. Timber harvesting has been done with the advice of a professional forester. Cutting has been such as to encourage superior reproduction. Planting on open spaces in two areas has been done, totalling 7,000 acres, under a conservation plan made with the U. S. Soil Conservation Service.
5. The author studied maps on topography, land-use planning, soils, and forest type, to gain a fuller understanding of the Russell Forest and some of these appear in the body of the text.
6. Schools were visited; principals and other teachers were interviewed in Russell, Pittsfield, South Hadley, Westfield, and Cleveland Heights, Ohio in regard to outdoor education.

CHAPTER II.

THE HISTORY OF THE DEVELOPMENT OF COMMUNITY FORESTS IN EUROPE.

The idea of community or town forests is not new. In Europe there were lands dating back to the Middle Ages known as communal areas where the then predominantly agricultural common people, as contrasted with the nobility and clergy, gathered wood and let out their livestock for grazing. Hogs were turned out to root and forage for food. Not the least of the uses made of the communal forest was for firewood and other wood products.

The pattern of land ownership and the structure of farm units varies greatly in Europe from what is commonly known in the United States. Some traces of feudal organization are recognizable, and in each country patterns peculiar to its history are felt. The consistent element found in most European countries is the high proportion of community-owned forest land.

Community Forests in Czechoslovakia Increase in Land Reform Legislation

Under the Austro-Hungarian Empire, the territory of what later became Czechoslovakia held about 27,000,000 acres of forest land of which some thirty-five per cent was in community forest. About one-half the forested territory was in possession

of the large private estates, and only one-sixty of forest land was in so-called state forests.

After World War I[1] the Land Reform regulations anticipated the expropriation of the great bulk of the privately held forest land. In practice, however, the forest land was not so completely taken out of private hands, nor was the disposition to create new and larger community forests carried out as widely as was hoped for the political parties of the left. The chief reason why most of the mountainous forested perimeter of Bohemia was designated a national or state forest rather than community forest, is that these forests were on or near the boundary line between Czechoslovakia and Austria, Germany and Poland. To have such borderland in the hands of the communities in the locality would have meant a great risk to the national security because the majority of the border towns were made up of people with German or Polish cultural orientation. An interesting case in point here is the [German-speaking] town of Graslitz, where the local communal authorities applied to buy the woods from the local big landowner, were not allowed to do so for reasons of Czechoslovakian national security.

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1. Wiskemann, Elizabeth; 1938. Czechs and Germans. Oxford University Press: London, p. 149.

Community Forest Land Use in Czeckoslovakia

As part of the political and social reorganization that accompanied the first World War, land reform played a great part in Central and Eastern Europe. In 1917 The Rumanian Parliament called an assembly which amended The Constitution, giving the Government the right to take over large estates "in the public interest." Jugoslavia and Bulgaria took similar action in 1919, and 1921 respectively. In Czechoslovakia a series of laws were enacted which were directed toward the compulsory redistribution of all but 150 hectares[1] of a given land holder's property.[2] Compensation was given the owner, and the agricultural land made available, with various adjustments, to small farmers or would-be farmers.

There are two noteworthy features of these Czechoslovakian regulations, both relating to forests directly or indirectly. The first point is that in most areas the size of farmland to be sold or leased to any one farmer in the redistribution was limited to 10 hectares, or in the case of Slovakian farming areas where farming is extensive instead of intensive, 18 hectares was commonly allowed. Since this

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1. A hectare contains .405 acres.

2. Textor, Lucy Elizabeth, 1923. Land Reform in Czecho-Slovakia, London: George Allen and Unwin Ltd. 157 pages, at pp. 1-109.

area measures in acres from four to seven and two-tenths acres, it is apparent that forestry was not planned as an important part of the average farm. On the contrary, the land reform regulations made provision for the permanent management of appropriated forested areas either by the state, or by communities. Fish-ponds in this Central European country had, even before World War I, been used as carefully managed producers of annual crops of fish, and these ponds were generally transferred from the possession of the previous large private landholder to the possession of the local community where they were located.

The Law of Allotment, the definitive law, providing for distribution to the people, was passed January 30, 1920. Among other things it provided that communities might acquire sub-marginal land, or land adapted to afforestation or fruit gardens, or, in effect, land which requires considerable expenditure before any return could be expected. This latter type of community acquisition is similar to the acquisitions of abandoned or sub-marginal land by certain counties and towns in New York, Michigan, and Wisconsin.

Community Forests in Other European Countries

In Bulgaria, a predominantly agricultural nation, over half the forested area of the country is made up of community

owned and administered forest units.[1] Little villages, towns and cities, especially in the more mountainous regions, operate their own forests.

One of the features[2] which has led to the wider development of community forestry in Europe, is the pattern, common in Europe, notably in Sweden, Denmark, Finland and Germany, of extensive ownership of land by the municipalities and towns within their territorial limits as well as holdings beyond the boundary. From 20-80% of the land within the municipal limits in the nations just mentioned is owned by the municipalities and put to a variety of uses, some residential, some business, some for playgrounds, parks, or watersheds, others for reserve land, and some for multiple use forestry. Through this land holding pattern, the local governments differ markedly from American cities, which add to public land holdings only for immediate public needs.

In Switzerland[3] over two-thirds of all forested land is community-owned, while in France the majority of land in the

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1. Brown N. C. 1938 "Community Forestry, a Neglected Phase of the American Forestry Program." Journal of Forestry 36: 687-94.

2. Buttenheim, M. S. and P. McCormick 1938. "Municipal Land Reserves" American City 53: 69, 70.

3. Brown N. C. 1938 "Community Forests Come of Age." American Forests 45: 16-19.

Vosges and Jura Mountains are in community forests, as are the majority of lands in the Black Forest of Germany. The local forests in the three nations last mentioned have had excellent records of returns. The City Forest[1] of Zurich in Switzerland, known as the Sihlwald, has been operated as a forest since 853 A.D. and has been the official Zurich City Forest since 1524. Revenues from this forest, and others like it in Switzerland, are used to support quasi-public agencies such as hospitals, libraries and museums. Since the larger community forests in Germany and Switzerland were averaging a new return of from three to six dollars per acre per year prior to 1938, when Professor Brown made his studies there, it is clear that these forests were able to carry a good share of local government expense.

Community Forests in Germany

In Germany the community forest has attracted wide acclaim from foreign observers, and there are many reasons for this widespread interest. In the first place men who have been brought up among the predominantly wasteful practices of agriculture and lumbering in the United States are habitually surprised at the stability and permanence of agricultural and silvicultural methods in Germany, France, Switzerland and Sweden.

In Germany, for example, lands are being tilled and

pastured efficiently even though they have been worked for over a thousand years, and at least until 1939 the woodlands in hundreds of localities had a record of sustained yield management that covered many generations. Observers from the United States have seen and read about the municipal and town forests in Germany, and in their efforts to promote conservation and community forestry in the United States they have published in many periodicals items exemplifying the more successful community forests. Franz Heske, a professor and research in German forest economics, gave a somewhat broader picture of the German community forest.[1]

Heske, himself a native German citizen, indicated that city-owned forests in Germany serve primarily either as recreation areas or as watershed protection forests. Of the former group it was said that recreation deserves and receives a large amount of attention and a large proportion of expenditures in relation to the potential yield of the forests. Maintenance of such facilities as camp sites, bridle trails, lakes, bridges, and picnicking areas require the expenditure of such a large amount that revenue from tangible forests products is very often offset or outweighed. The benefits to the population which enjoy the forest outings are a very important feature, however, and help keep alive

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1. Heske, Franz and William Norwood Sparhawk 1938, German Forestry, Yale University Press. New Haven, Conn. 399 pages.

the love of nature and feeling of pride in and kinship with the land, according to Heske.[1] The huge numbers of citizens (over 10,000 a summer day) who enjoy Berlin's extensive City Forests attest to the popularity of this municipal enterprise, which amounts to a combination forest and park undertaking.

On the other hand the forests owned by towns and villages in rural districts are basically economic in their function, and consequently have very little of the parklike aspects. Although a majority of the German community forests are large enough to allow a sustained-yield type of forest management, many of these forests, particularly in the poorer rural districts follow no forest management plan. To understand this it is helpful to consider the administrative structure under which the community forests operate.

There are two general types of community forest organization between which all the local forests are divided about equally. These are the "Domain property" and the "common forest." The "Domain Property" is managed more easily according to a long-term plan because receipts from forest operations are paid in cash to the community treasury, whereas the "common forest" type provides for payments in cash or kind directly to the individuals in the village. The latter method of forest administration leads to exceptionally bad

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1. Heske, Franz; Op. cit., p. 180.

abuse in rural districts where the demand for cordwood is allowed to outweigh more profitable silvicultural methods.

Stemming from the Mediaeval times when the common people utilized the common forest land for sources of fuelwood, construction timber, grass, litter, peat and pasture, the rural folk still exercise many of these functions in their communal forests in spite of the example set by State Foresters in State Forests. Control of forest management by a state or district forester varies greatly as between political districts within Germany such as Hesse, Baden, or Bavaria. In small rural communities the local forest is often treated like money in the bank to be drawn on heavily when there is economic distress in the village. As could be expected, this type of forest management runs counter to the sustained yield principal.

Size of German Community Forests

The community-owned forest makes up a large percentage of all forest holdings in many parts of Germany, and most of these community holdings are large enough to allow good sustained-yield management, since forty per cent are larger than 1,235 acres, forty three per cent are between 247 and 1,235 acres, and only seventeen per cent have less than 247 acres.

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1. Hoske, Franz; German Forestry, pp. 94-97.

Economic Advantages Paramount in Small German Forests

Having studied the experience of community forestry in the United States and Europe, Professor N. C. Brown distinguishes twelve real advantages such programs can bring if carried forward with enthusiasm and realism.[1]

Financial returns may well constitute the primary contributing function of a community forest, especially by the smaller communities in forested areas where forestry is the most profitable method of land use. In Germany in 1937 typical community forests realized a net income per capita ranging from $2.20 to $11.57. Per family the net income varied generally from $11.00 to more than $60.00 per annum. In terms of revenue per acre of managed forest land the net return was from about $3.50 to $15.50. Brown cited[2] a little Bavarian village which owned a 413 acre spruce forest in excellent spruce-growing soil and with favorable climatic conditions. This village forest, according to Brown, produced annually a cut amounting to 424,000 board feet. From the sale of this the village was receiving a net profit of $6,800 a year, which would be for the 585 inhabitants of the village $12.71 per capita or $53.55 per family. That particular

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1. Brown, N. C. 1938 "Community Forestry, a Neglected Phase of the American Forestry Program." Journal of Forestry, 36: 7: 687-694.

2. Ibid., p. 693.

forest employed six men permanently, and the acreage per employee was 69.

The Grunewald forest in Berlin produced on its 10,000 acre park forest an annual average profit of $152,000. This is an example where a heavily frequented city recreational facility also furnishes a substantial return in immediate cash.

In comparing methods of forest administration in Europe with those of the United States, several important differences should be born in mind. The pressure on all forest resources is relatively much greater in Europe. Labor is relatively cheap compared to American labor. Living standards are simple compared to American standards and costs of local government are relatively low compared to American localities. Where one man can be fully employed indefinitely on less than 100 acres in some parts of Europe, it takes several times that number of acres of good forest sites to carry a full-time man in the United States, equipped with the usual power tools.

The broad implications[1] of the rich human returns available from community forests as seen in Europe have awakened a growing response in the United States. In Europe more stability for the community's economic life is attained, a source of labor for idle workers is promoted, and nearby natural simple recreation

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1. Brown, N. C. 1939 "Progress in Community Forests," Journal of Forestry 37: 25-28.

is available. Arboreta and bird sanctuaries are common and hunting stock is provided with breeding grounds. The most important factor for the European communities however according to Brown, is the good cash return available from the intensively managed European forests.

CHAPTER III.

HISTORY OF LAND USE PLANNING IN THE UNITED STATES

In Colonial America numerous public or semi-public forests have been operated on a local basis since the eighteenth century. Church groups and educational institutions have had forests, some of them in continuous productive ownership since that time.

By and large, however, the theme in the United States since the time of the American Revolution has been to encourage and, if necessary, subsidize the taking of land by private owners. In the area of the original 13 colonies, title had been taken to virtually all land by 1850, and only a minute portion of this was under public control. The development of the lands to the west was taking place rapidly, as the Federal Government opened more and more territory for homesteading and other forms of alienation. Vast tracts were allocated to the young states to help them establish schools and roads. Most of the territory so granted in the productive regions was sold to private owners for revenue. Many western railroads were granted by Congress the title of great acreage, largely along their rights of way, and much of this land has passed into other private hands.

The policy of encouraging private settlement and use was

followed by the Federal Government, with numerous accumulating refinements and distinctions, until the decade of the nineteen twenties, when the trend of settling farmers began to reverse itself, and farm failures and abandonments in Reclamation Districts and elsewhere signalled the end of an era of homesteading.

Federal Steps in Conservation

Meanwhile, in the mid nineteenth century the conservation movement, beginning with protective measures for wildlife, spreading to include forest conservation and protected scenic areas for recreation, materialized in a series of reservations and purchases by the Federal Government. The establishment of a Forestry Bureau in the Department of Agriculture and the later development of the national parks and forests, were the earliest practical examples of federal land use conservation in the United States.

Growth of Protected Watershed Forests

Municipal water districts since the turn of the century have been accumulating substantial areas of land on their watersheds to protect their supply, particularly in areas where low land values and good reservoir sites made the combination economically feasible. As a result of the expanding search for water supplies and growing use of water, the municipalities

or water supply districts and private water utilities have taken up what amounts to a substantial portion of so-called public land in many populous states, especially in the East.

Multiple Use Doctrine Spurs Increase in State and Community Forests

Since 1900 the individual states have been devoting increasing attention to the acquisition of low-value forest land, and in 1913 the device known as the town forest became law in Massachusetts, a pioneer move in local conservation legislation.

The idea behind the movement embraced the multiple-use doctrine that has characterized the administration of the national forests, and was made flexible enough to encourage communities to fit their local resources and needs to their potential community forest. Since the time of its origin, the town or community forest movement in the United States has received considerable impetus from the examples set in Europe, where, notably in Switzerland and Germany, the communal forests have proved highly successful.

Today community and county forests number over three thousand and cover over four million acres. Motivation for their acquisition and control has covered a widening range of needs. As our nation has grown since the beginning of the century, dynamic changes have been at work in the relationship of land, space, and time.

New attitudes toward human needs and responsibilities have evolved; new philosophies of education are proving their superiority over the old. It is taking fewer farmers to produce enough food for a growing population, while mechanization and mass-production have helped raise the standard of living to unprecedented levels. Increasing millions of citizens seek the wild lands for recreation. Local, State and Federal parks and forests have annual use by over 50 million people.

To meet the problems of waste and social disorganization that have accompanied the growth and migration of our population, there have appeared numerous organizations, private, public and semi-public in character designed to plan and coordinate land use, with the help of both the physical and social sciences.

Planning Agencies

Almost all cities of the United States with populations over 100,000 have official planning agencies, and in addition there are 700 official and unofficial city planning agencies in the nation.[1] Planning and land-use control on the local level outside of cities, however, have been developed only recently. In New England zoning has been used largely in the thickly settled areas, not extending to the rural regions, while

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1. Renne, Roland R. 1947. Land Economics, illustrations, New York City, Harper and Brothers, pp. 704-724.

in the mid-West and West the effort has been made on the local rural level to control water, weeds, grazing, and other regional problems and uses by zoning and other devices. The decade of the 1930's saw the greatest rise in local planning agencies, under the impetus of economic disorganization and drought. During the depression the federal government evolved a program of agricultural land use planning maturing in 1938.

In hundreds of counties, towns, and neighborhoods committees were set up for rural policy planning. Federal aid was available, and Massachusetts established a Rural Policy Committee study and program for each rural town in the state. With the termination of federal and state financial aids, most of the county planning committee sponsored by the State Planning Board ceased functioning in Massachusetts, but the State Planning Board continued its work. Many towns and municipalities have persisted with planning or zoning boards such as in Russell.

Comprehensive Nature of Rural Land Use Planning

Under the terms of the Mount Weather[1] Agreement in 1938, the United States Department of Agriculture and the State Land Grant Colleges agreed to undertake, as a team, to help rural people set up the required organization and processes for

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1. Anon. 1940. "Land Use Planning Under Way." Bureau of Agri. Econ. U. S. D. A., U. S. Govt. Printing Office, pp. 3, 4. Renne, Roland R., Op. cit., pp. 708-709.

effective program-planning. The aim was to effect improved agricultural and other rural land utilization practices. State and federal agencies concerned with agricultural and rural land use on a very comprehensive over-all basis were included in the committees in plans for the coordination of efforts. Local farmers were included on the planning committees to achieve a more realistic, and democratic combination of parties concerned.

The Aim of Planning and Social Control of Land Use

Roland Renne[1] summed up the purposes of social land use control in a single aim--"a better life." Attainment of this aim can be approached by wiser land use practices and a reconsideration of the relationship of institutions and man to the land. But more than the machinery of democratic planning is called for, since material, political, and economic considerations mu t be motivated by a higher quality of social solidarity, or a "consciousness of kins."

Renne[2] points out the change in values taking place in the current generation looking toward new ways of living.

> "Enlightened people of the twentieth century are coming to regard the non-use or abuse of natural and

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1. Renne, Roland R. 1941, Land Economics, p. 723.
2. Ibid., pp. 723-724.

human resources - idle land, idle machines, and idle men--as the greatest sin against nature and the greatest crime against society... The best use of resources may call for different forms of ownership and economic organization in accordance with different technical and social conditions. Only the future will reveal the path to be taken by our modern societies in attaining their objective of improved human living, but encouragement of democratic planning through community and group cooperation, with the purpose of coordinating and ultimately integrating resource use, certainly offers definite possibilities of accomplishing these necessary changes most equably and satisfactorily."

Community Planning

"Community planning should connote a deliberate effort to develop a community so it will sustain permanently the maximum number of gainfully employed, healthy, and contented families."[1] The foregoing statement was taken from an address by a member of the Michigan State Planning Board, Paul A. Herbert, to a group of foresters.

In a study in southern Michigan in five and a half counties, it was found that only 6.6% of the community boundaries agreed

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1. Herbert, Paul A. 1938 "Rural Community Planning", Journal of Forestry 36: 1100-1105.

with the township boundaries. Such inconsistencies will eventually have to be recognized and boundaries changed, but it is an indication of a need for an overall-master plan.

Studies and planning are called for on every level from the neighborhood to the Federal government in order to approach the problem of the disorganized or planless community. Using soil classification, weather experts, geologists, and biologists, local communities can be rearranged by rural zoning in such a way as to reduce maladjustments resulting from unwise land use. Enabling Acts in effect in Michigan and Wisconsin, the author says, are only the first step, county boards of supervisors in Michigan, and the majority of voters in townships must approve a given zoning ordinance to give it effect.

The blocking off of certain areas from agriculture or settlement is no cure all, according to Herbert, nor is the solution of a town's entire land use problem enough, because all phases of community life must be given consideration in a plan. The land use plan aspect is simply a means to an end, namely increasing human happiness.

Referring to the need for sound positive planning of rural land use in New England, Professor John D. Black, of Harvard University writes,[1]

"It should be abundantly clear that any town or other jurisdictional unit needs to have a definite plan with

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1. Black, John D. 1950. The Rural Economy of New England, Harvard University Press, Cambridge, Mass. p. 749.

respect to what lands are going to be kept in what uses, and what highways are going to be maintained to protect such uses. Decisions on such matters should not be left to chance or to pressures exerted by a few individuals. Planning along these lines has strong positive as well as negative possibilities, [restrictive zoning]. Positive steps, for example, could lead to the development of good summer resort land or part time farming, by supplying a good access road."

Evolution of Uses of Eminent Domain and Zoning

The device of public acquisition or ownership of land forms another very important tool in the development, planning, and replanning of the community.[1] The use of the power of eminent domain is a sovereign power of government enabling it to take private property for public purposes if proper payment is made the owner, assuming that a voluntary sale cannot be arranged. This power of eminent domain is one of the inherent powers of the several states, and the federal government may use it only in the exercise of the delegated functions in the federal Constitution, while municipalities, which are created by the states are limited to the authority granted them by state laws.

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1. Walker, Robert Averill, 1941. The Planning Function in Urban Government, University of Chicago Press, Chicago, Ill. 1st ed., pp. 95-100.

In arriving at a definition of "public purposes" the courts have become increasingly generous in interpretation, as the recognized need of planning has spread. Under the older interpretation, it was necessary to show that the acquisition would be open to active use of the citizenry, while the tendency now is to shift the meaning of the public use requirement from "use by the public," to "useful to the public." This changed concept has served well to enable public agencies to retire certain lands from uses detrimental to the public interest. In this connection the technique of excess condemnation is often used where a public project will actually occupy only a part of land the balance of which is useful in other ways.[1] Some excess condemnations are made, for example, to beautify the area, solve the problem of lot remnants, improve administrability, to protect the usefulness of the public improvements established, or in order to make a profit for the public agency.[2]

Zoning Spreads from an Urban to a Regional Device

Once limited to urban use, a broadened device called rural zoning has emerged through twenty-five years of development into a widely used, flexible tool. Its application is rapidly

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1. Renne, Roland R. 1947. Land Economics. pp. 147-149.
2. Ibid., p. 149.

spreading as more political entities realize its value for promoting orderly growth, traffic facilities and flood control. There are laws enabling zoning outside the limits of incorporated cities in thirty-eight states. In twelve states fifty varied laws enable towns or townships to enact rural zoning. Other units of local government have certain zoning powers in twenty-three states. Erling Solbert in his recent work on rural zoning gave as an example the various ways in which a watershed could be affected.[1] The flood-control watershed area could be made a public forest or zoned for forestry and recreation in provate hands, or it could be controlled by a combination of public purchase and zoning.

Comparison of Community with State Forests and Parks

For a better perspective on community forests it is helpful to compare them with state forests in regard to their number size and uses. A compilation of state and community forests made by the United States Forest Service in 1947 indicated that Massachusetts is still among the leaders in the number of units of community forests, having 140 units, which places her in fifth position among the forty-eight states in that respect, while the acreage in these locally administered forests places

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1. Solberg, Erling D. 1951, "Rural Zoning in Transition" Agricultural Economics Research, 3: 41: 135-140.

her seventh on the list. Michigan, New Hampshire, New York, Pennsylvania, and Wisconsin have appeared most active in this type of community organization and land management, all having established well over one hundred.

As to state forests it will be seen on Table I that Idaho, Michigan, Minnesota and Pennsylvania account for eight and one-half million acres, but that in proportion to their areal size Connecticut and Massachusetts are above average with 120,000 and 170,000 acres respectively.

Another complementary part to the recreation-conservation program of forests is the state park system. The survey by the United States Forest Service of units and acreages of state parks disclosed over 4,000,000 acres in 1,187 separate units distributed throughout the states. Only Utah and Colorado are without this type of administrative unit, and only seventeen states have less than ten park units, among them Massachusetts with eight. Connecticut is again in a leading group with fifty-four units ranking her among the top six. Pennsylvania's aggressive public land policy has led her to select 92,000 acres for park land distributed in one hundred nine parcels.

According to George A. Duthie[1] of the United States Forest Service Division of Cooperative Forest Management,

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1. George A. Duthie to William G. Vinal, June 3, 1947.

Section of State and Community Forests, the large acreages of community forests in such areas as Michigan and Wisconsin is indicative of the land use problem in those states. Outside New England county forests, usually several hundred acres in size, have been part of the administrative efforts to handle the severe disorganization resulting from land tax delinquency. Duthie related that in many cases the development of the school forest projects has had a vital influence on the educational program of the school. He also mentioned that the dominant type of community forest in New England was the watershed forest. There the school forest had not been developed to any extent, he says, but he recommends serious consideration of the idea as an instrument for better common school education.

The community forest movement has continued to grow since the figures in Table I (following page) were gathered, and by 1949 there were 3,113 such units, a gain of over 700 in two years. Acreage in these units has increased to 4,413,950.[1]

Duthie furnished a breakdown of types of community forests which show a growing number of schools having their own forests. There are now 1,279 or more of these, while county and township forests have grown to 617, and that type called organizational forest, which includes many 4-H Club units like Escambia County

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1. Duthie, Geo. A. 1949 "Community Forests". Yearbook of Agriculture, p. 394.

TABLE I

STATE FORESTS, STATE PARKS, AND COMMUNITY FORESTS

Compiled by State and Private Forestry
U. S. Forest Service, Washington, D.C.
April - 1947

State	State Forests		State Parks		Community Forests[1]	
	Number Units	Acreage	Number Units	Acreage	Number Units	Acreage
Alabama	101	17,041	19	30,610	9	3,697
Arizona	--	--	3	8,250	--	--
Arkansas	--	--	9	18,064	65	2,193
California	7	61,625	30	107,453	2	2,703
Colorado	1	72,000	--	--	24	42,300
Connecticut	26	120,296	54	15,400	18	28,663
Delaware	6	4,318	2	25	--	--
Florida	3	24,013	16	38,254	5	820
Georgia	2	1,090	21	18,082	12	5,656
Idaho	1	1,029,148	1	10,169	6	1,789
Illinois	3	10,278	22	23,000	56	53,354
Indiana	13	68,706	14	39,540	8	6,698
Iowa	9	13,588	76	22,000	10	14,100
Kansas	--	--	23	16,575	--	--
Kentucky	1	3,624	21	7,037	5	6,220
Louisiana	2	10,300	9	11,361	7	4,928
Maine	1	21,000	11	127,676	42	14,666
Maryland	10	76,709	7	4,042	7	22,994
Massachusetts	75	170,000	8	5,267	140	50,110
Michigan	22	3,440,000	88	109,848	433	99,665
Minnesota	32	2,002,425	56	83,385	42	39,488
Mississippi	1	1,640	10	10,280	4	1,261
Missouri	11	110,879	23	59,425	2	120
Montana	7	227,473	1	2,777	2	21,030
Nebraska	--	--	7	1,036	1	600
Nevada	--	--	4	16,000	--	--
New Hampshire	71	32,968	36	16,578	115	41,000
New Jersey	9	56,628	17	18,109	9	52,033
New Mexico	--	--	6	78,178	--	--
New York	338	467,513	25	2,525,127	664	150,000
North Carolina	--	--	12	14,966	46	56,077
North Dakota	--	--	47	3,753	1	140
Ohio	16	83,141	29	195,883	46	27,589
Oklahoma	--	--	7	43,780	6	2,738
Oregon	25	410,000	162	71,000	42	30,560
Pennsylvania	25	1,655,870	109	92,520	101	79,797
Rhode Island	3	3,407	35	3,704	6	12,487
South Carolina	3	3,472	18	37,464	9	46,685
South Dakota	2	17,067	1	64,671	32	955
Tennessee	10	71,522	16	38,138	10	2,312
Texas	5	6,410	10	5,600	11	3,382
Utah	--	--	--	--	8	46,998

Vermont	24	71,712	21	6,871	44	9,223
Virginia	6	6,969	9	20,765	42	47,244
Washington	2	290,000	61	45,538	8	73,256
West Virginia	7	59,259	13	25,655	2	496
Wisconsin	8	258,700	16	14,258	277	1,983,334
Wyoming	--	--	2	1,400	--	--
Total	888	10,980,791	1,187	4,109,514	2,378	3,089.361

1. Includes municipal, county, school, and public organization.

unit in Pensacola,[1] number ninety-six. Illinois has ten well developed multiple-use county forests such as the Champagne and Cook County units where social and spiritual aims dominate the planning.

Wisconsin, under her Forest Crop Law has twenty-eight counties in the locally administered category with over two million acres, while the New York county forest program has accumulated marginal or abandoned land in fifty-two counties, and tree plantings there exceed 150,000,000 trees.[2]

It is striking that some states have very limited programs of either community or state forests, so that the diffusion of the potential benefits in education for resource use and improvement of public morale is not widely felt. For example, in Florida, there were five community forests and three state forests; in Georgia twelve and two respectively; in South Carolina, nine and three, while in New Jersey with extremely dense population had only nine community forests and nine state forests. New Jersey's State Parks numbering seventeen contain only about 18,000 acres, many units of which are under unsatisfactorily heavy recreational pressure because of the lack of alternate resources. According to the United States Census estimates, New Jersey was the second most densely

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1. Anon. 1947, "Community Forests for Rural People." U. S. D. A. Leaflet #244, p. 6.

2. Duthie, op. cit., pp. 394-396.

populated state in the Union, second only to Rhode Island. New Jersey's 7,514 square miles harbored an estimated population in 1948 of 629 per square mile. Massachusetts, with a density for the same year estimated at 587 persons per square mile, provides a more varied, less crowded array of recreational wildland facilities, with her basis of community forests and state forests totalling over 200 and aggregating over 200,000 acres.

State Forests Used to Retire Submarginal Land

Although many state forests have been developed around some scenic feature, recreation, or productive timber, over 31% of all state forests were acquired by tax reversion or exchange in order to improve the economy of a depressed area.[1] Minnesota, Michigan, New York, and Washington are states which required the bulk of their state forests as tax-reverted forests land. Active resettlement programs were carried out in the first three of these states because populations which had occupied these areas had no economic basis for survival either as farmers or woodland workers. The maintenance of schools, roads, and local government was therefore terminated as a responsibility of local inhabitants. The former residents moved into other populated communities and the state, or in many cases the country assumed responsibility for the

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1. Fontanna, Stanley G. 1949. "State Forests", Trees, pp. 390-394.

the maintenance and use of the land.

Acquired for the most part within the last twenty-five years, state forests in the eastern and southern states have as yet not attained a highly productive rate of growth. To explain this, 45% of the area is in seedling and sapling or understocked cover, while the sawtimber areas average well below the national state forest average of 21%.

All the states have managed to utilize at least some of their state forests for recreational purposes, and this very popular use has been encouraged by the development of camps, trails, ski areas, access roads, and wayside picnic areas.

The states in administering their forests have in general given good fire protection as a basic prerequisite, and have in some cases as in New York and Michigan, carried through a strong tree planting program on state forest areas. Most states operate tree nurseries, but allocate the produce largely to private individuals and state institutions other than the state forest. The making of a detailed forest inventory and management plans has not been possible in most states because of limited funds.

In New England Connecticut has the policy of adding 6000 acres a year to her state forests while Massachusetts aims at an eventual 500,000 acre increase in state forests, but has as yet not appropriated the funds for beginning the purchases. States elsewhere in the nation are going forward with purchase

and exchange programs, blocking in manageable units. Michigan spends $250,000 annually on this, and New York is to add some 20,000 acres annually.

Massachusetts has built a network of State Forests chiefly on unproductive depressed areas. The size of these units tends to fall into the 1000-3000 acre unit, whereas the Town Forests under the Town Forest Act are most heavily represented in the 100-200 acre size as indicated in FIGURE 1.

Summary

1. European communities large and small tend to utilize local public forest land intensively for recreation and physical forests products.
2. Larger proportions of forest land are in community forests in Europe than are in the State and community forests in the United States.
3. Good forest management in Europe resulted in economic benefits which stimulated early community forest activity in the United States. (Example, Massachusetts, in 1913.)
4. Growing concern over conservation of forests and other resources was prompted by several of the historic United States policies of unrestricted land settlement.
5. Efforts to reduce economic waste and social disorganization led to, (a) the purchase of land by the Federal, State and local governments for parks and forests, and wildlife refuges.

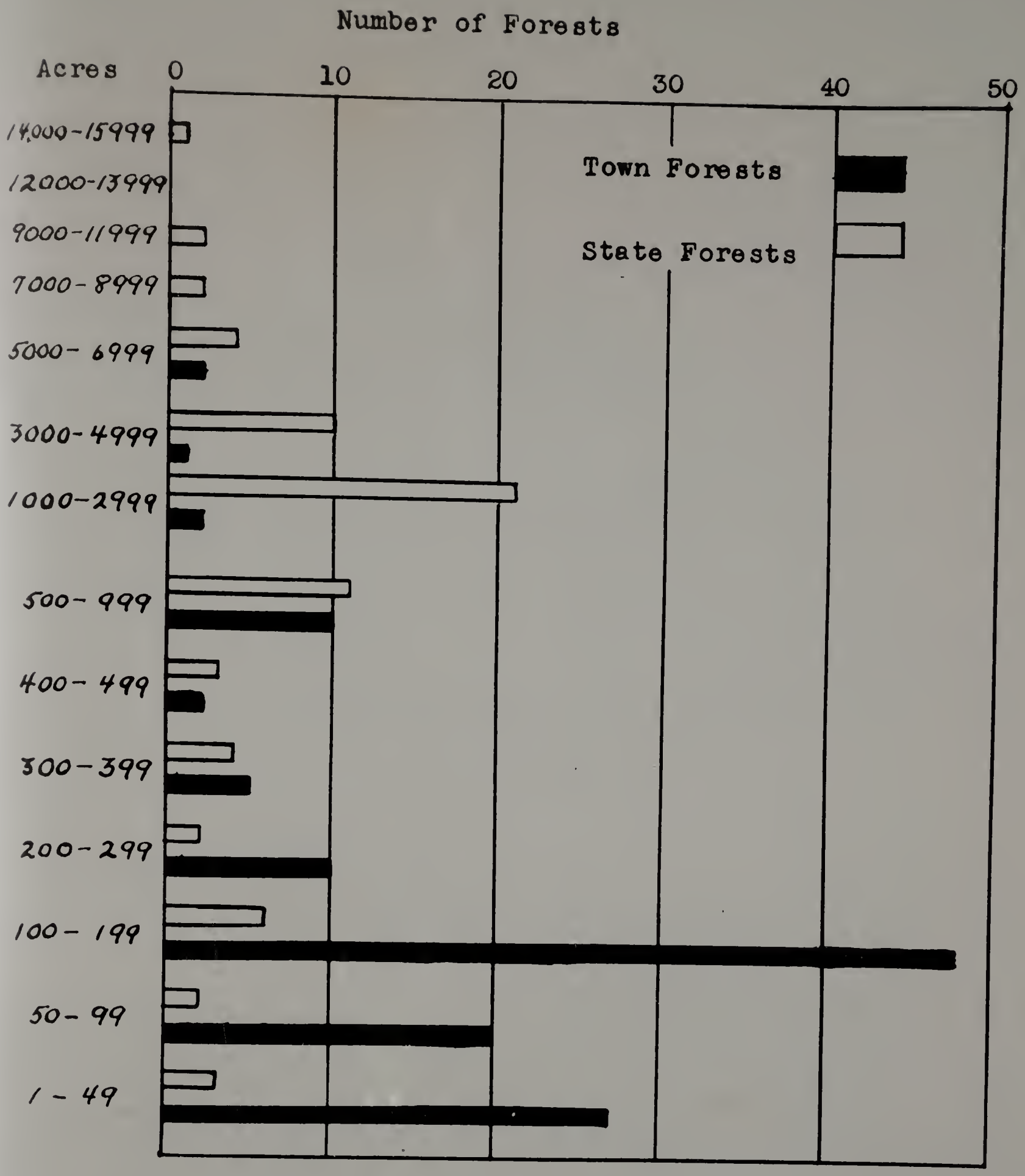

FIGURE 1.

DISTRIBUTION OF STATE FORESTS AND TOWN FORESTS IN MASSACHUSETTS, BY ACREAGE.

Source: For town forest data, A Survey of the Town Forests in Massachusetts, Mass. Forest and Park Assoc. Boston 1950 p 10-11.
For State Forest data, Recreation Guide to Massachusetts State Parks and State Forests. Dept. of Cons Bull. 1939.

(b) The use of ~~the~~ eminent domain is being broadened to include broader areas of application.

(c) The practice of zoning is spreading from urban use to wide regional and rural use.

6. State forest programs grew fastest just after the turn of the last century, but acquisition of State forest lands continued to grow during the decade of the 1920's and especially in the 1930's. Retirement of tax reverted submarginal land and conservation of resources are the two chief reasons for setting up the areas.

7. Both State and community forests have had the largest development in the northcentral and northeastern states.

8. One finds the heaviest development of local forests belonging to municipalities and towns in New England and usually to counties or schools in New York, Wisconsin, and Michigan.

9. The most important single reason for the establishment of the larger municipal forests in the northeast was for watershed protection.

10. There are approximately 3,000 community forests throughout the country, a number about equalling the combined State forests and parks.

12. National Forests and Parks are almost wholly located in the Rocky Mountains and in the Western states.

Growth of Town Forests in Massachusetts

The Massachusetts Forest and Park Association, which has been a prime mover in establishing the community forest movement in the United States and especially the town forest program in Massachusetts, made a survey in 1949 of the status of the town forests in the state. David R. Miner was engaged to gather data on the progress that had taken place since the passage of the Town Forest Act,[1] thirty five years before.

It was intended to find in the survey of the 127 town forests the condition of each forest and to analyze the results of the work done, and so "to determine the place of the town forest movement in the conservation of this natural resource, and to ascertain whether further expenditures for (promoting)

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1. Massachusetts General Laws, Chapter 132, Sect. 35.

extension were justified."[1]

Attention was to be gi en the records of the in-puts and out-puts kept by the town and standards were adopted to classify the quality of forest management observed.

The town forest committee in each town was to have visited the town forest itself with Mr. Miner, the investigating forester, and to have discussed problems of management and silviculture with him.

Particular attention was to have been paid to the condition of the 5,000 trees planted free of charge by the sponsoring Massachusetts Forest and Park Association in the 46 towns which set up forests larger than 100 acres.

The association's findings revealed that a total of 39,839 acres were covered by 127 town forests established under the Town Forest Act as of 1949.[2 & 3] The author notes that during the decade of the 1920's 61% of the town forests were established, indicating that the movement had then gained considerable support after an initial five year period under the Act when only three towns made the arrangement. (FIGURE 2.)

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1. Reynolds, Harris, "A Survey of the Town Forests in Massachusetts" Bulletin No. 171, Massachusetts Forest and Park Association, 1949 page 2, illustrated .

2. Note, The totals given in this 1949 survey are below those in the 1947 survey of the United States Forest Service because the latter included some forests and watersheds not constituted under the provisions of the Town Forest Act.

3. Ibid, pp. 10, 11.

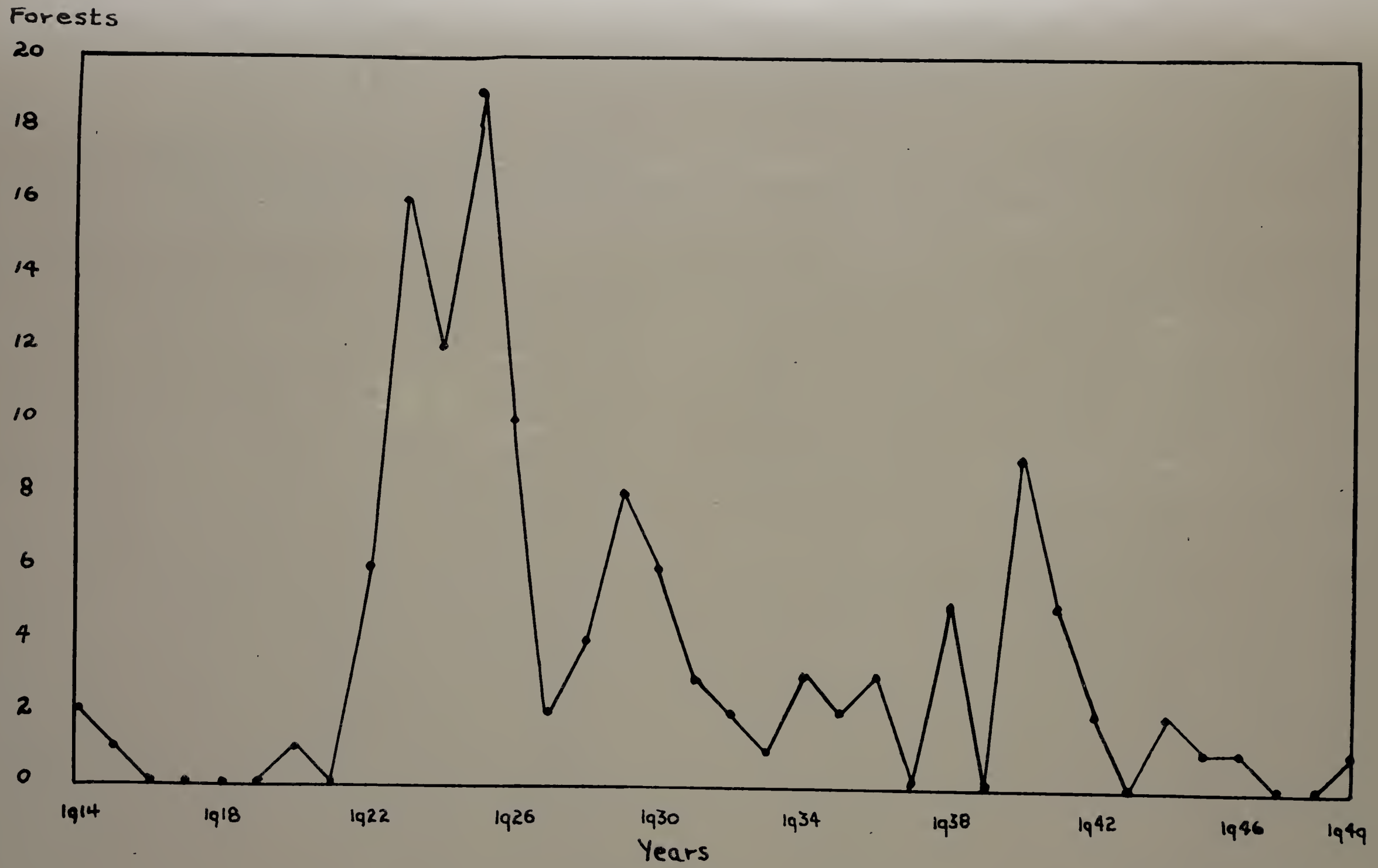

FIGURE 2.

DISTRIBUTION OF TOWN FORESTS IN MASSACHUSETTS BY YEAR OF ESTABLISHMENT 1914–1949

Source:- Annual Reports, Town Forest Committee, A Survey of the Town Forests in Massachusetts., Bulletin no. 171, Mass. Forest and Park Assoc. 1950. p. 10-11.

Fifteen towns were found to have placed at least 500 acres of their land under the terms of the Town Forest Act, and most of these have been partly or wholly for watershed purposes.

The Forest and Park Association compilation further revealed that a series of two or more acquisitions had constituted the holdings, often with apparently different motives in view. For instance, outright purchase for general forestry purposes seems to have led the categories of reasons for establishment, equalled in number by watershed purposes, as will be seen in table (2x),[1] each having 33 positions.

2x

Distribution of Town Forests in Massachusetts, 1949 by Means or Purpose of Acquisition Wholly or in Part[2]

Category of Acquisition	Number
Watersheds	33
Purchase	33
Town Farm	28
Gift	28
Town Land	19
Tax Land	10

When the survey was made in 1949, records showed that over 8,5000,000 trees had been planted on the town forests, but that only three-fifths of the individual town forests showed evidence of good substantial management.

1. Reynolds, H. C., op. cit., pp. 10-11.
2. Cf Appendix for complete tables.

Following a set of standards that had to be set up arbitrarily by Miner, the investigating forester, the Town Forests were classified as to quality of management in four groups as follows:-

> Excellent:[1] Forests under the management of a forester or a committee where a plan based on forestry principles has been followed for a long period and which are sufficiently stocked to provide a good crop of commercial timber, or on which profitable harvesting has already begun. Twenty per cent of the Town Forests, with 63% of the total area, were in this group.
> Good: Forests have been under management, but for lack of appropriations or other reasons will require a considerable expenditure to bring them to full stocking of commercial species. In this group 39% of the Town Forests were listed. They contained only 20% of the total area.
> Medium: Forests which have received insufficient care after the initial planting, and which will produce only a mediocre crop unless brought under more intensive control. Here thirty-one per cent have 15% of the total area.)

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1. Reynolds, H. C., op. cit., p. 3.

Poor: Woodlands which have had practically no attention since they were established as town forests, and from which no community benefits can be expected that would not have been obtained had the land been left in its natural condition. Only one per cent of the local forests examined were classified as under poor management. And the area was but two per cent of the total.

Two elements are noteworthy in the foregoing analysis, one is that the study confined itself to the business of profitable forest management with the aim of merchantable wood products, and the other point is the finding that three-fifths of the Town Forests which do practice good forest management contain four-fifths of the area. Even more pointed is the fact that the one fifth of the town forests exhibiting excellent management, contain 63% of the total area. There was a definite positive correlation between the large Town Forest tracts and sound management from a wood producing point of view.

Mr. Reynolds mentions in his article summarizing the results of the 1949 survey that it was not possible to obtain figures on income from the town forest committees or town officials, since the in-puts and out-puts are not recorded in one place or are not recorded at all. The author has observed that the town highway department in some towns may repair roads and bridges in the town forest or watershed without separating

the item from the general highway work, and similarly for example, trees used for ornamental town planting or for highway posts are not always credited to the account of the town forest.

Reynolds states that despite the lack of reliable records, it was known that several million feet of lumber have been harvested beside thousands of cords of fuelwood. The latter have largely been cut and distributed for the use of the town and city welfare departments. The report of the survey above mentioned drew on the findings in towns where the most adequate records were to be found, or where the Massachusetts Forestry Foundation had made a management plan. (The foundation is a non-profit service agency sponsored by the Massachusetts Forest and Park Association.)

The committees of Russell, Greenfield, Pittsfield, Needham, North Adams, Pembroke, and Walpole had contracted to make studies or management plans of their town forests, and the findings therein provided some encouragement for conservationists.

The city of Pittsfield, for example, has been building up protected forest land and plantations since the construction of the Ashley Reservoir in 1912. The Forestry Foundation prepared a set of findings and suggestions for the Commissioner of Public works who controls the water supply system.[1]

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1. Ibid., p. 4.

On its 4393 acre watershed there were 7,222,500 board feet of merchantable timber. Annual growth was accumulating at a rate of 685,500 board feet containing and counting all ages of trees. A cutting budget arranged for five year intervals would average about $2500 annually in gross returns from the sale of stumpage.

The author has investigated[1,2] the situation in Pittsfield since the 1947 study of the Forestry Foundation, and to date there has been no pruning or cutting based on the recommendations. In the same watershed forest a consulting forest engineer, Clifford Foster, had made type maps and treatment recommendations in 1930. The harvesting of then mature timber, chiefly hardwoods, was recommended but was not carried out. However cordwood fuel was cut extensively for the Welfare Department by unemployed men during the 1930's.

Pittsfield's large watershed is not legally under the Massachusetts Town Forest Act, but that substantial forest land is among 50 municipal forests in the state not under the Town Forest Act, totalling about 160,000 acres in area and owned by

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1. Conversation with R. L. McClelland, Commissioner of Public Works, City of Pittsfield, Mass. April 1951.

2. Annual Reports, City of Pittsfield, Department of Public Works.

local agencies.[1] Thus the town forests under the Act make up about one-fifth of the municipally owned forest acreage.

A survey is being carried on by Dr. David Rozman at the present time to distinguish in each town the extent of town owned property. Many towns have title to sizable lands for which they have no program, and much of this is forest land. For example, the author learned from the assessors reports in South Hadley[2] that the town controlled five woodlots containing a total of one hundred acres, only twenty acres of which were given consideration as to many particular uses. This type of situation exemplifies the difference between forested land which has become an interest of the community and merely town owned land.

Town Forests Well Scattered Throughout The State

The geographical distribution of the towns which have placed a forest area under the Town Forest Act shows a wide scattering throughout Massachusetts. But in localities, towns with Town Forests appear frequently in groups. The following map showing distribution of Town Forests show extensive areas having sparse populations for example in the Western Highlands, between Florida and Sandisfield which do not have any Town Forests.

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1. Ibid., p. 4 Note.
2. Assessors' Reports, 1951, South Hadley, Falls, Mass.

Map of Towns in Massachusetts Having Town Forests Under the Town Forest Act.

Source:- " A Survey of the Town Forests in Massachusett." Bull. I7I. Mass. Forest and Park Ass'n. I949

Legend:- Forests acquired by Purchase, Donation, Town or Tax Land

Forests acquired all or in part for Watershed

Figure 3.

VERMONT

NEW HAMPSHIRE

NEW YORK

CONNECTICUT

RHODE ISLAND

73° 00'

72° 00'

71° 00'

70° 00'

42° 30'

42° 00'

41° 30'

BERKSHIRE

FRANKLIN

HAMPSHIRE

HAMPDEN

WORCESTER

MIDDLESEX

ESSEX

SUFFOLK

NORFOLK

BRISTOL

PLYMOUTH

BARNSTABLE

DUKES

NANTUCKET

THE COMMONWEALTH OF MASSACHUSETTS
STATE PLANNING BOARD
CITIES, TOWNS AND COUNTIES IN MASSACHUSETTS

ELISABETH M. HERLIHY, CHAIRMAN
JAMES A. BRITTON
FRANK ROSS
HENRY I. HARRIMAN
FRANK W. HOWARD
ROBERT T. BARNICLE

COMMISSIONER OF CONSERVATION
COMMISSIONER-METROPOLITAN DISTRICT COMMISSION
COMMISSIONER OF PUBLIC HEALTH
COMMISSIONER OF PUBLIC WORKS

OTIS D. FELLOWS, CHIEF ENGINEER

10 0 10 20 30 40

SCALE IN MILES

NOTE: NORFOLK COUNTY INCLUDES BROOKLINE AND COHASSET.

Summary on Massachusetts Forests

1. The passage of the Enabling Act known as the Town Forest Act in 1913, did not mark the creation of the first community forest in Massachusetts but gave some impetus to active silviculture in towns with or without surface water reservoirs. The State agreed to supply trees free for reforestation.
2. Provided that locally owned lands were to be used for forest production the State agreed to supply seedling conifers for reforestation.
3. The Massachusetts Forest and Park Association was active in promoting the Town Forest legislation and offered to plant 5000 trees free of charge as an inducement for towns to set up forests of over 100 acres.
4. Not until the 1920's did the Town Forest Movement gain many participants. Most of the present 128 towns forests were created between 1920 and 1938.
5. Over thirty of the Town Forests were acquired wholly or in part for watershed purposes, the rest for mixed reasons such as the discontinuation of a town farm or by gift. Only 10 Town Forests were acquired by tax reversion.
6. The largest Town Forests have received the best forest management. About two-thirds of the area involved has been under good management.

7. Two-fifths of the Town Forests have been managed poorly.
8. The commonest size of the Town Forest ranges between 100-200 acres.
9. Almost 40,000 acres were under the Town Forest Act in 1949.
10. Timber harvests have been rare either through inaction or the fact that stands were not mature.
11. Considerable fuel wood cutting took place in the Town Forests in the 1930's.
12. Few towns keep comparable data on inputs and outputs of labor and woodproduction or public use.
13. Distributed well throughout the State, the Town Forests have had a tendency not to develop in the larger municipalities nor in the economically most depressed, least inhabited localities.

CHAPTER IV

WATERSHED FORESTRY

Effects of Forests on Watersheds

"Watershed management is one field where generalizations particularly about specific methods and practices, are not safe", according to E. N. Munns in an article discussing forest influences on reservoir watersheds.[1] So many variable factors - rainfall, snow melt, topography, steepness and length of slope, type of drainage system, texture and depth of soil, geologic structure -- all must be taken into account on an individual case-study basis. One of the most important of these variables is the type of plant cover, and whether it is an intertilled crop or small grain crop. Munns stresses three ever-present bases of guidance in a plan producing domestic water.

The first objective should be to stabilize the soil, for without this there will inevitably be siltation and turbidity resulting in unnecessarily high treatment costs and loss of storage capacity.

The capacity of the soil to allow ready seepage is

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1. Munns, E. N., 1946 "Forest Influences on Reservoir Watersheds", Journal American Water Works Assoc., 38: 10: 1111.

closely related to stability and is a second prime necessity. More important than length and steepness of pitch is the quality of the plant cover and texture of the soil. The presence of substantial amount of gravel or coarse sand in a soil, as is so common in New England's glacial till, makes for a high percolating capacity, but tends to work against the third important objective, namely water-holding capacity.

By creating mats of leaves, duff and root barricades, and by supplying animals large and small with a renewed supply of nutrients, the forest cover protects the soil, making it more available to percolation, and reducing mechanical raindrop damage or damage from rivulets that might otherwise erode into gullies.

By adding annual supplies of leaves, and branches to the soil, forests, particularly the hardwoods, are recirculating the mineral bases and ash necessary to vigorous plant growth. Infiltration and storage rates of soil under protective plant cover are improved greatly.[1] Studies by the United States Forest Service have shown that the increase ranges from a few to many times greater than they were for the identical soil before it was protected.

The depth of frost penetrations under forest cover has with

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1. Ibid.

but few exceptions (e.g., spruce in northern frings in this country) shown that the forest-covered land receives from a combination of factors a frost-retarding protection. Infiltration is greatly aided by the matted litter in the frozen forest floor compared to field and pasture open ground which tend to develop an impervious sheet of ice.

It is desirable to achieve a given soil's optimum water-holding capacity in order to gain a more even subsurface flow throughout the year. The soil itself is impractical to treat directly on vast watershed programs, but the type and condition of plant cover as managed by a watershed operator can move toward attaining the conditions desired by attempting to supplement the weak points in a soil structure.

Forests apparently have little effect on precipitation, although findings are inconclusive.[1]

Water is used by forests at rates varying greatly with the growth habits of the tree. Large hardwoods such as maple and oak use the greatest amounts. Some species of trees require the equivalent of three to five feet of rainfall in a year, whereas others can prosper with but six inches.[2]

Trees reduce the amount of precipitation that reaches the ground for example oak trees in full leaf, block off

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1. Munns, E. N., op. cit.
2. Ibid.

several times as much water as they do with bare branches.

Forests reduce evaporation by decreasing wind velocity at the surface of the ground and lowering mean temperatures by reducing isolation. Research at Seabrook Farms in New Jersey has indicated that water losses from a bare soil by evaporation may equal the water taken up by a plant covering the same area.

Watershed Forestry Can Be Profitable

Professor Hawley of Yale holds that forestry by watershed administrations for public water supplies need never by unprofitable if it is wisely carried out.[1] Hawley reasons that water boards are in a most favorable position to grow forest crops cheaply since much of their overhead is already in some sort of land management or interest and taxes. The permanent status of these water supply organizations enhances their long-term planning of timber crops. It is emphasized by Hawley that because lands are understocked, or stocked with unmarketable species most water companies have not derived the net return of which their forest land was capable of supplying.

Eventually when management has brought the New Haven

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1. Hawley, Ralph C. 1946 "Evaluation of Returns from Forest Lands", Journal American Water Works Assoc., 38:10:107.

Water Company forest into full production a net average per acre return of $2.00 can be expected (under monetary relationships as they were in 1946).

Few water boards have forests with adequate growing stock. Fire damage and overcutting by previous owners are the most common reason for being understocked. Where former farm land was woodland pasture numbers of inferior species of trees and shrubs make the achievement of a healthy commercial stand costly and troublesome.

Problems of efficiency, public relations and quality of labor complicate watershed forestry

One authority reports that to get the greatest economic return from a foresty operation, the administrator must draw the line decisively between aesthetic displays for the public to see, and the real commercial business of making the operation pay.[1] Hawley contended that well-raked, and well trimmed areas are frequently carried too far back from the public roads. As a result of the high labor cost involved, forest operations as a whole show a deficit. The use of permanent regular water board employees who ordinarily are at their best at their specialized piping program, is proper if there is a slack period in the water distribution work program and a job to be done in

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1. Ibid., p. 1110.

the woods. Hawley suggests close, skilled supervision of these temporary woods crews in order to reduce their relative inefficiency as much as possible.

Mr. Frederick Stillman,[1] Engineer of the Bridgeport Hydraulic Co. in Connecticut indicated that the regular labor force of the Water Company could not even with the best intentions accomplish the woods work and lumbering as cheaply for the company as outside contractors. Especially in harvesting and marketing a thinning or a mature crop the Bridgeport Hydraulic Company has found that the specialized machinery and know-how of lumbermen is the most economical to utilize. Connwood, the Connecticut cooperative service and marketing organization, has also been found a useful market outlet.

Practical Forestry on Water Supply Watersheds

The successful experience of the New Haven Water Company in Connecticut with intensive forest management reinforces the potentialities outlined in A National Plan for American Forests. According to Edward E. Minor,[2] Vice-president of the New Haven Water Company serving as Chairman of the American

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1. Silliman F., Interview in Bridgeport, Conn. Dec. 1950.
2. Minor, Edward E., 1940 "Practical Forestry" American Water Works Association, 38:10:1103.

Water Works Association Subcommittee on Forestation, "A municipality or a wat r board owning land and having as its primary purpose the furnishing of a public water supply is ideally constituted for such intensive forestry work." He recognized the benefits of such an intelligent use of the land as not only profitable in the eventual returns from the timber but in better water-quality and under certain regulations and conditions he saw that recreational areas were feasible for the enjoyment of the local community.

Reasons for Intensifying Watershed Forest Management

Regardless of whether an agency managing a given water supply watershed is tax-supported or privately operated, it is to the best interest of rate-payers and management to have an intensive watershed forest program. Ralph C. Hawley,[1] head of the New Haven Water Company's forest operations, presented figures in an effort to prove this contention. Basing his calculations on a $7.00 per thousand board feet price for stumpage, and the growth experience tables that have been formulated by the Yale School of Forestry on the Eli Whitney Forest, he put figures on the mean annual value of gross production when fully stocked over a long period of years. For the hardwoods

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1. Hawley, Ralph C., "Evaluation of Returns from Forest Lands" Journal American Water Works Association pp. 1105-6.

it was $1.40 per acre per year, $2.45 per acre per year on hemlock and $4.20 on white pine stands. Professor Hawley estimated that on the then current (1946) distribution of each forest type in the twenty-two thousand acre forest lands the average gross returns were $1.80 per acre per year for timber plus $.50 per acre per year for small products. This total of $2.30 per acre per year could be increased by a rise in stumpage value and by converting more forest from hardwood to softwood.

Hawley emphasized that these figures were valid only if sound measures of intensive forest management were followed, with the necessary fire protection and defense against insects. The growth tables of the New Haven watershed forest are comparable to the figures given in the United States Forest Service publication, A National Plan for American Forestry, Vol. 1,p.1321. (See Table II, p. 60)

Using the gross returns and costs according to the U.S.F.S. tables, Hawley continues, "For the New Haven, Connecticut region select costs from central hardwoods and for eastern white pines $.41 and $1.13, respectively, per acre per year. Property taxes, the largest single item in each year's costs are $.25 and $.60 respectively.

Using the gross per acre per year returns for white pines as $4.20 and subtracting the total cost per acre per year of maintaining it by intensive forestry, the net return is $3.07 per acre per year, and by similar calculations, the local hardwoods

TABLE II

REPRESENTATIVE COSTS FOR INTENSIVE PRIVATE FORESTRY PER ACRE PER YEAR

Type Cost	Taxes	Other Charges	Protection		Timber Management			Total
			Fire	Insects Disease	Cutting	Stand Betterment	Planting	
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Spruce-fir hardwood	25	2	2.50	.2	4.5	13	2.5	49.7
Eastern White pine	60	2	5.00	10.0	15.0	17	4.0	1.13
Western White pine	40	2	12.00	11.0	12.0	1	3.0	81.0
Ponderosa pine (Calif.)	40	2	8.50	2.0	10.0	1	2.0	65.5
Longleaf	20	2	7.00	--	3.0	4	1.0	37.0
Central hardwoods	25	2	6.00	--	3.0	3	2.0	41.0
Douglas fir (Pacific Coast)	50	2	8.00	--	3.0	1	2.0	52.3

net $.99.

These[1] are generalized costs for forest properties --- one half of the stand is presumed to be either merchantable timber or virgin forest. Silvicultural cutting changes, stand betterment, and planting are charged off at one percent per year, as a capital investment. These are generalized averages for large properties.

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1. Hawley, R. C. "Returns from Forests", Journal American Water Works Association; 38.

   Hawley, Ralph C., A National Plan for American Forestry, p. 1106.

TABLE III[1]

ESTIMATED INCREMENT AND GROSS RETURNS PER 1,000 BOARD FEET PER ACRE ON PRIVATE FORESTS

Region	Growth per acre fbm.	Stumpage Realization Value	Saw-Timber Returns	Salvage & Cutting Returns	Total Returns Per acre
From Intensive Forestry					
New England	307	9.00	$2.76	$.50	3.26
Middle Atlantic	275	9.00	2.48	.50	2.98
Lake	268	9.21	2.47	.50	2.97
Central	217	9.00	1.95	.50	2.45
South	365	9.36	3.42	.50	3.92
Pacific Coast	559	5.55	3.10	.50	3.60
North Rocky Mountain	348	9.29	3.23	.25	3.48
South Rocky Mountain	126	9.29	1.17	.13	1.30
From Extensive Forestry					
New England	166	9.00	1.49	000	1.49
Middle Atlantic	185	9.00	1.67		1.67
Lake	179	9.21	1.65		1.65
Central	140	9.00	1.26		1.26
South	257	9.36	2.41		2.41
Pacific Coast	213	5.55	1.18		1.18
North Rocky Mountains	175	9.29	1.63		1.63
South Rocky Mountain	79	9.29	.73		.73

Expenses include taxes, carrying charges, stand betterment and planting. Fire and insect control usually classed under carrying charges or stand betterment.

1. Hawley, R. C., National Plan for American Forestry, 1: p. 1320.

Reservoir Lands Made Productive

One of the most diversified public watershed programs the author has read of is that developed by the city of Akron, Ohio. Wendell R. LaDue,[1] superintendent and chief engineer of Water and Sewerage that city stressed a plan of balanced use - for example an orchard secured as a part of a watershed control policy around an impounding reservoir, was used as a fruit producing unit, first managed by the city and later leased by a private operator. Nearer the reservoir an active aforestation system has been followed since 1922 until now more than 800,000 trees have been set out, both conifers and deciduous types. Boats and fishing rights are let out at a profit to fishermen in the fishing preserve part of the reservoir system.

Newark, N. J. Watershed Forest is Self Liquidating

Newark, N. J. has a 41,000 acre watershed of which approximately 35,000 acres are city owned. Annually, this large water supply system supplies $3,000,000,00 worth of water to its users, and consequently the potential net income of $17,000.00 a year from forestry operations (not to be reached until 1968) under present prices, seems very small.

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1. LaDue, Wendell R. et al. 1948 "Reservoir Lands Pay Their Way". Journal American Water Works Association, 40: 827-236

Expenses of forestry work including the forester's salary are approximately $6,000.00 a year. During the past few years income from forestry operations has approximately equalled this.

The 1948 woodland inventory is approximately 235,000 cords of wood and 12,000,000 fbm timber. The cordwood is in young stands of potentially merchantable wood, while the sawtimber is now in its fastest growing stage and should be allowed to grow. In twenty years it is expected there will be an annual sustained cut amounting to 1,500,000 fbm.

Water supply needs are primary under Newark policy, and forest expenditures are either purely to improve water supplies or are currently self liquidating.[1]

Denver Water Department Involved in Diverse Use

The versatile flexibility called for in efficient land use is exemplified in the Denver Water Department operations. Denver Water Department has numerous enterprises on its lands. Properties are held primarily for water supply purposes, including farm water rights, but revenue is derived where practicable from a flour mill, grazing, and cropping. A gravel pit is a source of steady revenue until it becomes used up, at which time it will

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1. Hellman, John M. 1948. "Forestry on Reservoir Lands." Journal American Water Works Association, 40: 8:830-832.

be made into a recreational pond. Denver realized from her Water Department lands in 1947 over $23,000.00.[1]

Watersheds for Recreation

Some water supply forests are intensively used for recreation. The city of Springfield, Illinois is an example where a community has developed a much-used 4300 acre watershed forest along a self-liquidating multiple purpose pattern. Residential use of the water shed areas coupled with charges for recreational privileges brings more than $50,000.00 a year into the public treasury, while a growing timber crop and a game preserve enrich the variety of the resource. From the lake impounded by the development, drinking water and water power are both derived.

Manchester, N. H. has one of the larger watershed forests among municipalities in New England. On its5200 acres it produces very profitable timber crops providing income of from $10,000.00 to $30,000.00 a year. Besides this it is a heavily used recreation area.[2]

Should Reservoirs be open for Public Use

With increasing public pressure for hunting, fishing and

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1. Hughes, George F. "Income from Water Department Property". Jour. Amer. Water Works Assoc. 40:8:830-832.

2. Duthie. "Community Forests". p. 396.

general outdoor recreation areas, authorities differ as to what uses should be made of reservoirs.

Assuming that a purification system can safely and economically handle the extent of pollution created or likely to be created by public use of a given water supply reservoir, a managed amount of public use seems to be in the public interest, according to Lewis S. Finch.[1] Finch was, at the time he wrote, chairman of a sub-committee of the American Water Works Association studying public use of watershed areas.

Where filtration is not practiced, most authorities agree only very limited use if any should be permitted.[2]

If water is filtered efficiently, much recreational use can be made of it. Although the practice of mass swimming is unwise, on psychological grounds.[3]

On the other hand, Finch indicated that many sanitary authorities believe that recreation should be allowed up toa point where the raw waters are grossly polluted, assuming a filtration process to follow.

Definite community benefit should result if recreation is to occur on the watershed, so if there are alternative

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1. Finch, Lewis S. 1946. "Public Use of Reservoir Lands and Waters". J. Amer. Water Works Assoc., 38:10:1138-1141.

2. Ibid., 1141.

3. Ibid.

recreational and swimming areas available, the reservoirs should not be used for extensive recreational use.[1]

Recognizing that the element of prime interest in surface water-supply reservoirs is the maintenance of a satisfactory flow of good potable water, many experts in the public health field have proceeded to differ widely as to the uses that should be permitted on the watershed or the refervoir itself.[2] A panel discussion was held on the subject of public use of watersheds at the Annual Conference of the American Water Works Association in May 1948. Richard E. Bonyun, General Superintendent and Chief Engineer, Passaic Valley Water Commission of Paterson, New Jersey, began the symposium with a reasoned effort to meet the increasing public pressure for picnicking and fishing without sacrificing a safe standard of water.

Bonyun's[3] argument is that some happy medium can be struck which will promote good public relations and healthy recreation provided certain considerations are kept in mind:

(1) "Nature and source of supply. The source may be a water supply reservoir, a large lake or a river

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1. Ibid., 1142.

2. Bonyun, Richard E. et al. 1948. "Public Use of Reservoir Lands and Waters," Journal Amer. Water Works Association 40:945-960.

3. Ibid., p. 946.

with little or no storage. (2) The extent of water treatment. In guarding against possible pollution due to the public use of reservoir lands and waters, the extent of the purification treatment of such waters must of course be considered. (3) Time element - period of storage. 'Water naturally improves with storage in many respects. According to various authorities over 95 per cent of the typhoid bacilli discharged into surface waters die during the first week and after one month the bacilli have practically ceased to exist. The surviving minority may persist for two months or longer. Therefore in a large water supply reservoir, for instance, if water is stored for 90 days before it reaches the outlet, the danger from pollution is greatly minimized. Bonyun believes that certain parts of the water works property should be out of bounds to the public, for example, around the intake and headworks. Whether or not bathing in reservoirs would create a physical health hazard, that sport should be prohibited on psychological grounds, but fishing and boating on certain areas of reservoirs appear to Bonyun a good possibility. Provided the reservoir supply has a sufficient storage period, and if it receives purification at least by chlorination, a regulated amount of fishing and boating would not seem hazardous.

Regarding the land areas draining into reservoirs, Bonyun believes that it is better to prepare attractive, prescribed picnicking and recreation areas on some remote parts of the watershed, than futilely to attempt to prevent haphazard trespassing. This authority would provide supervised day camping spots with fireplaces, tables, and sanitary toilets, but would keep these developments at considerable distances from the reservoir because of the temptation of the public to bathe or go wading. In conclusion, Bonyun states,[1] "If public use of reservoir lands and waters constitutes a hazard to the public water supply, it seems practical to try to direct such use and minimize the hazard rather than to have the hazard exist but be unaware of its extent. Such a policy (regulated public use) would do much to further good public relations."

Reflecting the attitude which more generally characterizes water-works policies in areas where water bodies are scarce, Gerald E. Arnold, Director of the San Diego, California Water Department, holds that safe quality of drinking water must be assured by treatment rather than by protection of the supply. Arnold admitted that in areas where there is no scarcity of lake and stream recreational resources, reservoir management need not make the special effort necessary to provide a regu-

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1. Bonyun, op. cit., p. 947.

lated use. He reasoned that in most areas where there was considerable public pressure for hunting, boating, and fishing, and filtration processes were already in operation, the reservoir areas could be opened to use as they have been at San Diego. Under a supervised system such as that city uses where permits are sold for use of the hunting, boating, and fishing facilities, and strict sanitary control is kept at all times, the slight potential pollution load incurred by recreational use is not comparable to the established, heavy pollution load that many cities handle in using river water.

Adverse Effects of Granting Public Privileges

Eugene F. Duggan,[1] General Manager of the Newport News Water Works Commission in Virginia, has had adverse relations with the groups of people who would use the reservoirs in the system under his control. One of the chief sanitary problems in handling recreationists, he indicates, is that certain reservoir sheds in the tidewater region are such as to forbid adequate drainage (of sewage) to other than the reservoir itself. To Duggan, the ideal impounded supply comes from a place where there are no human habitations. It is this principle which has brought about the large acquisition of land covering the watershed of the Newport News supply. To

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1. Ibid., p. 946.

allow fishing and picnicking, after acquiring control of the land in order to prevent pollution, appears to Duggan as inconsistent.

One reservoir under Duggan's supervision has allowed the provision of sanitary toilet arrangements below the dam, and fishing has long been permitted there, but the small number of people who have participated make the project seem of doubtful value. According to Duggan, the majority of the citizens agree with the management policy of closing the reservoir lakes to the general public in order to keep pollution of raw water to a minimum.

Duggan was not alone in opposing the use of reservoir areas for public use. Gordon Fair, Professor of Sanitary Engineering at Harvard University, and C. A. Holmquist of the New York State Health Department opposed the use of reservoirs for fishing and boating.[1]

Speaking of the arrangements being made at the municipal water supply of Springfield, Illinois, S. T. Anderson,[2] General Superintendent, said that several thousand acres were involved in the plan in order to control a border land of the watershed for prevention of erosion and siltation, but the plan was to

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1. Fair, Gordon, et al. 1940. "Symposium on the recreational use of watersheds." Jour. Amer. Water Works Association 32:1009-1027.

2. Bonyun et al., op. cit., p. 949, 950.

allow home sites along the lake shore and public recreation. The land bordering the main body of the lake was subdivided into areas for homes and parks, and intensive and extensive recreation provided. Fees are being charged to make the program as nearly self-supporting as possible.

The people of the City of Springfield were promised a recreational area when the bond issue was passed to create the reservoir of Lake Springfield, and under the supervision of the water department not only recreation around the lake is provided but access to the tree nurseries, wildlife refuge, gardens, and reforested area is possible. Erosion control involved a reforestation program which at the time of Anderson's talk had planted over 5,000,000 trees. Based on a large storage capacity and thorough filtration Anderson anticipated no hazard by water-borne disease.

Charles E. Moore,[1] Manager of the City Water Department, Roanoke, Virginia, where conditions of the soil, topography, and average storm intensity make filtration essential, believed that hunting, fishing, picnicking, and boating can form a logical system of balanced use. He stressed, however, that the water department should under low-water or other special conditions have the right to suspend public use.

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1. Nonyun et al., op. cit., p. 954.

Summary

1. The effect of forests on watersheds depends to a great extent on climate, topography, rock, and soil, but in general, the forest stabilizes the soil, improves water infiltration, and soil structure, retards runoff, erosion, and depth of frost penetration.
2. Forest operations on most watershed areas are possible if careful logging procedures are followed.
3. Once watershed lands are owned by a water supply agency, intensive forest management is worthwhile on an economic basis. Using 1946 price ratios intensive private forestry on medium growing sites in southern New England would eventually yield between one and four dollars an acre per year depending on the species, net after taxes.
4. The use of water supply watershed lands and waters for diverse uses such as camping, swimming, picnicking, and fishing, or orchard growing, is practiced in some areas, but a thorough water filtration process must accompany these uses.
5. The existence of long term reservoir storage and subsequent chlorination or filtration help to determine whether or not certain public uses are made of water shed areas.
6. Considerable variation in practices followed by water supply agencies are found depending on the relative public

pressure for use of a forest land or body of water for recreation. Such public pressure is increasing and watershed managers are responding with various answers such as localized developed picnic areas or increased precaution in regard to filtration.

7. In the mid-western and western states where lakes and reservoirs are scarce, drinking water supplies are used heavily for multiple use programs. Use fees are charged the public to help offset the cost of maintenance.
8. Most river, lake or reservoir waters can be treated so as to be safe to drink, but the cost of treatment increases with the unreliability of the source.

CHAPTER V.

RECREATION IN COMMUNITY FORESTS.

Multiple Use Forestry May Reduce Net Cash Returns But Provides Other Human Values.

In describing different objectives for the practice of forestry, Phillip L. Buttrick[1] divided the field into four parts. Timber production forestry is the most general and profitable specialization, but this aim is occasionally modified to allow emphasis on one or more of the other three types, protection, park or recreational forestry, or game reservations, sometimes called game reserves. Where these objectives are combined, the forestry is termed multiple-purpose, and have dissimilar economic considerations. Protection forests are intended to protect or increase the value of other natural resources.

Recreation forests have a social purpose whose value is difficult to measure, but it is very real in its contribution to public health and enjoyment. Occasionally recreation or wildlife forest areas bring an indirect economic good to the people who live near them, but, according to Buttrick,[2] at

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1. Buttrick, Philip L. 1943. Forest Economics and Finance, p. 6.

2. Ibid.

times recreation forests become a local economic handicap. He emphasized that when a forest manager was obliged to include either a wildlife sanctuary or a recreation program, revenue from forest crops would necessarily suffer, and costs of administration would be considerably increased, frequently meaning a net loss instead of a gain.

Recreational Possibilities

Recreational possibilities can be made self-respecting and less "beholden" to the budget-makers of a city if the recreation program is "integrated" with a working, dynamic unit of land, not merely a pleasure-giving park. Fringes of forest land around intensively used areas can be left undisturbed. Roadsides and stream banks for example can be left undenuded of forest growth, but by and large forestry can be practiced without interfering with recreational possibilities. We have in the United States a great need for wild or wooded areas near our centers of population, need for more water sports, winter sports, golf, archery, nature lore, hiking, camping, hunting, and fishing.[2] Forest and park operations have been successfully carried on in Europe on the same

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1. Brown, N. C. 1938. Jour. of For. 36:7:689-90.
2. Ibid. p. 690

general areas. For many of the games and equipment the agency can charge the public a use fee, a plan that has proven extremely successful in reducing the park maintenance costs to the city.

A Managed Forest Produces Wild Game and a Diversity of Environment for Recreation

As the science of silviculture has accumulated evidence, the trend is toward understanding and utilizing as much as possible natural patterns and relationships. For example, natural reproduction, natural mixtures of woody plants stands, periodic cutting in restricted areas, are all policies that tend to provide extremely diverse situations of habitat. On a 500 acre managed forest one would expect to find, therefore, some open areas very recently cut, with some sheltered reproduction visible. Another area might be in saplings, sprout growth, brush and blueberries, while adjacent sections would be in cover representing later stages in the plant succession, cool deep woods, tall dominant trees, with a nurse crop of tolerant species at varying levels. The wide differences in physical conditions created by a well managed forest area provides the recreationist with a wider range of experiences and possibilities. Hunters have a better supply of upland game, when there are frequently interspersed open and dense areas. Patches of tall trees alternating with young browse

of mixed species make up more favorable conditions of food and cover for deer, partridge, rabbits, and coon than do extensive areas devoted to one type of tree, or to broad expanses of climax forest.

Other recreationists such as hikers, naturalists, fishermen, and picnickers may enjoy protected, permanently unharvested zones in a forest where places of special beauty, nature trails, and camping grounds are centered. The variety afforded by well-managed wood-producing areas elsewhere in the same forest can at the same time add much pleasure and enrichment for most of the recreation seekers just mentioned.

County Recreational Developments - Forests and Parks

There has been a strong increase in the number and area of county administered recreational park lands particularly near metropolitan centers of population.[1] Because of the increasing desire of the people in cities to seek outdoor recreation beyond the congested city, and because the country, particularly outside New England, is a practical political unit for acquiring and administering such programs, the majority of county parks and park systems are in counties

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1. By 1940, 152 counties administered at least one park area, totalling almost 200,000,000 acres. Butler, George D. 1949. Introduction to Community Recreation, 1940, 1949. Nat'l. Rec. Ass'n. p. 32.

within the metropolitan regions of cities. According to the Land Planning Report[1] of the National Resources Board the county is not only the logical unit for most park developments in thickly settled regions, but is probably the most practical political agency of local government to provide desirable recreation areas for the rural populations of the nation. To those authors this type of organization would also be most applicable to urban places up to about 10,000 inhabitants.

In detailing the services provided by county parks and parkways, many features are identical with those of city recreation systems such as childrens playgrounds, playfields, swimming pools, bathing beaches, golf courses, shooting ranges, riding and hiking trails, athletic fields, floral displays, picnicking facilities, boating, and numerous other games and sports facilities. Although many county parks provide the intensive type of service and use just described, the majority of county park acreage is devoted to a more natural development. Larger areas, where uses such as skiing, fishing, nature trails, and trailside museums, demand relatively little disturbance of natural growth, are becoming more and more popular. The enormous increase in owners of pleasure cars has

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1. Recreational Use Of Land In the United States, part XI of the Report on Land Planning, 1934, National Park Service, p. 98.

stimulated the use of the parkway as an expediter of traffic as well as a source of recreation.

A number of recreational services offered by county parks are also available as a part of county, municipal, or state forest programs. As an indication of interrelation aspects of forested recreation areas, there is often no clear distinction drawn between the administrative agency having control over "Forest" or "Parks", and on the other hand the label "forest" or "park" does not always indicate realistically the types of development and uses of parts or all of these land units. For example, in Connecticut the state forestry organization is entitled the State Forest and Park Commission; in New Hampshire, the Forestry and Recreation Commission; in Pennsylvania, the Department of Forests and Waters; and in Oklahoma, the State Planning and Resources Board. In Massachusetts there are numerous intensively used recreational areas of less than one hundred acres which are designated as State Forests apparently because of facilitated administration.

The close link between outdoor recreation needs and the wise management of resources is recognized in the important administrative divisions which forestry and fish and game make up in the eighteen states where these agencies are part of a department, board, or commission of conservation.[1]

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1. Illick, Joseph S. 1939. An Outline of General Forestry, p. 117.

Recreation Development in Some Massachusetts Towns

In most Town Forests in Massachusetts which are not watershed forests, group or unorganized hiking, hunting, or fishing is welcomed. Among the watershed forests that are controlled by local governments there is considerable difference in policy regarding recreational use of the watershed areas. Although the State Department of Public Health is the final arbiter of standards and conditions concerning public drinking water supplies, the Department ordinarily delegates to the local water supply agency the establishment of particular policies regarding watershed use.

Westfield and Pittsfield are examples of two owners of large watershed properties where visiting recreationists are not allowed unless accompanied by water department personnel. On the other hand, hunting is widely practiced over the Northampton[1] Watershed while fishing is permissible by signing one's name in a book. Between 60 and 150 anglers per year have been making use of this privilege in the last decade. The South Deerfield Fire District allows fishing and hunting within its watershed although storage capacity of the reservoir is small and automatic chlorination is the only treatment used. Russell has a small reservoir but her

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1. Interview with Charles P. Harrington, Sup't. of Northampton Water Department.

filtration process is relied on to remove what bacilli may result from the presence of hunters, fishermen, or hikers using the feeder streams and lands beyond the one-half mile limit drawn around the reservoir.

The Amherst Water Department until recently has been unwilling to practice intensive forestry for fear of disturbing the soil and polluting the water. Her officials have been less willing to allow trespassing on the watershed by recreationists because her reservoir storage capacity is not large enough to provide the long period necessary for natural reduction of the bacilli. The only treatment given to the Amherst water supply is chlorination.

Summary

1. Forest lands are near centers of dense population and offer great popular satisfaction of recreational needs.
2. In New England municipal or town owned parks and forests are the most important sources of local public recreation. Elsewhere in the United States the county tends to furnish the land and the administration for the increasing urge in metropolitan areas and in small towns for forest recreation.
3. Hunting, fishing, picnicking, and most other non-intensive recreational uses are compatible with multiple use forest

management.

4. A well managed community forest in successive stages of maturity creates a favorable habitat for game and helps provide stable stream flow so that hunters and fishermen are better supplied with game and fish.
5. Nature lore, hiking, and exploring on managed timber producing lands have most of the interesting features of a climax forest, with more variety in age class, and type of plant than the climax forest.
6. The all important factor of time and expense in reaching the recreation area is best satisfied by the community forest which may be no farther away than a few minutes walk as in Greenfield or Sunderland, Massachusetts or Brattleboro, Vermont.
7. Town forests in Massachusetts which are not involved in the production of drinking water universally welcome recreationists at all times except during periods of high fire danger. The watershed forests present a mixed picture, since their policies are not state-wide in standards and do not follow the logical pattern one would expect from the standpoint of size and purification systems.

CHAPTER VI.

EDUCATION IN COMMUNITY FORESTS.

Community Forests are of Basic Educational Value

It would be idle to say that each community forest can be used as an educational element for the members of its community, but strong support has been growing among scientists and educators since the work of John Dewey[1] for a total educational program that integrates learning and living with the needs and problems of the environment. It does not require many steps of logic to prove that the great majority of primary and secondary schools can achieve their highest aims most effectively not only by using the classroom and laboratory but by utilizing the whole community as tools of learning, each when it is the most effective way. Usable parts of this community laboratory may be such things as farms, factories, hospitals, parks or town-owned woodland.

It is difficult to separate recreation from education by any sharp line, since for example one obviously does not stop learning as one closes a book or walks out of a school building. Witness the enormous interest in adult education, evening classes, farm extension programs, hobby classes, photog-

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1. Dewey, John. 1920. 1st ed. Reconstruction in Philosophy, p. 71. Henry Holt and Co. New York. 224 pages.

raphy, art, and "ham" radio clubs. At the same time notice that compulsory public education is requiring more and more the acquisition of the ability to play and work together. School field trips and school camping seem to the nineteenth century mind to be merely recreational frolics, but in reality are not these manifestations that our educational system is growing mature?

The change from a strictly formal curriculum striving for little more than the three "R's" has been haltingly slow. School procedures were modified a little at a time - too often the change amounted to sandwiching another course in between the old ones.

To make students not only aware of conditions, but to charge them with the desire to improve conditions, Dewey devised and popularized methods which have become commonplace phrases today. He became known for such ideas as "learning by doing", "pragmatic sanction", and the linking of democracy with education and intelligence. Dewey's work has had a profound effect over the years in changing not only curricula, but in basically reorientating the concept and purpose of education as a whole.

Dewey's philosophy, developed and applied to modern school and community problems, has emerged in the form of such programs as community schools, outdoor education, work

projects, day camps, and school camping, school forests, school gardens, school land - use surveys, health surveys, apprenticeships, and many others. Utilizing one or more of these programs, the schools of New York, Michigan, Wisconsin, and Minnesota, for example, vitalized their school learning situation in or around their local publicly owned woodland.[1]

Education Needs Changing

Schools can serve communities by combining work and research projects. School systems may serve their communities in numerous ways beside supplying effective learning experiences for the students. The needs and resources of the community will determine what the school may do, for example The Parker District High School is in a predominantly industrial community near Greenville, South Carolina.[2] It has a 100 acre camp used the year round by pupils and faculty and other adults of the community, and long list of special features and facilities, such as its vocational building with welding and machine shops, power-sewing and textile equipment. The concern of the community school idea is to gain the inter-

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1. Abbott, R. W. and Wakelin McNeil. 1950. School Forests, A Handbook. Cir. #387. Cons. Dept. Pub. 614. Wisc. Cons. Dept.

2. Tyler, Ralph W. et al. 1945. American Education in the Postwar Period, Part I, Curriculum Reconstruction, p. 210.

est and purposeful activity on the part of the learners by beginning with immediate, tangible objects and problems. Then having thus aroused awareness in the student, the program can widen the scope to regional, state or national problems. Through research problems and fact-finding surveys classes in school can use their community as a laboratory as well as help it materially with the considered appraisal of findings. The intellectual leadership, the enthusiastic energy and trained ability of staff and students can bolster the cultural economic and aesthetic level of a community.

School Forests have Developed in about Thirty States

With the growing interest in using the outdoors for education, and the rise in the awareness of the need for conservation thinking and living, the school forest is coming into use on a wide scale. Throughout the country there are now over 1350[1] school forests in operation, whereas the public school forest and its colleague in outdoor education, the public school camp, were practically unheard of a generation ago. Three strongly conservationist minded states operate the great bulk of school forests - Michigan with 627, New

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1. Summary of Community Forests, July 1, 1948. Prepared by U. S. Forest Service, Programs Division. (See APPENDIX III-B.)

York with 246 and Wisconsin with 233 - but a strong program is under way in other states, for example:-

STATE	NUMBER OF SCHOOL FORESTS
Arkansas	21
Florida	51
Illinois	37
North Carolina	16
Ohio	52

Since 1930 the school forest movement has gained considerable momentum. By making a school continually responsible for the management and understanding of a so-called school forest, usually not over fifty acres, the way is open to a potentially sound educational experience for all members of the school community. This school forest program has attracted much attention in many states. It is not yet well accepted in New England, but a great deal has been said in most of the more recent community forest literature of the opportunities the schools have in the local community or school forest.[1]

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1. Abbott, R. W. and W. McNeil. 1950. School Forests, A handbook. Circular 387, University of Wisconsin Extension Service. March 1950. 32 pages.

Massachusetts Schools and Outdoor Laboratories

In a recent survey[1] of the facilities being used in high schools in Massachusetts for the teaching of Biology, no schools of the 128 completing the questionnaires had school camps or were using a school forest. The two schools which had forests took no field trips therein. Malcolm Graham discovered in this survey that the number of schools that use a greenhouse, observation bee hive, or school garden was small, being reespectively only seven percent, seven percent, and four percent of the 128 schools counted. The school system of Newton, Massachusetts, on the other hand, has been transporting 300 students to a leased camp in Peterborough, New Hampshire in recent years for a school camping experience, and is seeking control of a permanent suitable property nearer the schools, since the practice has been very successful.

Dr. J. Bernard Everett, Director of Instruction, Newton, Massachusetts, mentioned that between twenty and thirty day trips during regular school days in Newton took six or seven hundred students to Cedar Hill, a Girl Scout camp in a nearby town.[2] Everett believes firmly that the direct contact between

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1. Graham, Malcolm. 1948. The Present Status of some significant methods of teaching Biology in public high schools of Massachusetts. Thesis, for M.S. Univ. of Mass. Amherst. Fig. 2, p. 39.

2. Everett, J. B. 1951. Speech at Univ. of Mass. Rec. Conf. Amherst.

the students and the natural surroundings found in wooded or wild areas is a particularly effective stimulant to the speed and enjoyment of the learning process. Under the well-planned programs which prepare students in advance in the classroom to have certain goals, things to look for, and projects to accomplish, the Newton school day camp and five-day camp program has made very encouraging progress. The school authorities believe that children have gained in their use of democratic methods, in their use of tool subjects on projects, and in an appreciation of the interrelationships of the natural environment.

School Forests in Massachusetts

In 1944 the town of South Hadley purchased a thirty-five acre tract for a much-needed new High School. Beside making provision for the school buildings and athletic fields, an energetic plan was devised by the school authorities toward development and use of some twenty acres of woods, stream and ponds. The integration of such land into a high school program would have been a pioneer step in Massachusetts. Students and Boy Scouts were to have performed all the labor under supervision of high school staff and experts from other land use agencies.[1]

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1. Cf. Outline of South Hadley High School Forest Plan, Appendix III-C.

Until 1951 South Hadley had neither built its new High School nor carried out any plans for the School Forest, although the site for the new projects was only about one half a mile from the present school. The Walpole, Massachusetts High School already has owned their own School Forest for some twenty-five years. Although the 384 acre forest is located directly behind the High School, Mr. Fred Libby reported that the students had not used their forest in the educational program for many years.[1] Now that there are no suitable open areas for pine planting, the school authorities have not taken the occasion to use the forest with staff leadership.

Outdoor Education is Gaining Wider Acceptance

Unlike the theme that characterized so much of the education in the 19th century, namely, self-centered competitive effort, the great aims[2] of public education proclaimed today include among them a broader view of the needs of all youth, social cooperation, community-mindedness, and ethical principles, along with economic efficiency, scientific attitudes, and some cultural background. The American public school is no longer as restricted by college entrance requirements in

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1. Conversation, Frederick Libby, Town Engineer, Walpole, Mass. April, 1951.

2. "The Imperative Needs of Youth". Bulletin of the National Association of Secondary School Principles, 31, March 1947, p. 2.

its curriculum as it was previously. Eighty percent of the vastly increased high school student population do not enter college, and need diverse preparation before they leave school. The trend is to provide them with a so-called general education,[1] especially in the eighth, ninth, and tenth grades, while reserving the more specialized vocational courses for the eleventh and twelfth grades.

In spite of regular school activity periods, clubs, hobby shops, musical, dramatic, and journalistic organizations, the school administrations today are coming to realize that the school needs to use a very different environment and method if it is to succeed in one of its most crucial functions. The development of cooperative skills in living and solving problems together is an essential of modern education and is most effectively achieved in a camp type community. Harl Douglass,[2] an experienced educator, writing in his Teaching in High School, states, "For the pupils who do not attend boarding schools, summer camps and school camps afford to some degree a substitute and provide an opportunity for a training which is different from and superior to any community experience available within the walls of a school building."

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1. Bent, Rudyard K. and Henry H. Kronenberg. 1949. Principles of Secondary Education. p. 238.

2. Douglass, Harl R. and H. H. Mills. 1948. Teaching in High School. p. 366.

Noting the exceptionally strong school camp programs of the schools in Atlanta, Georgia, Catskill, New York, Dowiagiac, Michigan, and Los Angeles, California, Dr. Douglass believes that camping is coming to be recognized as a vital educational experience for all youth, urban and rural. Useful as a colorful sidelight on many subject matter fields, school camp is much more important as a challenge to initiative, source of inspiration, and a fund of simple, wholesome recreational possibilities.

School camping has proven successful on both the elementary and the secondary level, although the experience had with the high school groups is so far much more limited. In Michigan, the state legislature has authorized school districts to use the out of doors by buying, maintaining, and equipping camps as a regular part of the school program. Funds were set aside in the school aid bill to encourage experimental camping programs, and during 1948-1949 eleven high school camps were operated and deeply appreciated by students and staff.[1] Successive groups of students spent Sunday through Friday at camp during the fall and spring, and had valuable experiences in social living, cooperative planning and evaluation. The experience included work projects, outdoor education, related

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1. Thurston, Lee M. An Account of Eleven Experimental High School Camps in Michigan, 1948-1949. Michigan Department of Public Instruction. Lansing, Michigan.

directly to the secondary school curriculum, and recreational living, both the social and individual hobby types.

Outdoor education on the elementary level is gaining ground rapidly and takes the form of carefully planned field trips, work projects, garden projects, or school camping expeditions, such as have proven so successful in the Cleveland Heights, Ohio school system.[1] Here is an example where the authorities believe in carrying on learning experiences inside and outside the school walls depending on which is more effective in a given case.

School Students can Advance Outdoor Ecological Studies

According to some authorities in the field, the modern ecological movement has been making constant efforts to take the study of nature once again out under the sky.[2] In the Principles of Animal Ecology the same authors explain however:[3]

> This could not entirely succeed in part because of difficulties in doing accurate analytical work in the field. A partial compromise is attained by our turning to the greenhouse and the breeding cages.... Some ecologists have remained stubbornly in the field where they are being joined by a trickle of the more orthodox indoor students. Laboratory and field ecology are interdependent, and both are essential.

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1. Outdoor Education in the Cleveland Heights School, by Hubbard, Ruth E. Mimeographed 8 pages. February, 1950. Cleveland Heights Public Schools, Cleveland Heights, Ohio.

2. Allee, W. C. et al. 1949. The Principles of Animal Ecology. p. 5.

3. Ibid.

Being built not only on the many phases of biology but directly and indirectly on the physical sciences, ecology embraces and enormous area of subject matter, and almost any sound biological field observation makes a useful contribution to the supply of wanted ecological findings.[1] Such a wide range of divers techniques is available to workers that well directed students in schools could carry on in school or in other local forestland careful tests and observations to build up fresh valid data on the life in particular habitats during each season. Annual records can be compared and changes in plant and animal types noted.

Interesting camera point studies can be made of identical areas year after year, with comparative animal and plant censuses developed. This experience would show dramatically over a period of years how animals, plants, and soils change in the stages of plant succession in the forest community.

Watershed Forestry a School Work Project

The South Deerfield Fire District in Deerfield, Massachusetts has developed an example of a cooperative educational project. In 1949 an article was successfully put to the district members to vote on whether the water commissioners could sell such wood and timber as would cause improvement in

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1. Ibid., p. 1.

the watershed.

A watershed management project had been evolving during the years 1949-1950. Donald Thayer, associate county agent for Franklin County, and Vernon Johnson of the U. S. Soil Conservation Service had visited the watershed and had discussions with members of the water board. Thayer, as the specialist in forestry in the Extension Services forestry program, helped arrange a gathering of representatives of several public agencies interested in some way with the forestry project in February 1950.[1]

Beside the water commissioners, there were present at the meeting Thayer, Johnson, Harold Wolfram, vocational agriculture instructor at the Deerfield High School, and two members of the forestry staff at the University of Massachusetts, Robert B. Parmenter, extension forester, and Professor Robert P. Holdsworth, head of the Department of Forestry. The development of a long range watershed conservation program was discussed involving mutual advantages to students, water users, and the region as a whole. As described in Thayer's report, objectives of the project in order of their importance are:

1. To provide the South Deerfield Fire District with a practical long range management plan that will

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1. Annual Report, 1949. (Year ending Dec. 31, 1949.) South Deerfield Fire District, Annual Report.

stabilize and protect the watershed and provide maximum yields of high quality water.

2. To provide a sound forest management plan compatible with the primary purpose of the watershed and encourage yields of forest products on a sustained basis.

3. To promote interest and participation in conservation practices in the community by providing a demonstration area wherein vocational agriculture students and other youth and civic groups may practice conservation measures to the social and economic welfare of the community.

4. To utilize the information and services of cooperating public agencies concerned and coordinate their technical assistance in a workable program.

During the winter and the spring of 1950 the active watershed management program began to show its value.[1] The Massachusetts Department of Conservation contributed 6,000 spruce and pine trees which were set on the compartments of one area together with the following varied species received from the U. S. Soil Conservation Service:

21,000 red pine
100 European larch
100 Douglas fir
500 Scotch pine
500 white pine

The vocational agriculture students from the Deerfield High School and the water district employees planted the 6,000 trees that came from the state nurseries, and later when the other trees came and there were insufficient funds

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1. Annual Report. 1950. p. 10. South Deerfield Fire District.

to hire help, about thirty volunteers responded on two successive Sundays and the remaining trees were set out.

In another part of the program the same year, the students at the Deerfield High School Vocational Agricultural School, under the direction of Mr. Robert Owers,[1] had a realistic experience in woodlot management. The trees which were owned by the South Deerfield Fire District in its watershed were examined and some were marked for harvest by a trained forester. The Vocational Agriculture School students had training in the mental skills of estimating footage, and calculating costs of trucking and sawmill operations. They themselves cut and transported the logs, piled and burned the brush, and delivered some of the sawed lumber to the High School where it will be available for future school building construction and shop work.

School Camping and Community Laboratories

The public high schools of the future in the United States will become so useful and important to the youth that almost 100% of the population of high school age will be in school, according to a prediction by John W. Studebaker, United States Commissioner of Education. To effect this

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1. Owers, Robert. Instructor, Vocational Agriculture, South Deerfield High School. Interviewed April, 1951.

change he recommended that new techniques and philosophies must become current, among them:[1]

1. Universal physical education, medical and dental exams.
2. Camps and camping as an integral part of the secondary school program.
3. Use of the community as a laboratory and a project for civic training and participation.

Summary

1. The philosophy and methods of education have changed over the past forty years to a point where the public schools are utilizing more laboratory work in and outside the school building, more meaningful project work, and at the same time teaching the basic tool subjects to a higher proportion of the population than any decade previous to 1940.
2. The elements of activity, aliveness, and reality which appeal so much to students are being provided by some school systems through audio-visual aids and the undertaking of real community or home problems, to be solved partly in class and partly out in the field.
3. The community park or forest land offers excellent proven opportunity for the successful applications of much course

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1. Studebaker, John W. 1947. Bull. of the Nat'l. Assoc. of Sec. Sch. Prins. 31:146:24-32.

work by outdoor education.

4. Outdoor education is not well established in Massachusetts public schools, Newton Schools being an exception.
5. Public school forests number over 1300 in the nation, centered heavily in New York, Michigan, and Wisconsin, while public school camps tend to follow the same pattern. In neither group is New England substantially established.
6. The value of day camps and week long camps operated by school systems have proven successful on both the elementary and the secondary levels. Subject matter is satisfactorily assimilated but more important are the social values and responsibilities learned by the camping experience.
7. Community forests used by schools or by higher education institutions can become valuable laboratories of plant and animal ecology.

PART II.

THE RUSSELL TOWN FOREST.

CHAPTER VII.

INTRODUCTION.

History of the Town of Russell, Massachusetts

The present day town of Russell is an industrial valley town whose chief settlements lie winding along the Westfield River in western Massachusetts. Traversed by a heavily used state highway (Route #20), a main east-west highway over the western highlands, Russell is also on the main Boston and Albany railroad line between Springfield and Albany. The town is some six miles northwest of the City of Westfield, Massachusetts and fifteen miles from the Connecticut River at Springfield. This proximity is enhanced by the present rapid transportation facilities, good roads and automobiles. Thus the people of Russell are within commuting distance of a vast variety of industry, trade, ans specialized services.

The Westfield-Springfield-Holyoke triangle embraces over a third of a million people with a huge cumulative need for housing, space, recreation, not to mention the consumer goods they regularly require. The most thickly settled regions of the town are three rather concentrated communities, Crescent Mills, to the extreme northwest corner of the town on the west side of the Westfield River, while the larger villages of Russell and Woronoco appear successively as one progresses

downstream. Russell's town area to a great extent consists of hill land, with a section of narrow bottom land where the railroad, paper mills, and chief residential developments are. The public water supply is devised to serve only the two thickly settled valley bottom communities in the town, Russell Village and Woronoco. This factor, coupled with the rough terrain and the difficulty of excavation due to the rocks tends to reduce the likelihood that Russell will experience a great influx of new homes and inhabitants. The fact that the town taxes are low and the hilly, partly wooded land rather inexpensive may interest a limited number of would-be home builders who are more interested in privacy and rustic scenery than they are in closely planned housing developments.

The town of Russell is a thriving well-housed community whose economic life is based primarily on two paper mills in Woronoco and an artificial leather plant in Crescent Mills. Although the census says that there are about eighty-two farms in Russell, these farms are more subsistance or part-time farms than large independent economic units.

The early background of the town shows that drastic changes have taken place in the type of land use and occupation. What is now the Town of Russell was constituted an incorporated town in 1792 when parts of Montgomery and Westfield were placed together in a unit. At that time the virgin wilderness was yielding large stores of logs, and

farming was being attempted on less favorable locations than existed in the hill town of Blandford to the west, or in the valley town of Westfield to the east, both of which were settled earlier than Russell.

Clearings on the plateaus and in the valleys became farms, but the cultivation was found impracticable because of the steepness of the slopes and the rockiness of the land. Based ona combination of factors determining suitability for agriculture, a study by the Massachusetts Agricultural Experiment Station, (exhibited in FIGURE 4) shows that only 6.2% of Russell's land area was well suited to agriculture,* 15.9% only medium well suited, and 71.3% not at all well suited.[1] At present the town is about 90% in woodland cover of varying densities, continuing the tradition that it was a settlement in the woods.

In 1838 the town was connected to the Connecticut River Valley by the railroad and the woodburning engines created a new outlet for thousands of cords of fuelwood.[2]

The population trends for Russell and its surrounding towns gives a clear picture of the decline of the one time

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* Cf. FIGURE 10, Map, Soil Classification.

1. Roxman, David. 1941. "Interrelationships of Land Uses in Rural Mass." Bull. #387. Mass. Ag. Exper. Sta.

2. Reynolds, H. C. 1950. "The Russell Town Forest". Mass. For. and Park Assoc. Bull. #170.

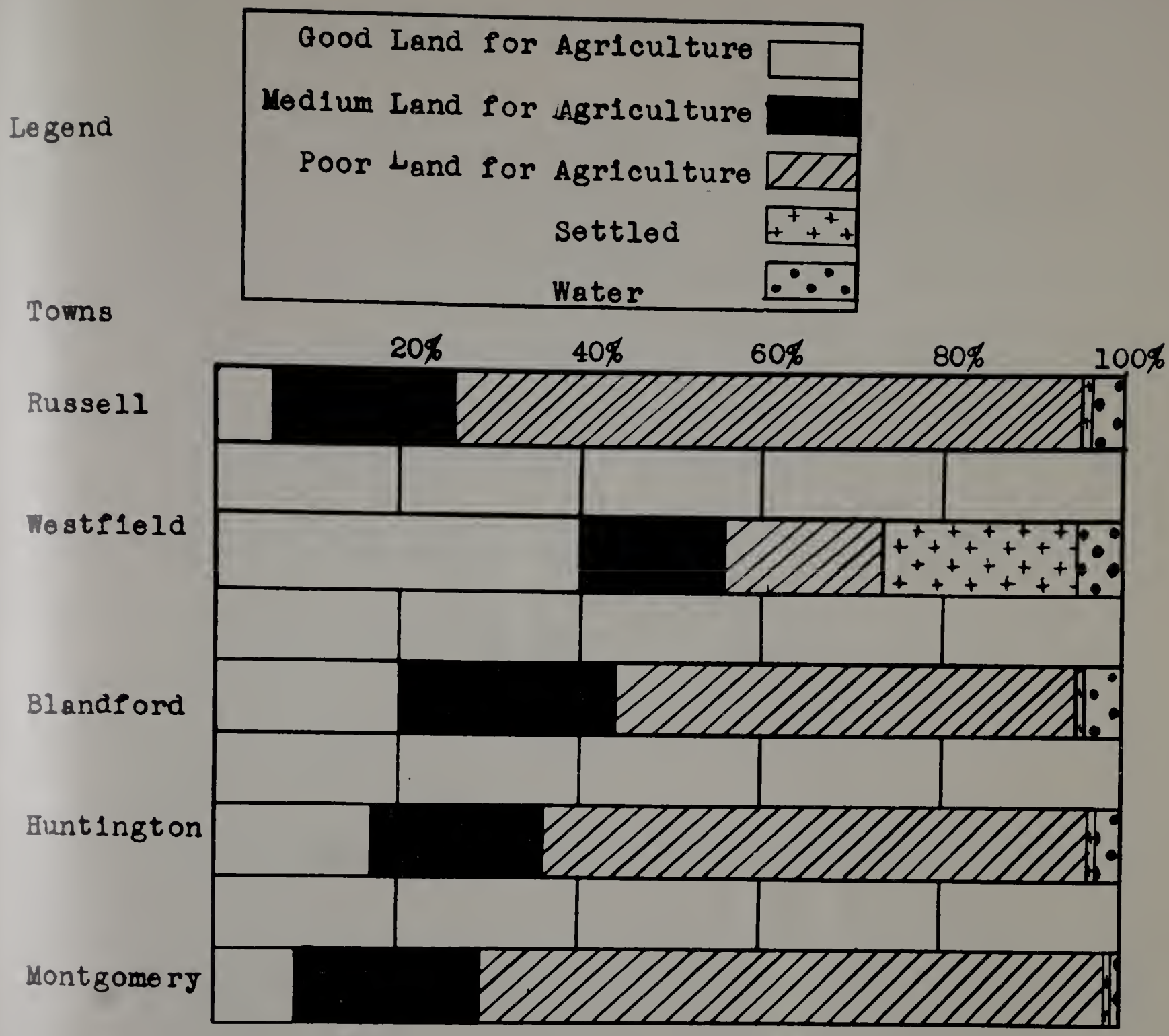

FIGURE 4

PERCENT OF LAND SUITABLE FOR AGRICULTURE IN RUSSELL, WESTFIELD, BLANDFORD, HUNTINGTON, AND MONTGOMERY

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Source: Rozman, David, 1941. Analysis of Agricultural, Economic, and Social Data." (of the towns herein listed). Report for the Department of Agricultural Economics, Mass. St. Coll. Amherst, Mass.

active agricultural towns of Blandford and Montgomery. Figure 5 shows that Blandford had 1778 inhabitants in 1800, but from that high figure there was an irregular decline especially rapid between the years 1850-1870 to the general range of 400 to 600 where the population stood in 1950. As farming changed in character from the self-sufficient type to the commercial type during the 19th Century, the marginal farms in New England tended to be abandoned. Some of the people leaving the farms moved to better farm land in the mid-west, others moved to the manufacturing towns, and in the case of Blandford and Montgomery some of the exodus contributed to the rise of the mill towns in the valley like Russell and Huntington.

The census of 1885 indicates that there was more than five times as high a percentage of foreign born inhabitants in Russell as there were in Blandford or Montgomery, indicating a heavy influx of immigrants to work in the mills. The important rise in Russell's population beginning in 1872 when the first paper mill was built in Russell, taking advantage of the water power available in the Westfield River marks the beginning of an important activity which is still chiefly responsible for the existence of the town and its relatively stable population which stood at 1221 in 1945.

It has been shown that Russell developed from an unsuccessful timber growing and agricultural town into a rather

FIGURE 5

NUMBER OF INHABITANTS IN RUSSELL, BLANDFORD, HUNTINGTON, AND MONTGOMERY 1800-1950

Source:- Massachusetts State Census 1837-1895. U.S. Census

concentrated industrial community built around the water power in the valley bottom.

Western Massachusetts largely in woodland

Russell and Blandford, where almost all the Russell Town Forest is located,[1] are located in Hampden County which has large successful crop farms in the Connecticut Valley. (FIGURE 6) Although farmland makes up over 42% of the land area, FIGURE 7 shows that almost 67% of all land is in woodland. In Hampshire County north of Russell over 50% of the land is in farms and the total woodland is 61.5% of the area. Berkshire County has an even higher percentage of its area in woodland as the comparative graphs exhibited in FIGURE 7 indicate.

The so-called hill towns west of the Connecticut River Basin, among them the group around Russell, have a very high proportion of their land in woodland cover. Russell is 90% wooded with 74% of its land in non-farm use. Of the 25.6% that was in farm land in 1945 FIGURE 8 shows four-fifths was in woodland.

Blandford to the west of Russell has 34,184 acres of which 81% are in woodlands, and only about 18% is farm land.

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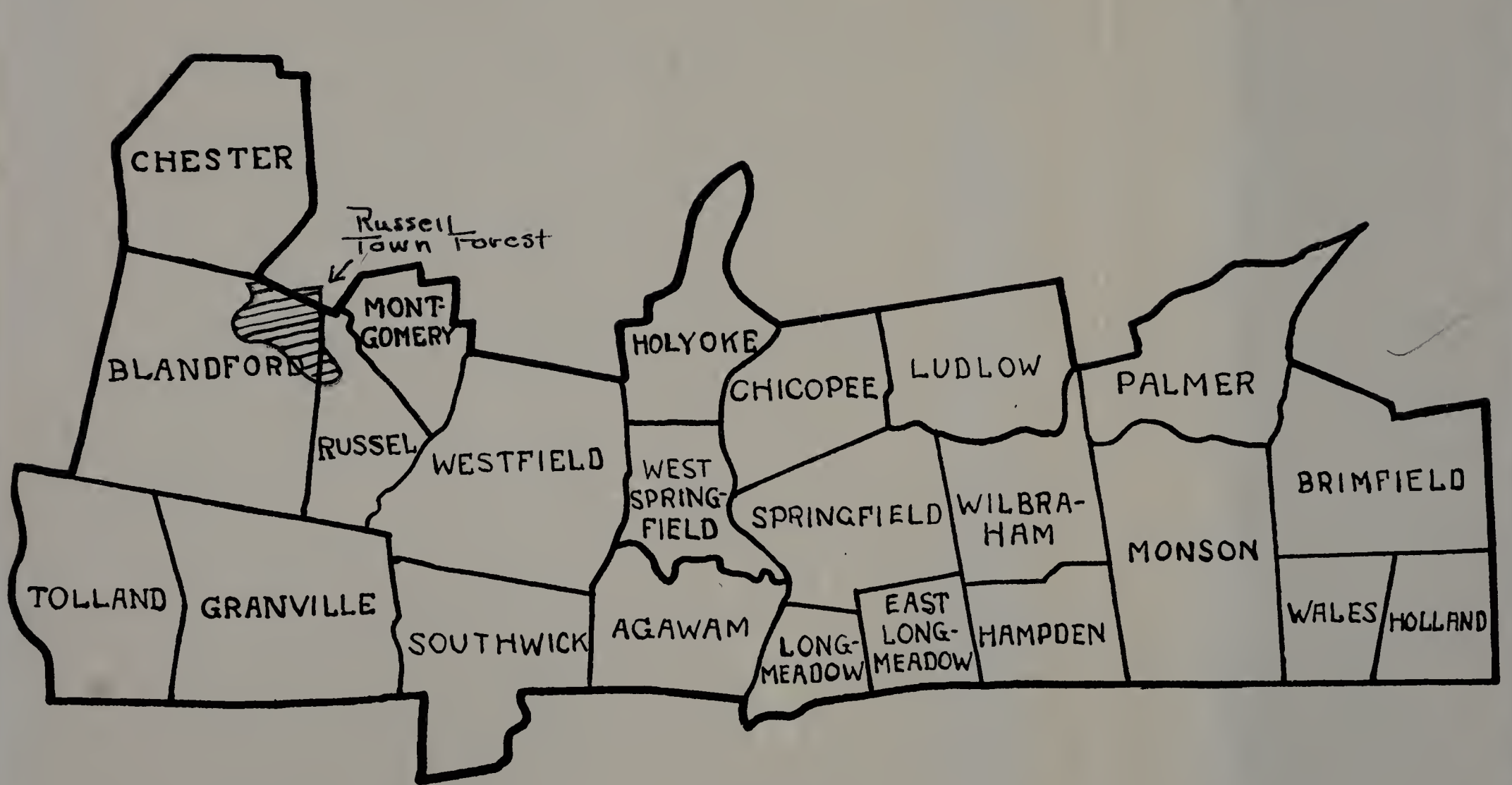
1. Approximately 20 acres of the Russell Town Forest is in Huntington.

MASSACHUSETTS STATE COLLEGE
U. S. DEP'T OF AGRICULTURE
HAMPDEN COUNTY EXTENSION SERVICE
COOPERATING

HAMPDEN COUNTY

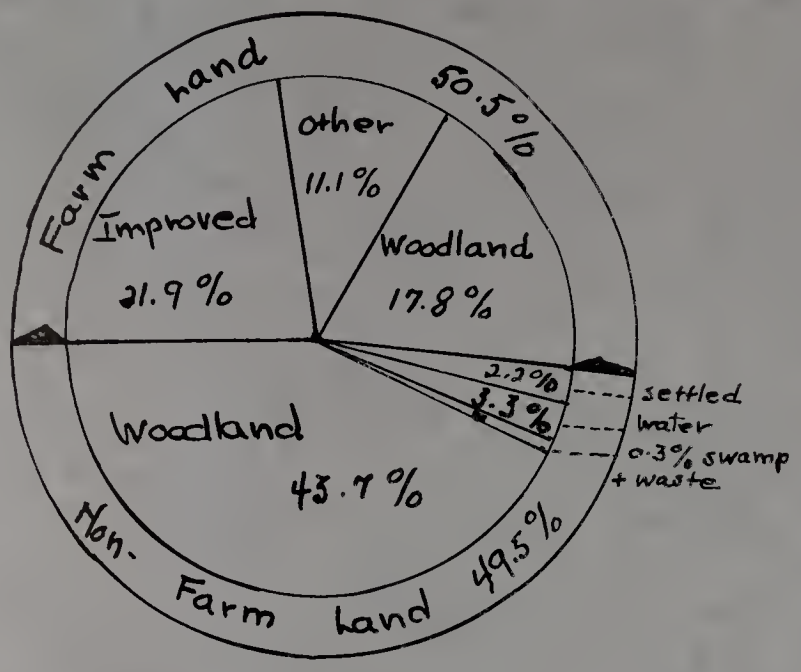


LOCATION OF THE RUSSELL TOWN FOREST IN HAMPDEN COUNTY.

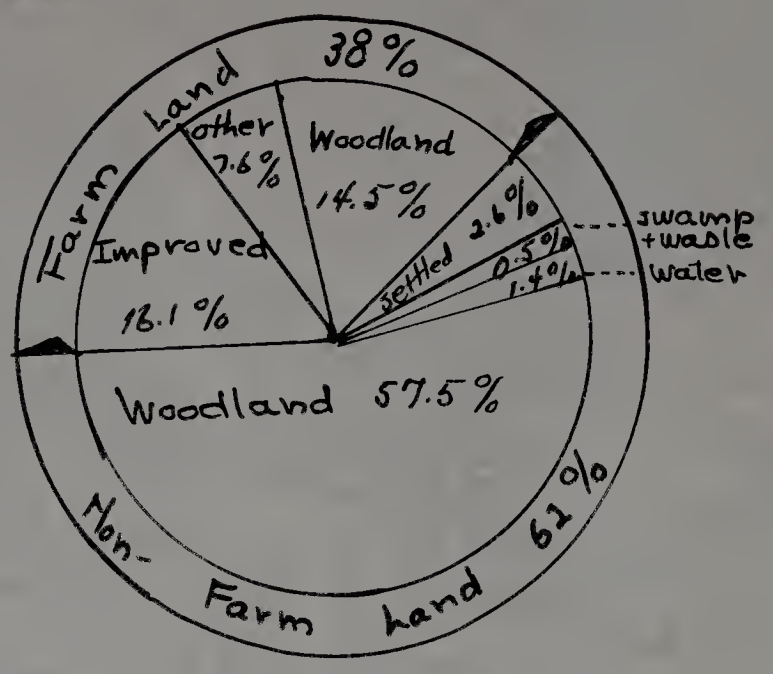
FIGURE 6.

2M-1-'37. No. 406-A

Land Utilization in Massachusetts by Counties, Based on Massachusetts State Planning Board Land Use Survey of 1936 - 1938 and the U.S. Census of 1940

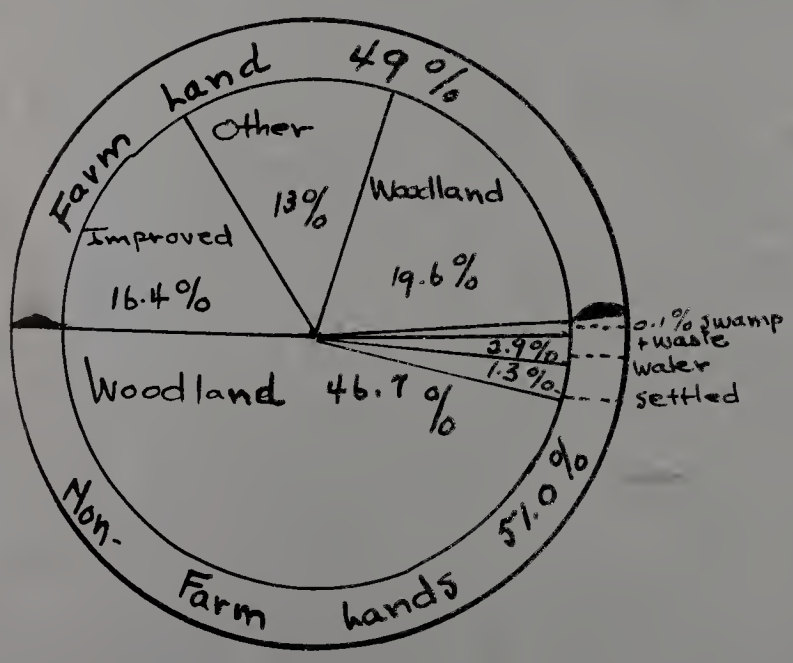


Hampshire



Berkshire

Franklin



Hamden

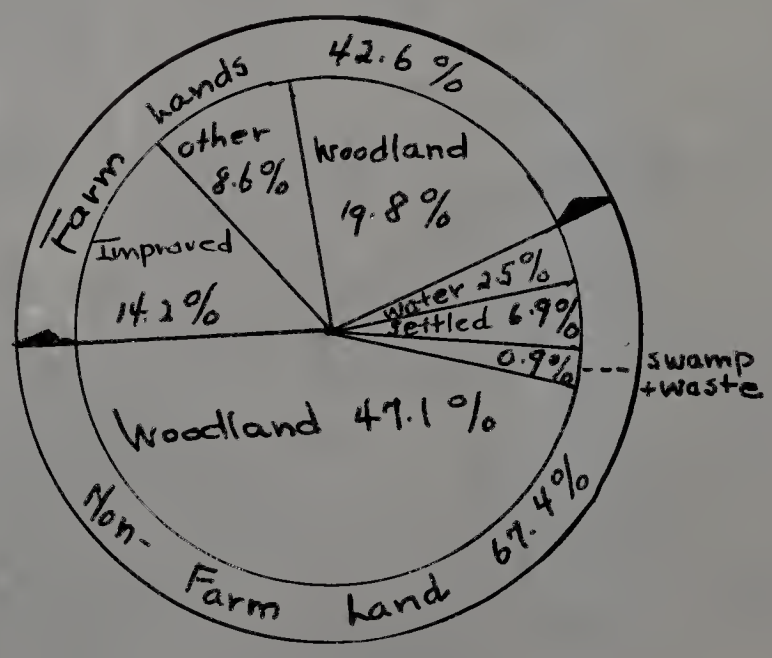


Fig: 7.

Source: Rozman, David, Land Use Interrelationships; Op. cit.

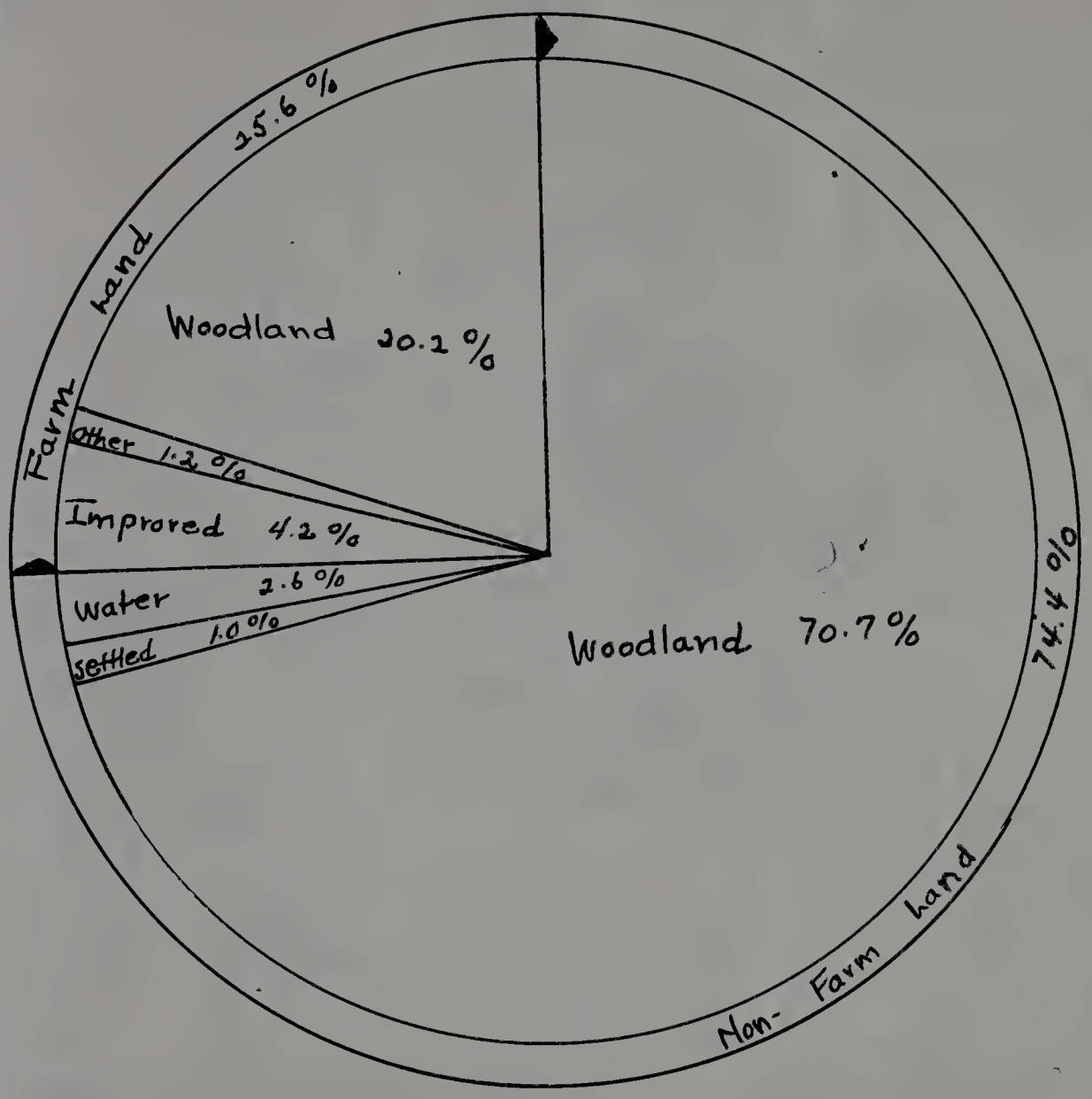


FIGURE 8.

RUSSELL LAND UTILIZATION IN PERCENTAGES OF THE TOTAL ACREAGE, WHICH IS 11,554 ACRES.

Source: 1945 U. S. Census.

Its high plateau has been utilized for many years as a summer colony and almost 40% of its woodland and water way areas has been acquired by public bodies. (See FIGURE 9.)

First, the Town of Russell bought extensively in the northwest corner of the town until at present that part of Russell's watershed that is in Blandford covers 2628.5 acres. As TABLE IV indicates, the City of Springfield has acquired over twenty-three per cent of Blandford's area for reservoir and watershed purposes. The third substantial public land owner in Blandford is the Commonwealth of Massachusetts with 1889 acres of its so-called Chester-Blandford State Forest.*

Population behavior in the area of Russell

Like Montgomery, Blandford has no significant percent of the population employed in industries in the town, but thirty-seven percent of Russell's population was employed in industry in 1940, while in Huntington 6.3% was so engaged. Following this industrial pattern of settlement it is interesting to compare the population per square mile of these towns. Russell

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* Blandford receives a type of payment in lieu of regular taxes from these outside public land owners. A fixed assessment is placed on the land based on the average of the assessment of the three years preceding year of purchase. With this constant assessment as a basis the regular town tax rate is applied and the amount calculated. Thus, as Blandford's tax rate fluctuates, the amounts that Springfield and Russell must pay fluctuates similarly.

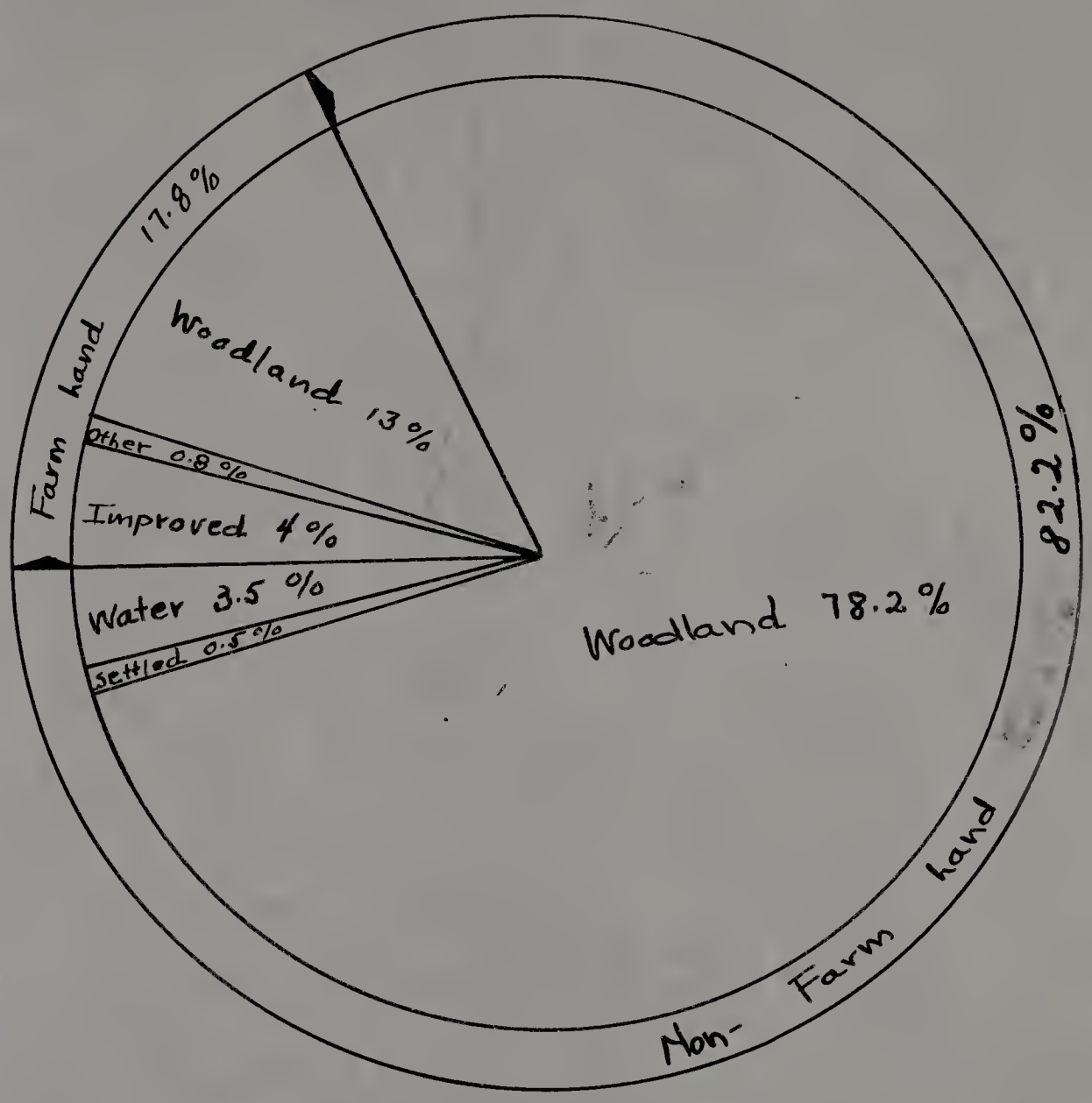


FIGURE 9.

BLANDFORD LAND UTILIZATION IN PERCENTAGES OF THE TOTAL ACREAGE WHICH IS 34,849 ACRES.

Source: 1945 U. S. Agricultural Census.

TABLE IV.

AREA AND ASSESSED VALUATION OF LAND IN BLANDFORD OTHER THAN HIGHWAY AREAS, OWNED BY THE COMMONWEALTH OF MASSACHUSETTS, THE CITY OF SPRINGFIELD, AND THE TOWN OF RUSSELL, 1950.

Name of unit	Owner	Area in acres	% of total town area so owned	Assessed value in dollars
Chester-Blandford State Forest	Comm. of Mass.	1,589.6	5.5	9,615
Cobble Mountain Reservoir and Watershed	City of Spring-field	6,158.69	23.8	115,703
Russell Town Forest	Town of Russell	2,628.5	7.7	28,511
Totals		12,677.19	37.1	153,829

Source: Annual Town Reports; Assessors Reports.

is densely populated with over 70 persons per square mile, Huntington has less with 51, while Montgomery and Blandford number about 12 and 10 people per square mile.

The general area around Russell can be characterized, then, as one of small residences, some part-time farms, declining farms, or summer homes, isolated locations, generally poor soil and sparse population, with predominantly woodland cover types. With this understanding the way has been prepared for the treatment of the area occupied by the Russell Town Forest.

The following FIGURES, 10, 11, 12, 13, 14, 15 show the soil classifications, land utilizations, and roads and buildings in the Town of Russell and Blandford.

MASSACHUSETTS STATE PLANNING BOARD

SYMBOLS FOR LAND STUDY MAPS

W.P.A. PROJECT NO. 13664 — NOVEMBER 1937

BOUNDARIES

STATE OWNERSHIP

COUNTY OWNERSHIP

TOWN OWNERSHIP RESERVED FOR FOREST

STATE LINE

COUNTY LINE

TOWN LINE

TOPOGRAPHY

TWENTY-FOOT CONTOUR INTERVAL

WATER BODIES

LAND UTILIZATION

CROPLAND

- ORCHARDS
- HAY
- MARKET GARDEN
- OTHER CULTIVATED CROPS

PASTURE

- PLOWABLE PASTURE
- STONY PASTURE
- WOODLAND PASTURE

FORESTS

- MERCHANTABLE TIMBER
- POTENTIALLY MERCHANTABLE TIMBER
- BRUSHLAND

H = DOMINANTLY HARDWOOD
C = DOMINANTLY CONIFEROUS
M = MIXED HARDWOOD AND CONIFEROUS

O - OPEN (NOT MORE THAN 20% OF COVER)
T - THIN (FROM 20% TO 50% OF COVER)
D - DENSE (50% OR OVER)

OTHER AREAS

- SWAMPS
- SANDY WASTE-LAND

PUBLIC AND QUASI-PUBLIC AREAS

- PARKS
- PLAYGROUNDS BALLFIELDS ETC.
- BATHING BEACHES
- SKI GROUNDS
- GOLF COURSES AND COUNTRY CLUBS
- AVIATION FIELDS
- CEMETERIES
- WATER SUPPLY-RESERVOIRS
- FILTER BEDS
- FORTS
- THICKLY SETTLED AREAS

ROADS AND BUILDINGS

- THICKLY SETTLED AREAS
- INDUSTRIAL AND COMMERCIAL AREAS
- PRIVATE ESTATES

BUILDINGS IN RURAL AREAS

- RESIDENTIAL (INCLUDING SUMMER HOMES.)
- TOURIST ACCOMMODATIONS (T)
- OCCUPIED GOOD CONDITION / VACANT GOOD CONDITION
- OCCUPIED POOR CONDITION / VACANT POOR CONDITION
- ABANDONED (A)
- CELLAR HOLES
- SEMI-AGRICULTURAL / FARMSTEADS
- DAIRY FARM (D) / POULTRY FARM (P)
- CHURCHES / OTHER RELIGIOUS INSTITUTIONS
- SCHOOLS / OTHER EDUCATIONAL INSTITUTIONS
- CIVILIAN CONSERVATION CORPS, CAMPS (CCC)
- HOSPITALS / CORRECTIONAL INSTITUTIONS
- OTHER PUBLIC AND QUASI-PUBLIC BUILDINGS
- COMMERCIAL BUILDINGS (GAS STATIONS ETC.)
- HOTEL OR INN (H) / QUARRIES AND GRAVEL PITS (Q)
- COMMERCIAL GREENHOUSES AND NURSERIES

NOTE: LETTER APPEARS UNDER SYMBOL WHEREEVER NECESSARY.

ROADS — U.S. ROUTE

- HARD SURFACED
- GRAVEL
- DIRT
- ABANDONED

RAILROADS

- IN OPERATION
- ABANDONED

CANALS

- IN OPERATION
- ABANDONED

TUNNELS (WATER) — W — — — W —

HIGH TENSION LINES

SOIL CLASSIFICATION

GROUP I — VERY DROUGHTY SOILS (PRINCIPALLY COASTAL AND DUNE SANDS)

GROUP II — DROUGHTY SOILS (USUALLY SOILS OF THE SANDY LOAM AND LOAMY SAND SERIES)

GROUP III — SOILS BOTH MOIST AND OF GOOD TEXTURE (WELL WATERED LOAMS AND THE BETTER SOILS OF THE ABOVE TEXTURED GROUP)

GROUP IV — SOILS MOIST BUT SOMEWHAT ROUGH AND STONY (STONY SOILS OF VALLEYS AND LOWER FOOTHILLS)

GROUP V — ROUGH AND STONY SOILS (ROUGH STONY AND OTHER OF THE VERY STONY AND STONY LOAM GROUP)

GROUP VI — WET SOILS (ALL SOILS MORE OR LESS SATURATED YEAR ROUND WITHOUT STONES)

GROUP VII — WET STONY SOILS

THICKLY SETTLED AREAS

51 - C 8

LOOKED FOR FIGURES 10, 11, 12, 13, 14.

MASSACHUSETTS
STATE PLANNING BOARD

SOIL CLASSIFICATION
TOWN OF RUSSELL

W.P.A. PROJECT NO. 13684

SCALE IN MILES

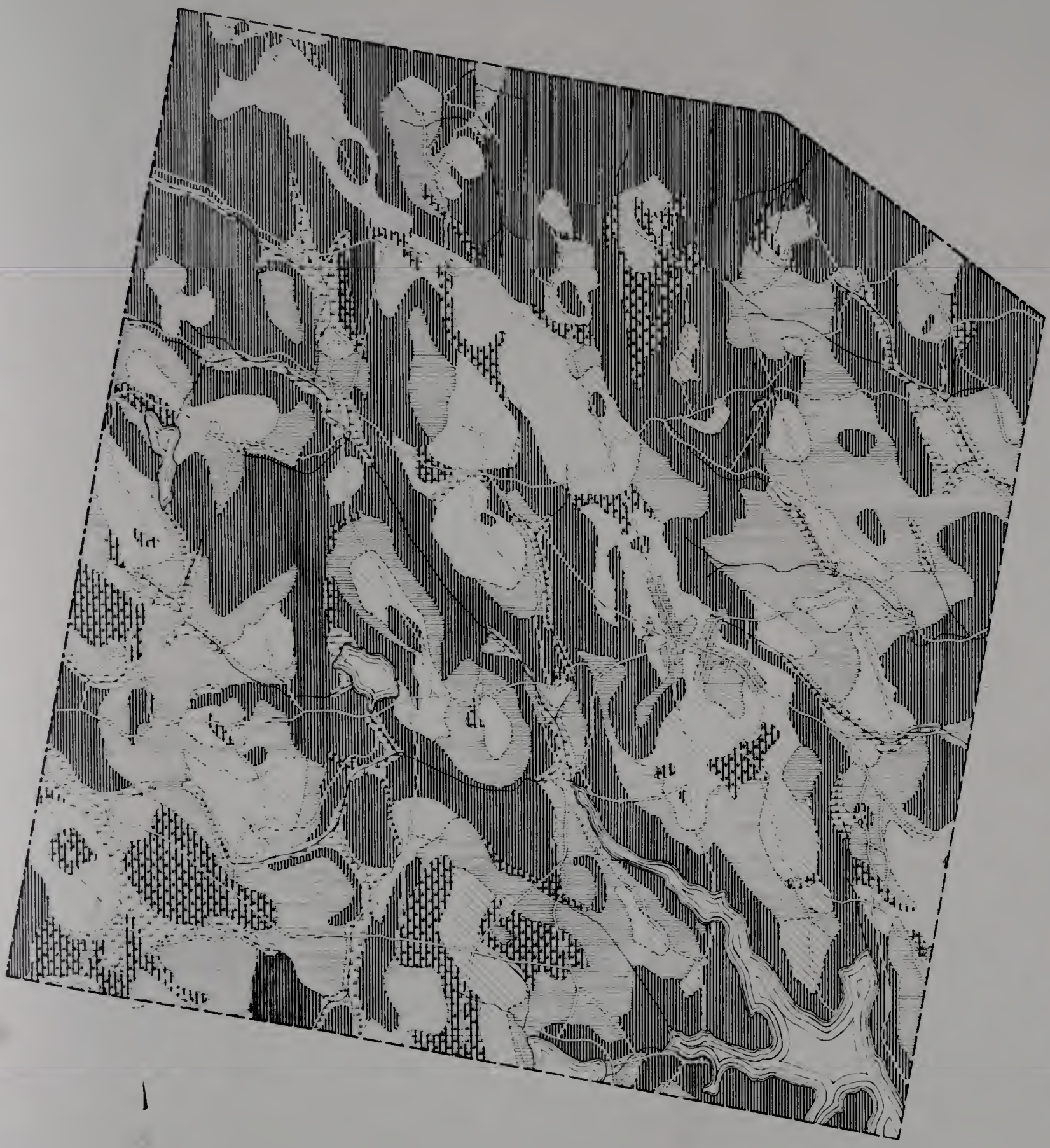
1/2 1/4 0 1/2 1 2

OCTOBER 1937

BASED ON USDA SOIL SURVEY

51-285D

FIGURE 10.



MASSACHUSETTS
STATE PLANNING BOARD

SOIL CLASSIFICATION
TOWN OF BLANDFORD

W.P.A. PROJECT NO 17788

SCALE IN MILES

1/2 1/4 0 1/2 1 2

JANUARY 1939

BASED ON U.S.D.A. SOIL SURVEY

FIGURE 11.

51-58D

MASSACHUSETTS
STATE PLANNING BOARD

LAND UTILIZATION
TOWN OF RUSSELL

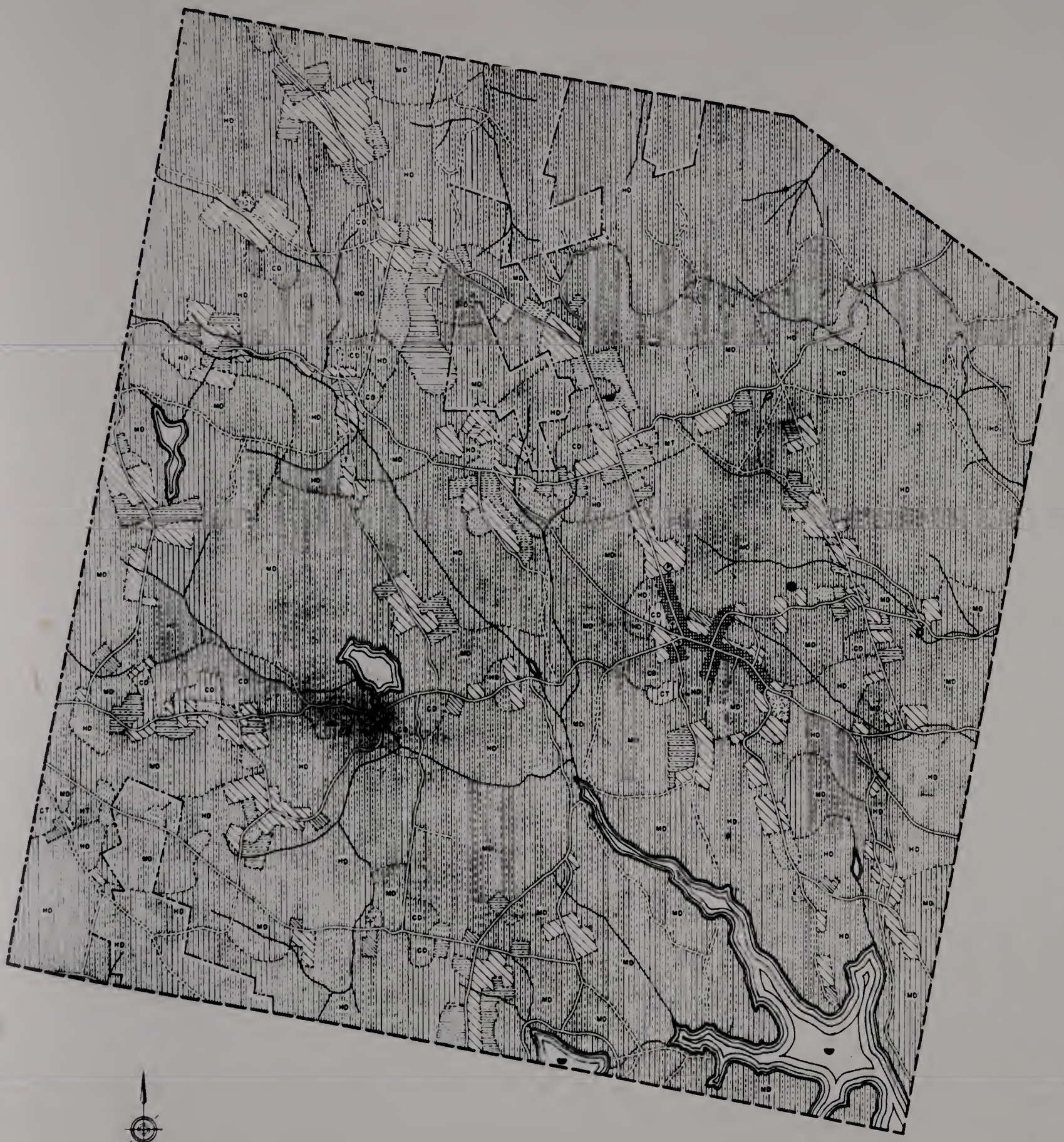
W.P.A. PROJECT NO. 13684

SCALE IN MILES
1/2 1/4 0 1/2 1 2

OCTOBER 1937

51-285C

FIGURE 12.



MASSACHUSETTS
STATE PLANNING BOARD

LAND UTILIZATION.
TOWN OF BLANDFORD

W.P.A PROJECT NO. 17788

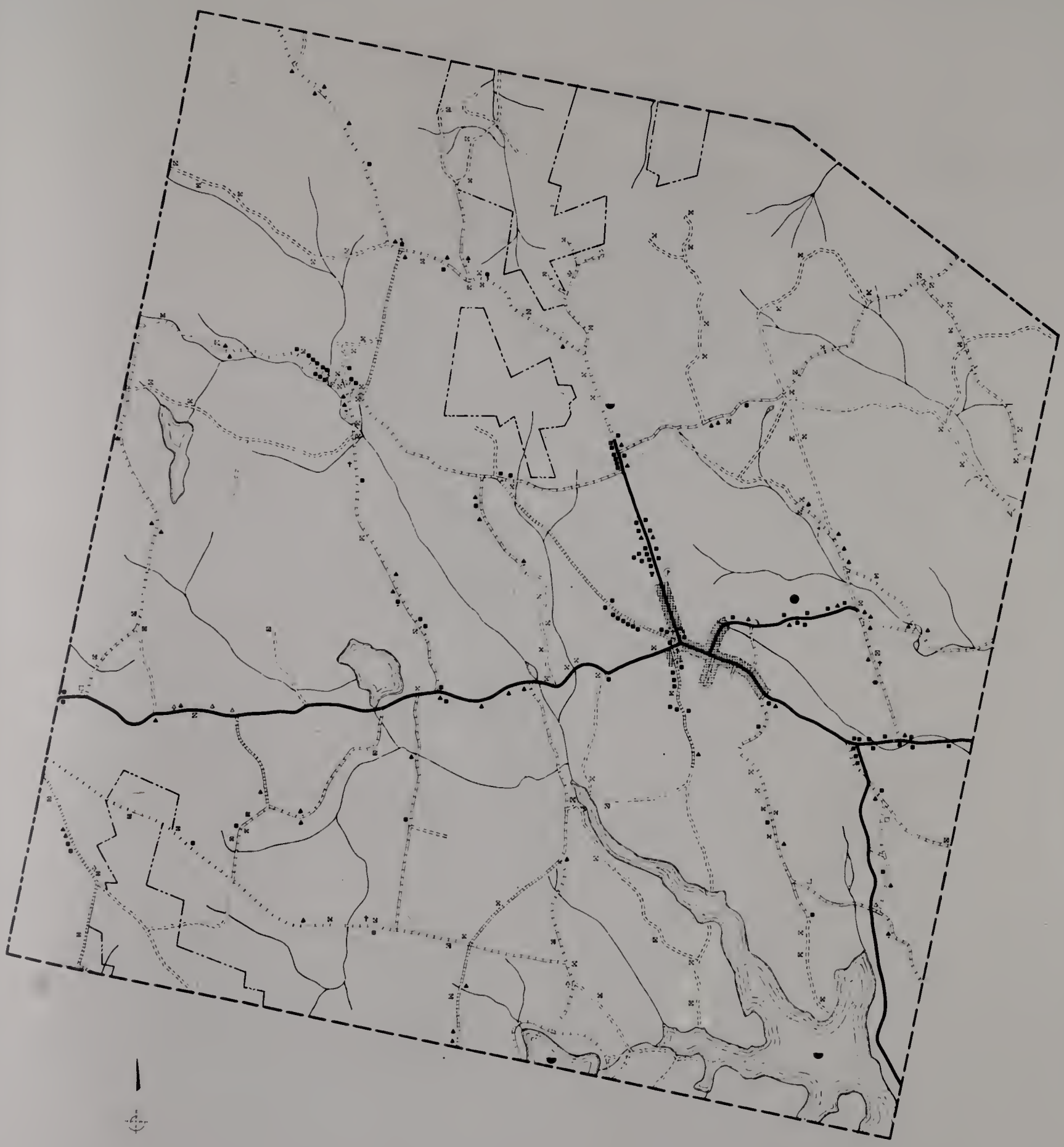
SCALE IN MILES

1/2 1/4 0 1/2 1 2

JANUARY 1939

FIGURE 13.

51-58C



MASSACHUSETTS
STATE PLANNING BOARD

ROADS AND BUILDINGS
TOWN OF BLANDFORD

W.P.A. PROJECT NO. 17788

SCALE IN MILES

1/2 1/4 0 1/2 1 2

JANUARY 1939

FIGURE 14.

51-588

Land Use Cover Map Of Parts of the Towns of Blandford and Russel

Source:- Land Utilization Maps of the Mass.
State Planning Board 1937

FIGURE 15.

Legend

Boundaries

County Line — — — —

Town Line — — — —

Topography

Water Bodies

Land Utilization

Cropland

Orchards

Hay

Market Garden

Other Cultivated Crops

Pasture

Plowable Pasture

Stony Pasture

Woodland Pasture

Forests

Merchantable Timber

Potentially Merchantable Timber

Brushland

M- Mixed Hardwood and Coniferous

C- Dominantly Coniferous

H- Dominantly Hardwoods

o- open(not more than 20% cover)

t- thin (from 20 - 50 % cover)

d- dense (50% or over)

Public and Quasi-Public Areas

Thickly Settled Areas

Ski Area

Cemeteries

Roads

Roads

Abandoned

Railroads

High Tension Lines

HUNTINGTON

Boundary Russell

Town Forest

RUSSELL

BLANDFORD

HD

MD

CO

HT

CHAPTER VIII.

PHYSICAL DESCRIPTION OF THE TOWN FOREST OF RUSSELL.

Topography

The Russell Town Forest is located on the east fringe of the Green Mountain Plateau partly in the valley and partly embracing the crowns of rather flat lands. The elevations in the Town Forest rise as high as 1400 feet and is largely sloping plateau, pitching gently southeasterly above the 900 foot contour. The low point at the reservoir is 600 feet above sea level.

The majority of the town inhabitants live in the valley both to the east of the Forest at the 350 foot contour approximately. The Westfield River has cut a deep trough through the rock in the northwest corner of Russell and the steep rocky hillsides rise sharply on both sides of the river to plateaus of over 1100 feet.

Black Brook, which is the chief brook running from the Russell Town Forest Watershed, is such a young, small stream that its valley is not deeply entrenched except in the distance between the reservoir and the valley bottom where it falls 250 feet within three-quarters of a mile.

FIGURES 16 and 17 show the topography of the two towns of Russell and Blandford herein described.

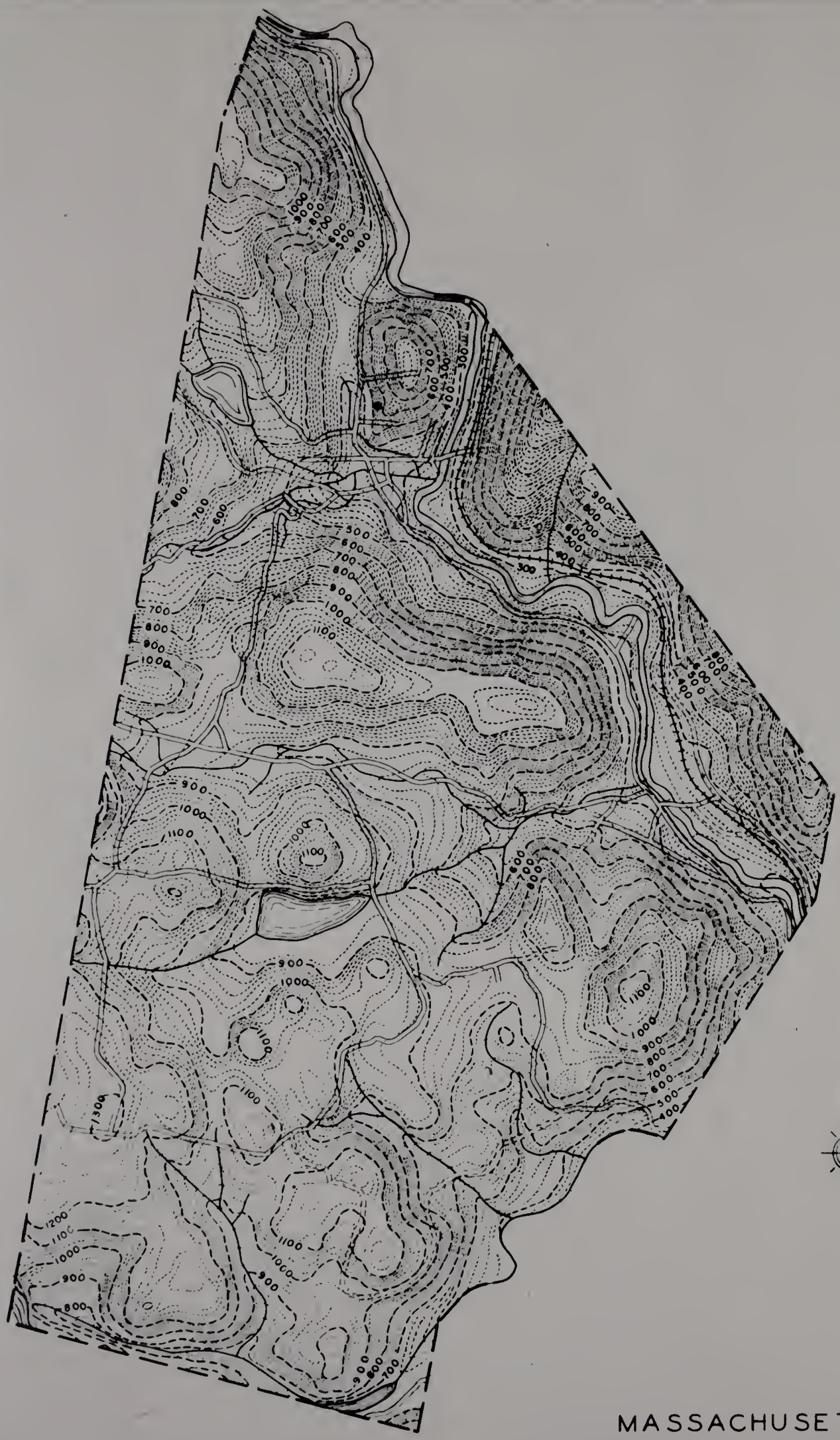
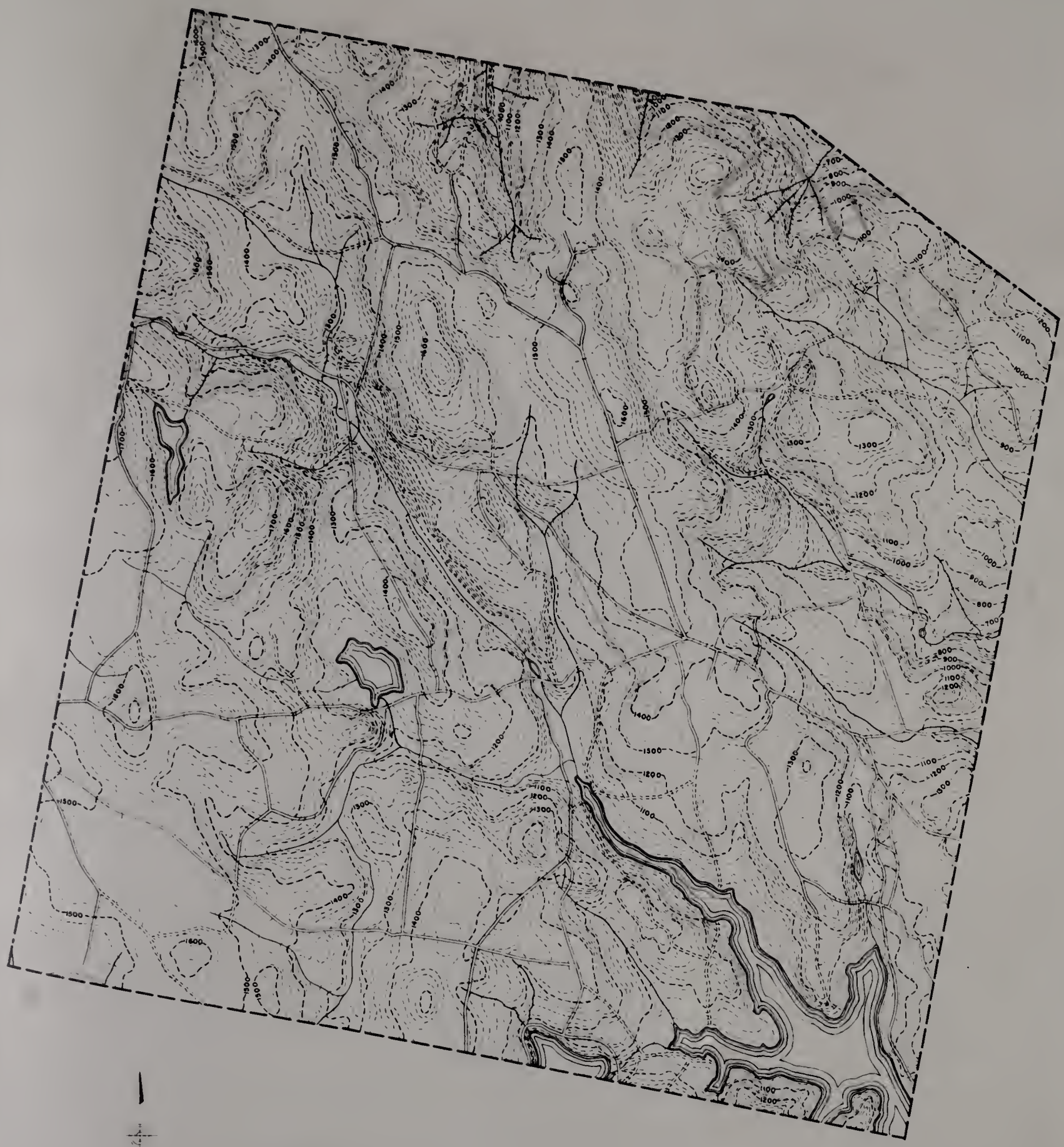

MASSACHUSETTS
STATE PLANNING BOARD
TOPOGRAPHY
TOWN OF RUSSELL
W.P.A. PROJECT NO 13684
SCALE IN MILES
1/2 1/4 0 1/2 1 2
OCTOBER 1937
BASED ON U.S.G.S. MAPS
51-285A

FIGURE 16.



MASSACHUSETTS
STATE PLANNING BOARD

TOPOGRAPHY
TOWN OF BLANDFORD

W. P. A. PROJECT NO. 17788

SCALE IN MILES

1/2 1/4 0 1/2 1 2

JANUARY 1938

BASED ON U.S.G.S MAPS

FIGURE 17.

Soil and Rock in the Town Forest

The bed rock underlying the Town Forest is a mixture of highly metamorphosed schists, particularly of the Conway Series, which tend to weather into clay and loam. The materials constituting the stone walls in the Forest would tentatively indicate that glacial action has brought many types of rock to add to the soil mixture. The major rolling areas of the Town Forest are covered by soil classified as "moist but somewhat stony" and "rough and stony" while there are relatively few acres in the brook's narrow valley both which are "wet and sandy". Superior meadow soils are located in small patches many of which were still in hayland or under cultivation when the watershed was purchased. It is on these areas that most of the plantations occur. The whole area is suitable for forest growth.[1]

The Climate of Russell

The weather in Russell, Massachusetts, in the western foothills of the Connecticut River Valley, tends to fluctuate every few days. This weather is influenced by the constant conflicts between the dry polar air masses originating from the northwestern part of Canada, and the marine tropical air

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1. Map. 1916. U.S.G.S.

from the Gulf of Mexico which is warm and carries large quantities of moisture. Speaking of New England climate, Mark T. Nesmith observes:[1]

> The tendency of most of the general cyclonic disturbances to skirt the polar front brings their paths of movement through this region and results in a more or less regular succession of biweekly storms of snow or rain, with intervening two or three day periods of fair weather, typically with warm west to southwest winds in summer and cold northwesterly winds in winter.

The steep hills and narrow valleys of the Town of Russell bring about contrasting local climatic conditions which are reflected in vegetational differences. High and low land, northern and southern exposure are sufficiently varied, for instance, to cause several inches difference in annual rainfall, many days difference in the length of the growing season, and a significant difference in temperature. The accumulated snow blanket in the highlands is striking compared with conditions along the Connecticut River Basin, only ten miles away.

To the east, Russell's neighbor Westfield has a climate rather like the rest of the Connecticut River Valley lowland. Its annual precipitation is 47.69 inches and its safe growing season, one hundred and sixty-six days.[2] The average January temperature, for example, in Westfield is 27.8 F. compared with that of higher towns to the west such as Pittsfield with

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1. Nesmith, Mark T. "Climate of New England". Climate and Man Yearbook of Agriculture, 1941. p. 1000.
2. Ibid., p. 991.

23.9 F., almost four degrees lower for the same month. The hill town of Egremont, west of Russell, enjoys forty-seven fewer days in its growing season than Westfield, even though it is no farther north. Egremont's annual precipitation of about forty-three inches is some three and one-half inches less than that of the valley town of Westfield, but Westfield's warmer weather tends to equalize the effective rainfall for these two points.

With the knowledge that daily and weekly weather patterns fluctuate widely from the means, and noting the influences of local topography on storms and temperature, certain general observations on the climate in Russell and the Russell Town Forest can be made in terms of zones.

FIGURE 18 indicates the importance of the tempering effect of the Atlantic Ocean. All of Hampden County, including Blandford and Russell, is in a belt whose average January temperature is between 24 and 26 F., while the average for July puts Russell and Blandford in the large zone which embraces both eastern and western highlands in Massachusetts with averages between 70 and 72 F. Blandford and Russell have an average annual snowfall of between forty and sixty inches, and maintain at least one inch of snow cover, an average of more than forty days a year.

Hardwood trees in the natural stands and pine trees in the plantations have both suffered from ice storms that have

JANUARY

JULY

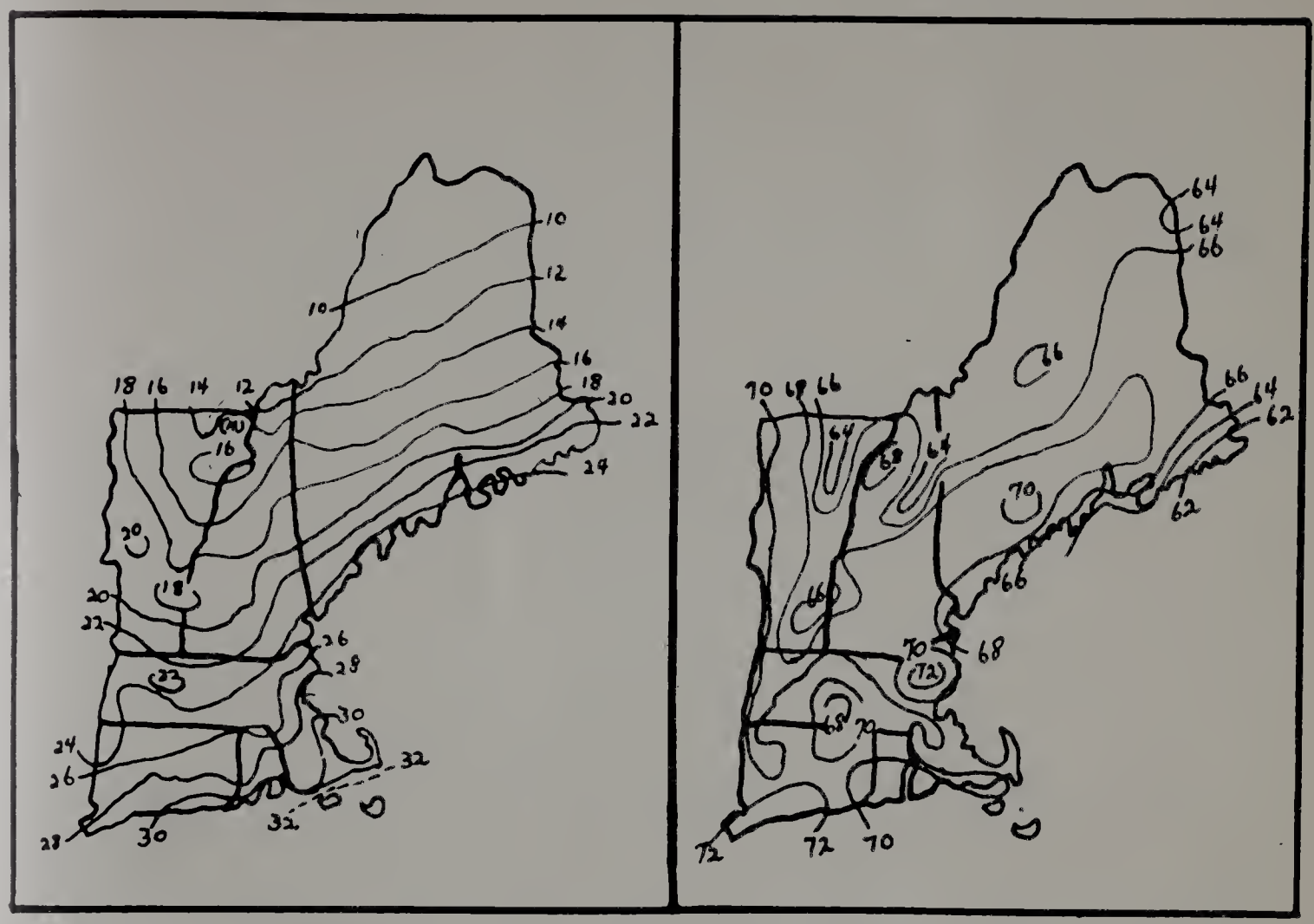

FIGURE 18

NEW ENGLAND AVERAGE TEMPERATURES IN DEGREES FAHRENHEIT IN THE MONTHS OF JANUARY AND JULY

Source: Climate and Man, U.S.D.A. Yearbook. p. 996.

repeatedly struck the uplands where the Russell Town Forest is located. So much of the time winter temperatures fluctuate at freezing temperatures or a little below, that freezing rain is common in the region. The most damaging storms are those in which the moist southeast or east winds sweep over the higher lands forcing the wet air masses upward over stagnant cold air to levels where they condense. Many ice-coated trees bend and break under the great weight, and this damaging action has materially reduced expected yields, as will be indicated in the chapter on forestry.

The average annual precipitation for the general Russell area is relatively stable throughout the seasons. It dips to slightly more than three inches per month in December and February and maintains an average near four inches per month between June and September. September with 4.2 inches is the wettest month as is indicated in FIGURE 19, AVERAGE PRECIPITATION, CHESTER, MASSACHUSETTS.

Year by year there is a marked difference in annual rainfall. FIGURE 20 shows the extremes to which differences have ranged since 1930. A period of several successive months may occur with negligible rainfall as in 1948 and 1949. The occurrence of some of these periods is indicated by FIGURE 20, ANNUAL PRECIPITATION, CHESTER, MASSACHUSETTS, 1930-1950. During the year 1938 the extraordinary conditions preceding

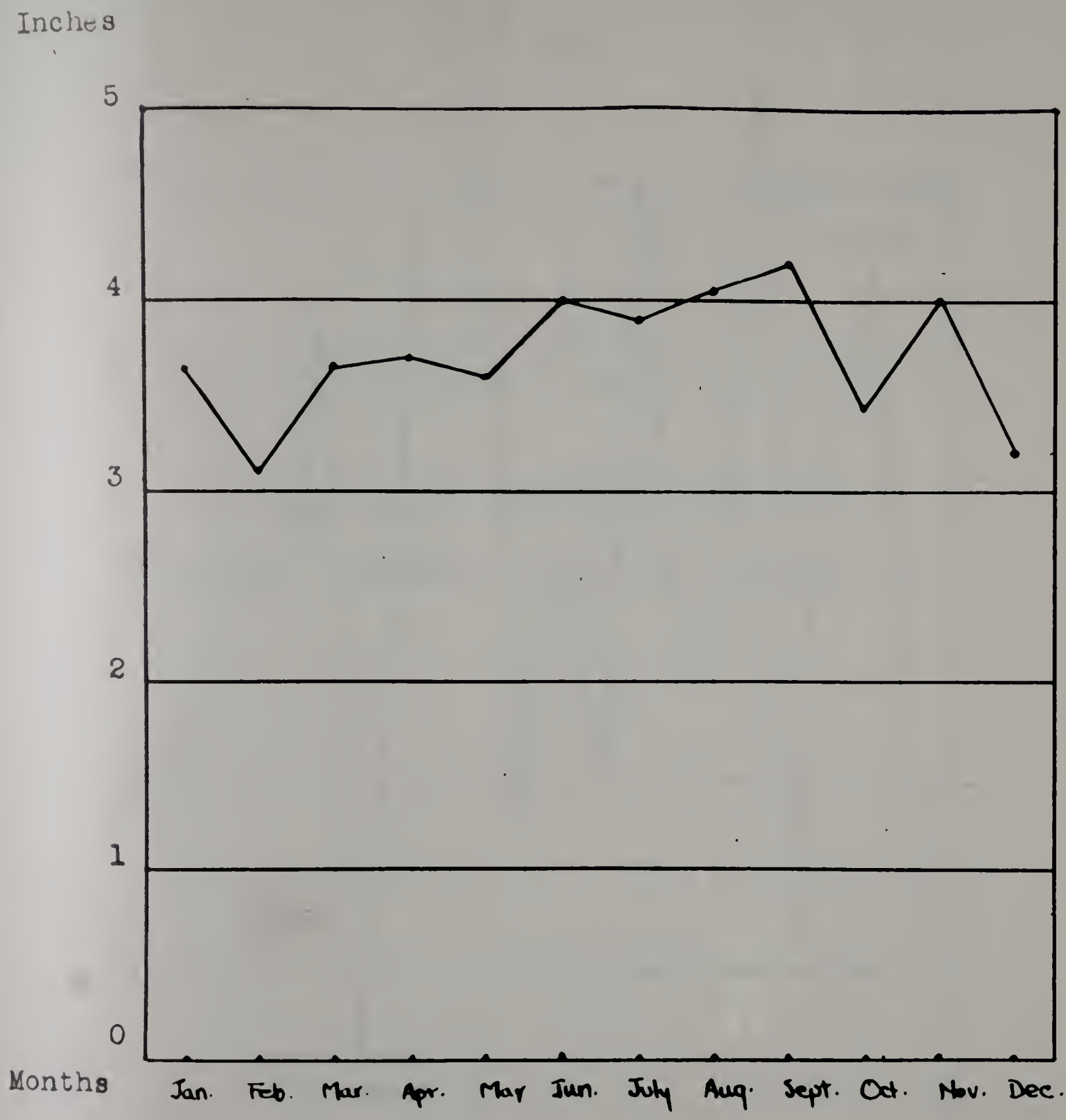

FIGURE 19.

AVERAGE PRECIPITATION, CHESTER, MASSACHUSETTS
BY MONTHS IN INCHES DURING FORTY YEARS 1.

Source: Climate and Man, U.S.D.A. Yearbook, 1941.p.991

and including the hurricane in New England brought about 60 inches of precipitation while in the year 1935 little more than half that amount fell.

Russell Forest Type Vegetation

Russell and Blandford, Massachusetts, where the bulk of the Russell Town Forest is located, lie in what is sometimes called the transition forest zone. The so-called northern forest types merge in this area with many of the central hardwood species.[1] The combination makes a diverse and interesting vegetation cover. Some of the trees common in northern Minnesota, for instance, and in Wisconsin, Michigan, and New York are present in northern and central New England, and extend in a narrowing tongue along the higher Appalachians wouthwesterly as far as the Tennessee-Georgia line. On the other hand there are trees in the Russell locality which are common to the major areas in the central states, extending southwestward to within fifty miles of the Rio Grande River in southern Texas.

Food for Wildlife in the Russell Town Forest

The constant change in the composition and density of a

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1. Map. 1949. Trees. Yearbook of Agriculture. U.S.D.A. p. 113.

given woodland brings a succession of more or less favorable habitats for wildlife, and will in turn modify the wildlife population there. Woodland which has grown beyond the shrub and brush stage may offer deer and rabbits little browse from buds and branches, but the larger trees of some species begin to provide substantial food in the form of seed. The larger conifers supply large amounts of grouse and squirrel food.

The red maple and birches, which are well scattered throughout the Russell Town Forest, provide food for birds and rodents in their seed crop almost every year, while the beech seed is not to be counted upon except at intervals of several years. The red oak, the most substantially represented larger hardwood in the Russell watershed produces a good crop of acorns every three or four years on an average. According to Albert Downs studies show that the red oaks which are twelve inches in diameter four and one-half feet from the ground produce an average of only 2.2 pounds of acorns, while the same tree when four inches thicker (and with a proportionately larger crown) provide 10 pounds of acorns.[1]

It is clear that squirrels, deer, grouse, and other animals are being given increasingly large supplies of this

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1. Downs, Albert A. 1949. "Trees and Food from Acorns." Trees, Yearbook of Agriculture. p. 572.

important food since the red oaks of this diameter are common. Not only mammals and birds, but insects and fungi utilize acorns, and the period of usefulness to deer, for instance, is therefore limited to the fall and early winter.

The Russell watershed forest harbors all kinds of shelter and food for upland game, and there is little danger for example that many den trees would be removed even though forest operations might increase. Mr. Elmer Foster, the Town Forester, has actually set out apple trees to provide additional feed for game in the forest. He is keenly aware of the hunting pressure and the food problem for the animal life. In his opinion should the game population reach a dangerously low point, he would recommend to the Forestry Committee of Russell that there be some sort of restriction on hunting in the Russell Town Forest, other than the present zone around the reservoir.

CHAPTER IX.

HISTORY OF THE WATER SUPPLY PROGRAM IN RUSSELL.

It was considered wise to treat the history of the water supply program in the Town of Russell separately from the history of the Town Forest itself because there are important distinctions which must be born in mind between the water department activities and the Town Forest program. The water supply program was established long before the Town decided to place itself under the Town Forest Act and it is likely that the watershed properties would have been acquired by the water department had there been no Town Forest Act.

Until 1911 the population of Russell used individual springs, wells and brook water. The Town voted that year certain bond issues and undertook surveys for construction of a town water supply. The dam and water extension system together with acquisition of a few acres around the reservoir had cost $45000.00 by 1913, and gradually the lines were extended to Woronoco and more land was added in the watershed.

It was not until the 1920's that the great bulk of land was bought for the water supply protection after the State Department of Public Health had urged either wise spread land holdings or constant patrolling of the watershed. During this period some 2500 acres were acquired either by purchase or by eminent domain, all in the Town of Blandford. In this

process eleven houses were acquired and destroyed as well as two neighborhood school houses, all of which appear in FIGURE 21, DRAINAGE AREA OF THE RUSSELL WATER SUPPLY.

The town voted to place the Town Forest under the State Town Forest Act in 1923 and the Water Department delegated the supervision of the watershed to the Town Forestry Committee. The Water Department continued to keep under its account the tax items which annually became due to Huntington (20 acres) and Blandford (to reach about 2700 acres). During the years previous to hiring a permanent forester the Water Department undertook much of the actual work done on the Town Forest.

In thirty-one plantations averaging 7.6 acres apiece conifers have been planted to improve the value of the protective forest. The plantations consisted of some sixty-six acres of white pine and about equal areas of both red pine and Norway spruce, while the balance of the planted area was in Scotch pine and white spruce. The ages of these plantations are shown in TABLE V where the large concentration of plantations fifteen and sixteen years old reflects the activity in reforestation during the early thirties. (See FIGURE 22.)

Despite the report of an engineer in 1914 that the Black Brook Watershed would be adequate for 30,000 people, it has come about that a driven gravel well was found necessary and constructed in 1930-1931 for a supplementary or emergency supply. These new sources delivered by pump were capable of

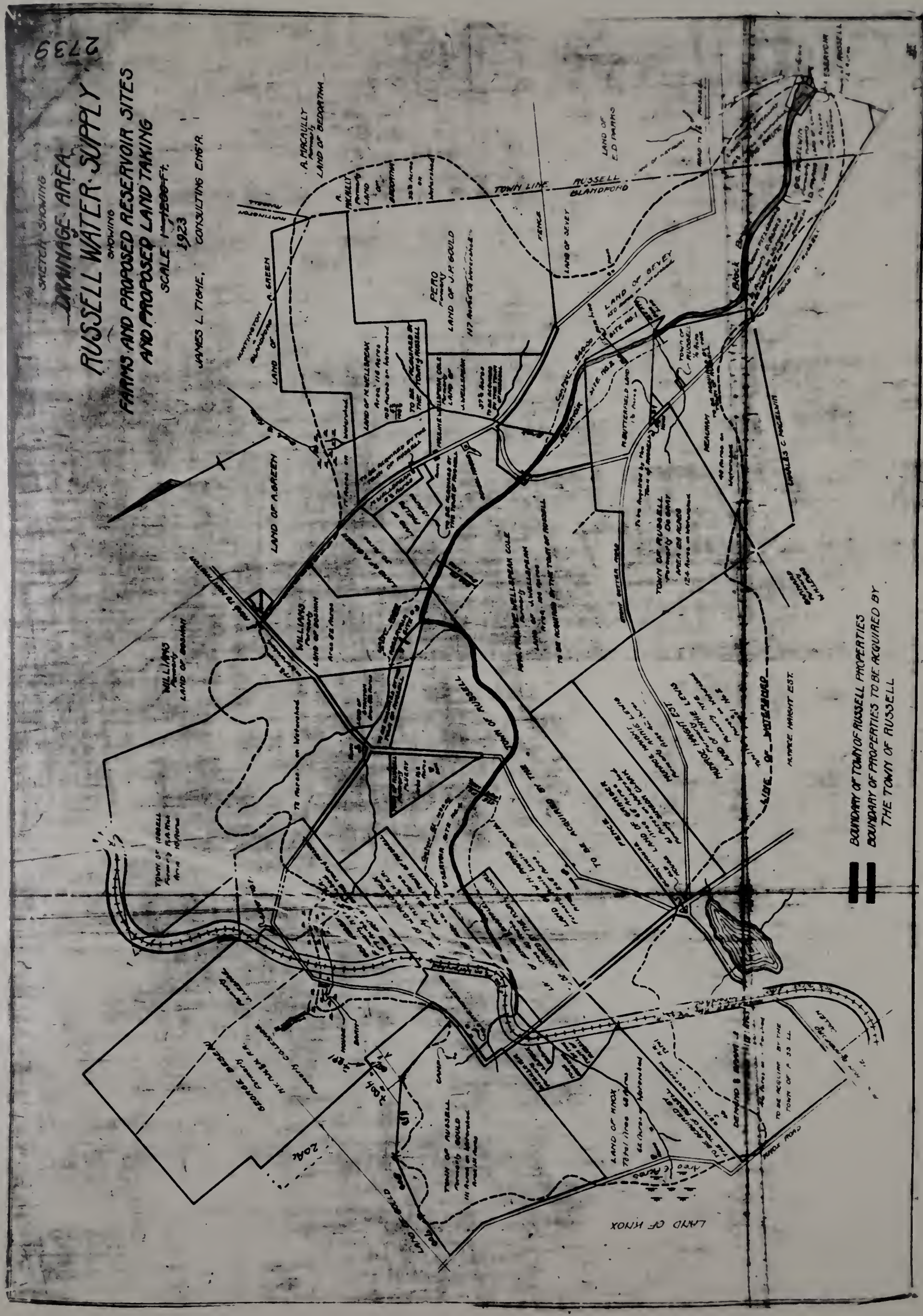
SKETCH SHOWING
DRAINAGE AREA
RUSSELL WATER SUPPLY
SHOWING
FARMS AND PROPOSED RESERVOIR SITES
AND PROPOSED LAND TAKING
SCALE 1" = 800 Ft.
1923
JAMES L. TIGHE, CONSULTING ENG'R.
TOWN LINE
RUSSELL
BLANDFORD
LAND OF A. GREEN
LAND OF SEVEY
LAND OF E.D. PARKS
PERO
LAND OF J.P. GOULD
SITE NO. 1
SITE NO. 2
TOWN OF RUSSELL
LAND OF KNOX
BOUNDARY OF TOWN OF RUSSELL PROPERTIES
BOUNDARY OF PROPERTIES TO BE ACQUIRED BY
THE TOWN OF RUSSELL

FIGURE 21.

TABLE V.

AREA, SPECIES, AND AGE OF PLANTATIONS,
RUSSELL TOWN FOREST, 1946.

Plantation name	Number	Area in acres	Species	Age
Meecham	21	1	Norway spruce	20
Meecham	22	3	Red pine	20
Meecham	26	8	Red pine	20
Cole	17	2	White pine	18
Meecham	20	20	White pine	18
Meecham	21	3	Scotch pine	18
De Gray	19	4	Norway spruce	17
Knox	1	8	Red pine	16
Gould	4	10	Red pine	16
Williams	6	5	Norway spruce	16
Wellspeak	14	20	Red pine	16
Butterfield	25	7	Scotch pine	16
Knox	13	5	Norway spruce	15
Rich	15	7	Norway spruce	15
Wellspeak	15	20	Norway spruce	15
Cole	16	7	White pine	15
Cole	18	2	White pine, spruce	15
De Gray	24	3	Norway spruce	15
Wellspeak	29	2	Norway spruce	15
Sevey	30	20	White pine	15
Sevey	31	10	White pine	15
Sevey	32	15	White spruce	15
Green	11	9	Norway spruce	14
Green	12	10	Norway spruce	14
Green	13	14	Scotch pine	14
Fitzgerald	27	1	Norway spruce	14
Knox	2	5	White pine	13
Stanton	7	5	Norway spruce	13
Williams	9	2	Red pine	3
Bausman	28	10	Red pine	2

Total 237 acres

Source: Plantation Management Plan, Russell Town Forest.

AERIAL PHOTOGRAPH, 1940, SHOWING THE RUSSELL TOWN FOREST AND VICINITY.

Source: U.S.S.C.S. Aerial Maps.

Identification No. CNI 6-15, 7-3-40
CNI 3-33, 6-14-40
CNI 3-32, 6-14-40

FIGURE 22.


Russell
Village
Russell
Blandford
Russell Reservoir
Blandford Village

furnishing 165,000 gallons a day over and above the reservoir flow. This has become an inadequate volume for safety because of increased use. The well water is piped to consumers without need for filtration or chemical treatment.

In 1936-1937 a sand filtration plant was installed to treat the reservoir water and must now be enlarged to accommodate the new peak demand of 165,000 gallons a day. One half the filtering units should be "at rest" at any given time under proper circumstances, but today in order to rest the sand filters, water has to be pumped entirely from the gravel wells to supply the town while the filter is shut down.

The Water Department is now considering new sources of water since the daily usage has increased from 95,000 gallons a day in 1940 to the peak load of 165,000 gallons as of 1950. Dry seasons do not provide that amount of run-off in the watershed.

The annual average cost of cleaning sand and leaves from the reservoir is about $80.00, yet the need for this work does not indicate an unstable watershed soil or inadequate forest cover. There is no settling basin in the Russell system to facilitate the removal of water carried debris and silt.

State Health Department data show an occasional contamination by the bacillus coli in samples of untreated reservoir water taken above the dam, in numbers above the safe standard

for drinking water. The filtration process[1] has given consistently high quality safe water to the people of Russell and no criticism has been heard from the State Health Department about conditions on the watershed since 1934.

The present approximately 600 water-user accounts pay an average of about $10.00 per year for water, a figure which is low for the state and the nation. The revenue from the water-users plus reimbursement for service extension and other job work brings enough to pay the cost of land taxes, about $1200.00 per year, and other current Water Department expense. Water Department revenue is not large enough to pay for the management and supervision of the watershed as it is supplied by the Town Forester. Water bills are sent out by town employees from the Town Hall and all revenues are paid into the town treasury as they are in the case of the Town Forestry program.

To get capital funds for such Water Department work as reservoir construction, water main extensions, large watershed purchases, and the filter plant, serial bonds were issued as an obligation of the Town of Russell.

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1. See APPENDIX II-C, ANALYSIS OF DRINKING WATER SUPPLIES.

CHAPTER X.

HISTORICAL BACKGROUND OF THE RUSSELL TOWN FOREST PROGRAM.

When the Town of Russell organized its public reservoir water supply system in 1911, it did not anticipate owning an extensive forested area. When the town bought the Gould farm in Blandford in 1914[1], an engineer who surveyed it reported that there was a good growing timber crop on the 130 acre farm. No further mention was made in the Annual Reports of forest operations until 1922 when for the first time the Town Forest Act and profits in forestry were discussed by the Town Planning Board.

The start had been made on the program which was to have far reaching effects, for the fame of the Russell Forest has been repeated in countless articles, books, and periodicals. In none of the articles the author has read, however, has there appeared a careful listing of costs, interest, and time preference. Few of the articles mention that the presence of large corporate industries in town results in the payment of lower general property taxes by individuals. In effect local industrial corporations pay in taxes that reach the town treasury about 65% of the annual property taxes raided by the town.[2]

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1. Annual Reports. 1914. Russell.

2. Annual Reports. 1949, pp. 32, 33. Interview with Town Clerk, Vivienne Irwin, April 1951.

The Russell Town Forest, based on a water supply watershed, has evolved in a flexible type of partnership with the Russell Water Department. Superior in power to the local Water Department is the State Health Department which delegates authority for adopting various water supply practices. So the Town Forest Committee has numerous restrictions on it for financial or recreational resources.

As an example of the close identity the Town Forest Program had with the Water Department, the Annual Reports of Russell for some years listed the financial items of the Town Forestry Program in the group "Protection of Persons and Property", at other times, items appeared under special appropriations or under Water (Department). In 1949 and 1950 the Town Forestry Program appeared as an independent group under "Town Forestry". Payments for lands on the watershed as well as for clearing out the reservoir are listed consistently under the Water Department, as are watershed taxes paid to Blandford and to Huntington.

It was the State Health Department Survey made public in 1922 (May), that directed attention to alternative methods of managing the watershed area. The State authorities urged either a constant patrol or ownership of extensive areas in the watershed to prevent pollution. Since patrolling the lands constantly would have been too expensive, and the state recommended the surface water in this case as superior to the

drilled or driven well type, the town voted in 1923:[1]

1. To purchase 100 acres of watershed land and place it under the Town Forest Act taking advantage of the free planting stock provided by the state and the offer by the New England Forestry Foundation to pay for planting 5000 trees.
2. To appropriate $26,00.00 for the acquisition by purchase or eminent domain of additional lands in the watershed.
3. Selection of land to be bought was left to a group consisting of: Town Forester; Chairman, Town Planning Board; Chairman, Water Department; Chairman, Board of Selectmen.

Following this action by the voters, the Board of Selectment appointed a Town Forestry Committee and also authorized a Committee survey to determine the best way to develop the watershed forest.

During 1923 the first watershed planting of 1500 trees was made, thus the Town Forestry Program was launched. In 1924 the recommendations of the Watershed Survey were made public. It was suggested:

1. Town ownership of all the watershed, as indicated in FIGURE 21, SKETCH SHOWING DRAINAGE AREA OF RUSSELL

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1. 1922, 1923, Russell Annual Reports.

WATTER SUPPLY.

2. Planting open areas with proper type trees.

3. Selective cutting of logs.

A professional forester's survey followed in 1925,[1] and his findings explained that the town-owned watershed area as a whole had been recently cut over. The best remaining timber on the watershed was privately owned. The report suggested that the soil and site conditions were well suited for timber growing - very small swamp areas or dry shallow soils were found - but that the forested section in general contained an inferior growth, mixed in composition and character, small in size and poor in quality. Hemlock reproduction was found in large proportions on 70% of the ground.

The forest Survey recommended planting all open areas, particularly on the open meadows where the best soil was. He also maintained that the Town could logically follow two general courses:

1. Merely plant the open spaces and provide fire protection, or

2. Practice intensive forestry for an eventual return.

Land purchases[2] and plantations went ahead so that by 1928 the Town owned 2570 acres. Plantings of conifers each

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1. Galarneau, D. C. 1926. Report of the Forest Survey, Russell Town Forest.

2. 1928. Russell Annual Report.

year beginning in 1923 had totaled 155,000 trees by 1926. A ten year planting program was under way which would set out 30,000 trees a year for the next ten years, starting in 1926.

The vigorous tree planting program was not accompanied by many other intensive efforts at forest management* until 1931 when the unemployed were used to cut a small fire break. Gypsy moth control work and cull cord wood cutting were done between 1935 and 1939 again with the use of unemployed labor. In nine of these years did total watershed work costs exceed $1044.00 or fall below $500.00.

Marking a continued interest in good forest management by the Town Forestry Committee and the Board of Selectmen, the Committee employed James Manning in 1941 for one year as Town Forester. His work chiefly involved fire lane construction, plantation release, and gypsy moth control. Under his direction he had some unemployed labor which carried on minor welfare fuel wood production.

Although Manning was with the town only one year, the Town Forestry Committee persisted in its efforts to secure a good management. The New England Forestry Foundation, represented by an experienced forester, Philip T. Coolidge, made a thorough forest survey of the 3000 acres in the Town Forest.[1]

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* Blister rust and white pine weevil damaged plantation white pines very badly. Nothing was said about controls.

1. Cf. Coolidge Report in text following.

The next year Elmer Foster, an experienced graduate of the New York State Ranger School, was engaged as a permanent full time Town Forester.

With the employment of Foster the Town Forestry Program has emerged into an effective organ for meeting the needs of the Town. Not only is the Town Forest well protected, but other Town-wide tree problems are met, such as Dutch Elm Disease, Gypsy Moth, and shade tree production. Social aspects of the Town Forest Program are dealt with in the following chapters.

Since the Forest area was largely in poor quality, young, and understock condition, it was not to be expected that returns from the forest products would be substantial during the early years. Bearing in mind that the Water Department was receiving a constant return in the form of water protection and gravity supply, the author has totaled certain categories of costs, exclusive of interest to date.[1]

For land purchases of 3000 acres including original reservoir acquisitions on the watershed and adjacent areas, approximately the following amount was spent: - $26,000.00

For planting and improvement of watershed cover approximately, - - - - - - - - - - - - - - - - -	32,000.00
For watershed taxes paid on land in Blandford and Huntington, approximately - - - - - - - -	21,000.00
Total - - - -	$79,000.00

1. 1911-1950 Russell Annual Reports.

The total of $75,000.00 represents an investment in a resource that is growing constantly in value.

The accumulated gross cash income up to 1950 amounts to less than $100.00. However it is anticipated that within fifty years the investment will have begun to return the Town a constant financial gain. Current gross costs of the Town Forestry Program, exclusive of watershed taxes, are about $4,000 per year, resulting in a net deficit of some thirty-five hundred dollars per year.

The direct benefits that people in the community and elsewhere have from this forest as a source of recreation and wildlife, and the indirect benefits resulting from a substantial well managed forest area cannot be measured in dollars and cents. In the following chapters there will be a discussion of the current economic considerations and the recreational and educational benefits of the Forest.

CHAPTER XI.

TOWN FOREST PROGRAM AT PRESENT.

The Town Forestry Committee.

A brief description of the administrative relationship between the Town and its forest is in order. Russell has the Town Meeting-Board of Selectmen type of government. The Town Forestry Committee, consisting of from six to ten members is appointed on a rotating basis by the Board of Selectmen and has been especially active in the past ten years, although the early committees did excellent, far-sighted work and carried out a constructive land-use program. The Committee hires the Forester and plans the budget and the policy in conference with the Forester. The Town Forestry Committee's requests for funds to the Board of Selectmen and the Town Meeting have been consistently granted. Expenses and receipts are handled through the Town Treasury general fund.

The Town Forestry Committee meets about eight times a year and usually reports to the Town annually through the Annual Town Report, this being its regular organ of publicity and education.

The make up of the Committee has included business men, clerks, maintenance men, contract farmers, engineers, paper makers, factory superintendents, and men from other categories

of work. Water Department and Forest Fire control personnel were usually well represented on the Committee. The School Department up until this time has not often been represented. Since almost all employable men in the Town of Russell are connected with one or more of the paper mills in some capacity, it is obvious that the Committee tends to be well represented by employees of the manufacturing units in the Town.

Functions of the Town Forester

The position of Town Forester is the chief element which distinguishes Russell from other towns which have a water-protection forest. Bound up in the position are important tangible and intangible elements which are more or less difficult to measure. The duties involved have been conceived through a broad interpretation of community land-use planning.

The Town Forester's first function is to safeguard the watershed of fire, insects, diseases, and improper human activity. During the days of high fire danger, for example, a patrol is maintained all day. Gypsy moth attacks for example will be sprayed by plane with D.D.T. if a dangerous buildup seems iminent. So far this has not been necessary.

Hunting is allowed in keeping with the Massachusetts Game Laws and scores of users roam the Town Forest during the hunting season, respecting the one half mile safety zone which has been drawn around the reservoir. Fox, coon, rabbit,

deer, and grouse, are all taken. The Town Forester patrols actively during these periods. Inhabitants from Blandford and Huntington make frequent use of the areas, and are not discouraged, but strangers from greater distances are not as welcome since they are not familiar with the reservoir regulations.

Planting of trees is now limited to educational enterprises by the Boy Scouts, but adequate nursery stock, hard maple, and hemlock have been raised in the nursery for Town needs. This covers the need for shade trees planned for streets and parks.

An effort is made to find markets for the products of the forest, the harvesting of which will not adversely affect water protection and good timber growth. Laurel, saplings and cull cordwood have been sold in recent years. The Town Forester's silviculture operations will be on a small scale until such time as cheap labor becomes abundant, although some thinning and improvement cutting are underway. Self-liquidating thinning in plantations is expected at the proper time. At present townspeople free of charge and others at fifty cents a cord may cut marked trees in limited areas.

As part of the Forest Management plan, the Forester maintains roads, bridges, and firelanes, in adequate condition so that lumbering equipment and fire trucks can have access to most sections, and men on foot can bring equipment to bear

on a fire on any front within an hour of the warning.

Survey of Forest Resources Within the Town

In 1948 the Town Forester at the request of the Town Forestry Committee completed a survey of the forest cover types within the political boundaries of the Town of Russell.[1] A copy of this map appears in Figure 23. Volumes and growth rates were charted, and the material made available for study by interested officials and citizens in the area.

Foster[2] explained the meaning of the forest cover in terms of flood control and in terms of annual increases in value as timber and cord wood, to help people gain more perspective regarding this local natural resource. The Town Forester will continue woodland management education as a service of his official function to individual Russell residents who have a woodland.

Management of the Town Forest

Economic Aspects of the Town Forest Program

The future income from the Town Forestry Program depends on a complex of factors. Some of these factors man can control, some he can measure, and some are incapable of forecast measure-

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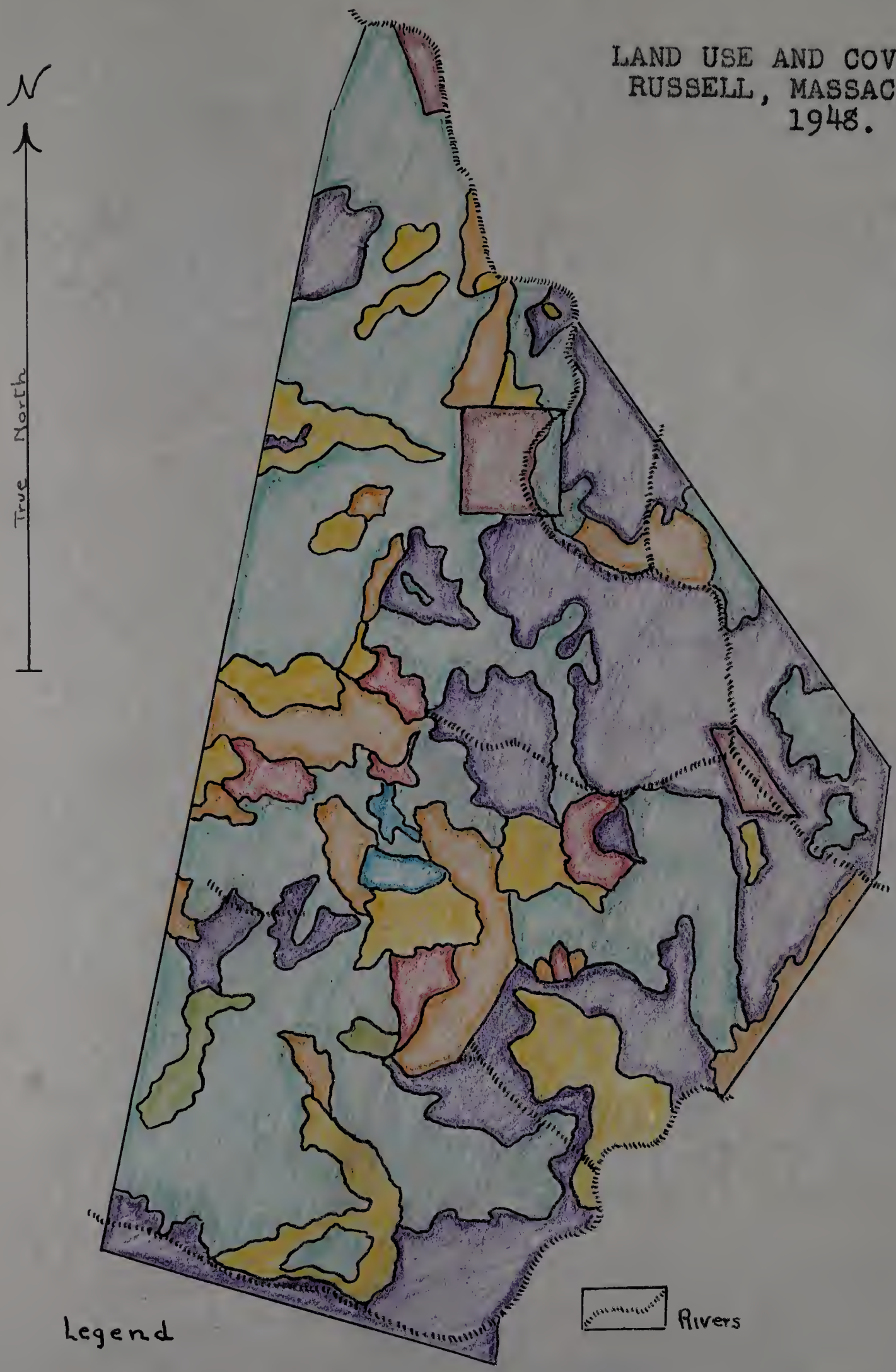
1. Russell Town Report, 1948, p. 50.
2. Foster, E. M. 1948. Natural Resources of Russell, p. 22.

LAND USE AND COVER TYPES,
RUSSELL, MASSACHUSETTS,
1948.



Source: Foster, Elmer. 1948. Natural Resources of Russell.

FIGURE 23.

ment or control. The part of this study contained in the Economic Aspect of the PRESENT TOWN FOREST PROGRAM will deal with the following:

1. The security against forest fire risks.
2. The security against insect attacks.
3. The results of planting.
4. The growing stock on the forest.
5. The growth rates of trees, the financial returns resulting from various types of treatment.

The economic aspects of the Town Forestry Program will be considered apart from the benefits derived by the Water Department, intangible benefits, and tax costs which must be paid by the Town each year to Blandford and Huntington.

Forest Fire Control

Adequate forest fire control measures are a primary consideration in a managed forest. For detection Russell is covered by a State triangulation system of fire tower observers the nearest point being in Chester. The state fire control agencies are equipped with telephone and two-way radios. Their trucks are highly mobile units and would attend a fire on the Russell Town Forest, but Russell equipment would probably have arrived first.

Russell has a trained crew of some fifty men, volunteer forest fire fighters who can be assembled especially quickly if the mills are in operation because they are regular mill

employees for the most part. The Town has four trucks carrying three portable power pumps and several thousand feet of hose. Also in the area of detection and suppression the Town Forester patrols constantly on days of high fire danger. Fire lanes and water holes have been developed and maintained on the forest itself, present and abandoned roads constitute the major fire lane patterns.

Insect Control

Insect pests are chiefly noticeable in the plantations, where they have caused considerable damage, especially to the white pines and spruce. No program of chemical control is anticipated with either the white pine weevil or the spruce bud worm, but the gypsy moth will be attacked with aerial D.D.T. spraying if there is a dangerous buildup. During 1935-1941 some labor was used to control the gypsy moth by painting egg clusters with creosote. Foster, the Town Forester is alert for changes in the insect population and is in the habit of calling expert advice when he suspects a problem.

Growth of the Plantations

The plantation program has resulted at its worst in certain minimal benefits such as watershed protection, and food for wildlife, while the better stands of young conifers are in vigorous thrifty condition. Among the groups which will not produce commercial timber are the Scotch pines which

fortunately only cover a small acreage. All but one of the white pine plantations has been badly damaged by the white pine weevil, blister rust, or by ice breakage, meaning that only about thirteen of the sixty-eight acres in white pine look promising for successful quality timber production.

Ice damage caused severe breakage among five of the red pine plantations, but the deformities were usually high enough to allow for a twelve foot butt log. Red pines have shown excellent health and vigorous growth. Ninety-one acres of spruce were in generally good condition although spruce bud worm infestation had caused more or less serious damage in nineteen acres. Overtopping by the competing hardwoods has been adequately controlled on the more valuable plantations.

Town Forest Cover Evaluated

In 1945 the Russell Town Forestry Committee contracted with the New England Forestry Foundation to make a survey and analysis of the inventory on the Russell Town Forest. Mr. Philip Coolidge was directly in charge of the work and prepared the report which the writer found contained data helpful in understanding the forest cover. Coolidge prepared a map of the forest showing the areas of various types of cover.

The report makes no mention of such woody plants as apple, alder, pin cherry, striped maple or sumach and others which do not occur in large amounts or are of no importance

commercially. Nor is anything said of such shrubs as laurel, some of which the Town Forest authorities marketed in 1949, but the list of cordwood species given in Table VI shows seventeen broadleaved species commonly found in the transition forest were more or less established. Table VI indicates there are only 1065 cords of the two most intolerant types poplar and grey birch, or about six per cent of all hardwood cordwood, which totals 17,450 cords. This is significant when one considers that so much of the land was open or cut over when it was acquired by the Town for a watershed forest during the 1920's. Nevertheless FIGURE 24, FOREST COVER TYPES, RUSSELL TOWN FOREST, 1945, shows approximately half the whole Town Forest area is understocked or is in stands of trees smaller than cordwood size.

Recognizing that the Russell Town Forest serves the primary purpose of protecting the water supply, Mr. Coolidge arranged his findings in such a way that an operating plan would place revenue, enjoyment, or a source of employment in second place. He gave a total figure, for example, of 3,844,000 board feet of sawtimber standing on the forest. But for reasons of watershed protection, and to some extent because of inaccessibility, he classed 811,000 f.b.m. of the total as unavailable timber. The remaining 3,033,000 f.b.m. of sawtimber are available and merchantable.

Coolidge divided the wood resources into available or

TABLE VI.

AVAILABLE CORDWOOD, ALL QUALITIES, RUSSELL TOWN FOREST, 1945

Type of tree	Estimated number of cords standing
Hardwood	
Ash	520
Bass	248
Beech	1,378
Black Birch	1,398
Yellow Birch	1,261
Grey Birch	535
White Birch	1,817
Butternut	228
Elm	116
Hickory	12
Ironwood	76
Locust	45
Hard Maple	1,830
Soft Maple	5,550
Oak	1,898
Poplar	520
Total Hardwood	17,450
Softwood	
Hemlock 6" - 9"	554
Pine 6" - 7"	75
Total Softwood	629
Total Hardwood and Softwood	18,079

Source: Coolidge, Philip T. Report on the Russell Town Forest, 1945, p. 3.

FIGURE 24.

FOREST COVER TYPES, RUSSELL TOWN FOREST, 1945.

Source: Photograph of map prepared by Philip T. Coolidge, Forester for the New England Forestry Foundation.

unavailable sawtimber, firewood of various types, pulpwood, and plantations. He indicated the forest was in a thrifty, vigorous condition, that natural reproduction of hardwood and hemlock was proceeding well, and it would be impractical to try to change the mixture, other than to show favoritism where feasible for hemlock stock through harvesting methods.

Having sectioned off the forest into eight blocks for management purposes, Coolidge found that one-third the available mature timber was in Block 5.[1] The best locations for cutting were in Blocks 4 and 5 and smaller amounts were ready in Blocks 2, 6 and 8 where the densest stands of mature wood were found. FIGURE 25 shows that Block 5 has 630,000 feet of mature wood, Block 8 has 263,000, or less than half as much, while Block 3 has for its size a negligible 44,000 feet of this mature class of wood. Blocks 4, 5, 7 and 8 have a substantial amount of potentially merchantable growing stock, totalling 779,000 feet at present.

Hemlock, red oak and white pine make up the most important commercial species at the present, according to Coolidge's figures. Among sawtimber type trees the hemlock leads with 1,567,000 board feet of which over half is mature, while a sizeable 669,000 feet are "growing". Figure 12 shows the

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1. Cf. Figure 24. A Map.

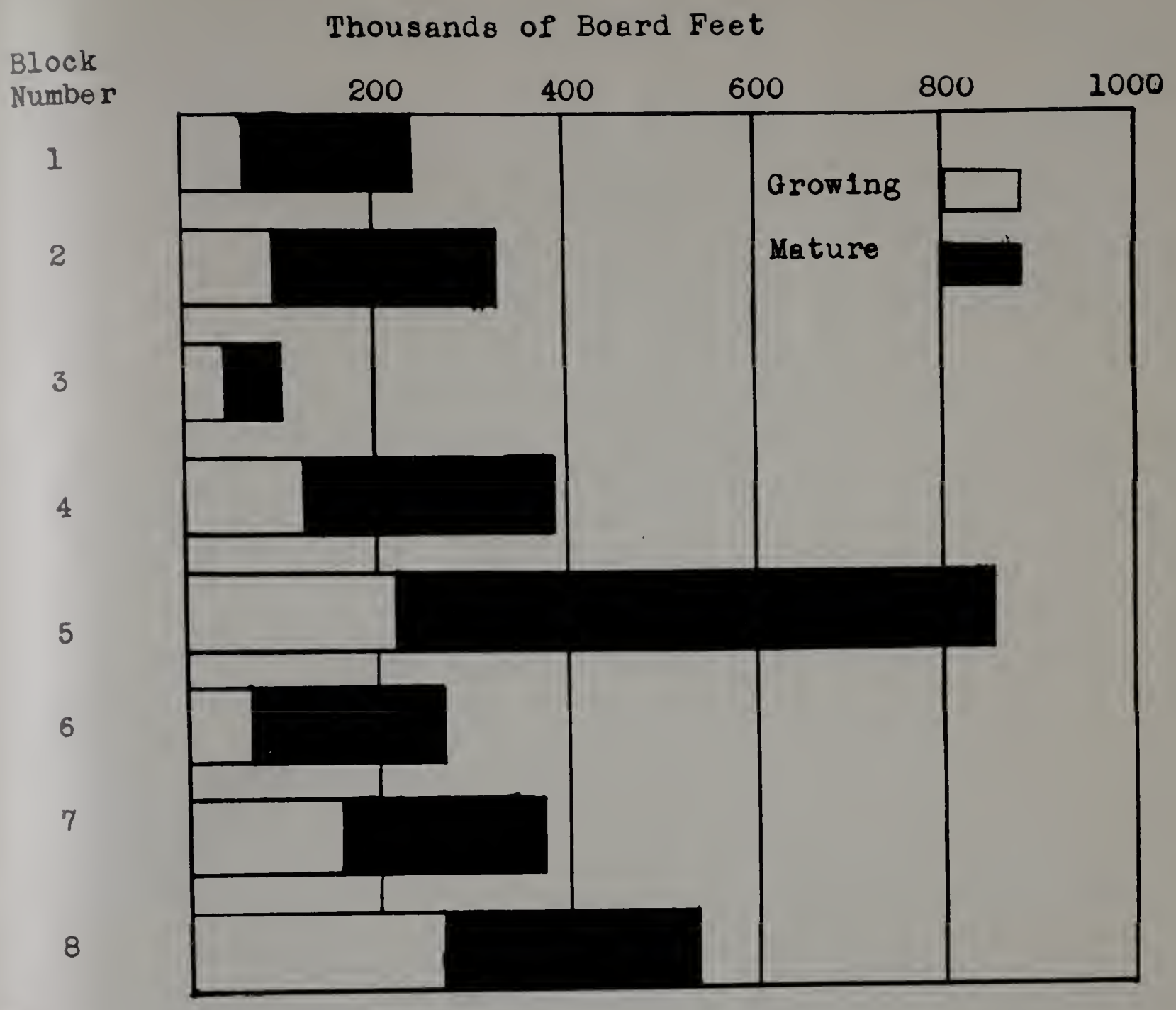

FIGURE 25

AVAILABLE GROWING AND MATURE TIMBER BY BLOCKS ON THE RUSSELL TOWN FOREST 1945

Source: Coolidge, Philip T. Report on the Russell Town Forest. 1945. p. 4

relationship of the various species of available sawtimber, and emphasizes the extent to which red oak leads the hardwoods. This oak comprises twenty-four percent of the available matured timber. Its growth is clean and thrifty and at fourteen to fifteen inches diameter at breast height it has scarcely begun to show maturity by slowing down its rate of growth, according to Mr. Coolidge's report. It was suggested that because of the importance of the large fifteen inch oaks as a host for gypsy moth caterpillars, that they might well be considered in the first planned cutting.

The hemlock timber is almost all grouped together in various stands on relatively moist, protected sites covering six hundred eighty-six acres, making an average stand per acre for this area of two thousand two hundred eighty-four board feet. The remaining 246,000 board feet of hemlock is scattered over the forest so widely that it would be uneconomical to try to operate it. This hemlock, though making up forty-five per cent of the mature timber, stands to a considerable extent along the margins of the streams of the watershed, and so Mr. Coolidge advised a process of gradual, careful cutting in these areas where it was feasible. The report cautioned against severe cuts anywhere in the hemlock territory, because of the protection needed by seedling trees of this favored species. (See FIGURE 26.)

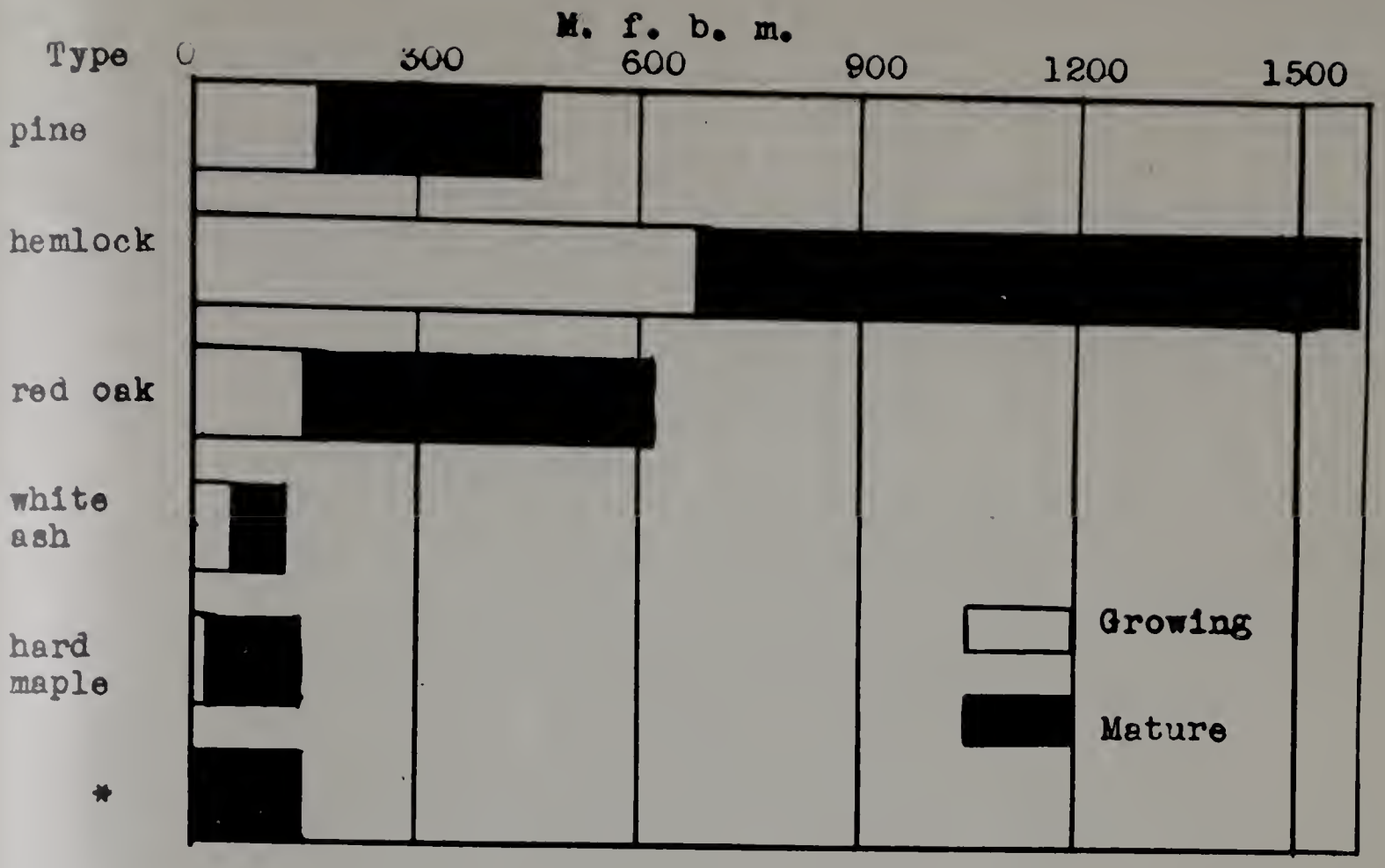

FIGURE 26

AVAILABLE TIMBER ON RUSSELL TOWN FOREST 1945, GROWING AND MATURE BY TREE TYPES IN THOUSANDS OF FEET BOARD MEASURE

Source. Coolidge, Philip. Report op. cit. p. 3

* Black birch, yellow birch, beech, bass, cherry
Note, beech and black birch are all classed arbitrarily as " mature".

The status of the white pine other than that in the plantations was much less favorable than the hemlock, oak, or white birch. Equalling nine per cent of the mature timber on the forest, the white pine type has suffered heavily from ice storms, and the white pine weevil, or the results of open field growth. Among the competing hardwood undergrowth the white pine reproduction is not proving generally successful. Mr. Coolidge recommended that many of the poorly shaped pines over twelve inches in diameter be cut if the project could be made self-liquidating, as these trees are not growing in value, and are retarding more promising growth.

Each year the merchantable stand increases in volume, at rates depending on the species, site, weather and maturity. Mr. Coolidge judged that between a two and three per cent growth rate would add about seventyOfive thousand board feet of merchantable wood each year, for the next few years, distributed as follows:

hemlock	35	M.f.b.m.
white pine	15	"
oak	15	"
other hardwood	10	"

Where cutting is to be undertaken, Mr. Coolidge proposed that little "wells" of an acre or less be the pattern, allowing for ample reseeding and some protection from the wind.[1]

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1. Coolidge, Philip. op. cit., p. 6.

Not knowing whether a practical market would ever exist for soft maple sawtimber, Mr. Coolidge classified that tree with the pulpwoods and cordwoods, among which its fifty-five hundred fifty cord volume loomed more than two and one half times as large as the next smaller volumes. FIGURE 27 shows there are seven species with over a thousand cords of cordwood. Not counting ironwood, poplar, bass or elm, there are sixteen thousand four hundred eighty cords of moderately good firewood. Viewed from the standpoint of pulpwood in Mr. Coolidge's analysis, over half the cordwood, or about 9,700 cords of hardwood pulp are available if there is a market.

FIGURE 28 shows the location of the pulpwood and other fuelwood by Blocks. Again the greatest accumulation of available wood product is in Block 5, but the eight Blocks are much more evenly matched in this cordwood category than they were in the sawtimber class. Assuming a two and one half per cent annual increment, Mr. Coolidge believed at least 400 cords of hardwood cordwood could be harvested annually without injury to the stand or the watershed.

Stumpage Price

One of the unstable factors in attempting to forecast the results of a forestry program is the changing levels in prices for labor, lumber, and cordwood. As with most other

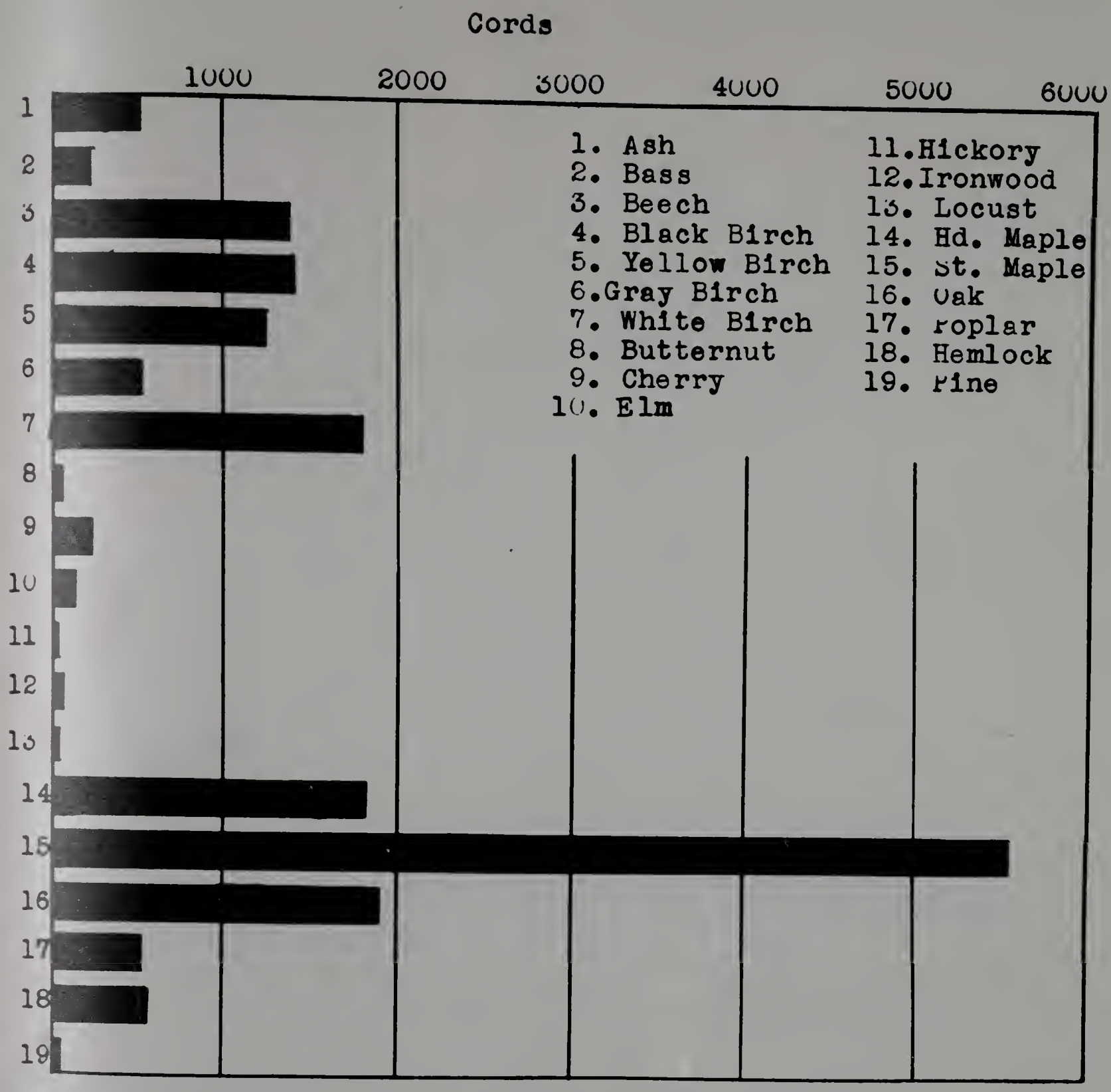

FIGURE 27

AVAILABLE CORDWOOD IN THE RUSSELL TOWN FOREST 1945
ALL QUANTITIES BY TREE TYPES IN CORDS

Source: Coolidge, Philip. Report. p.

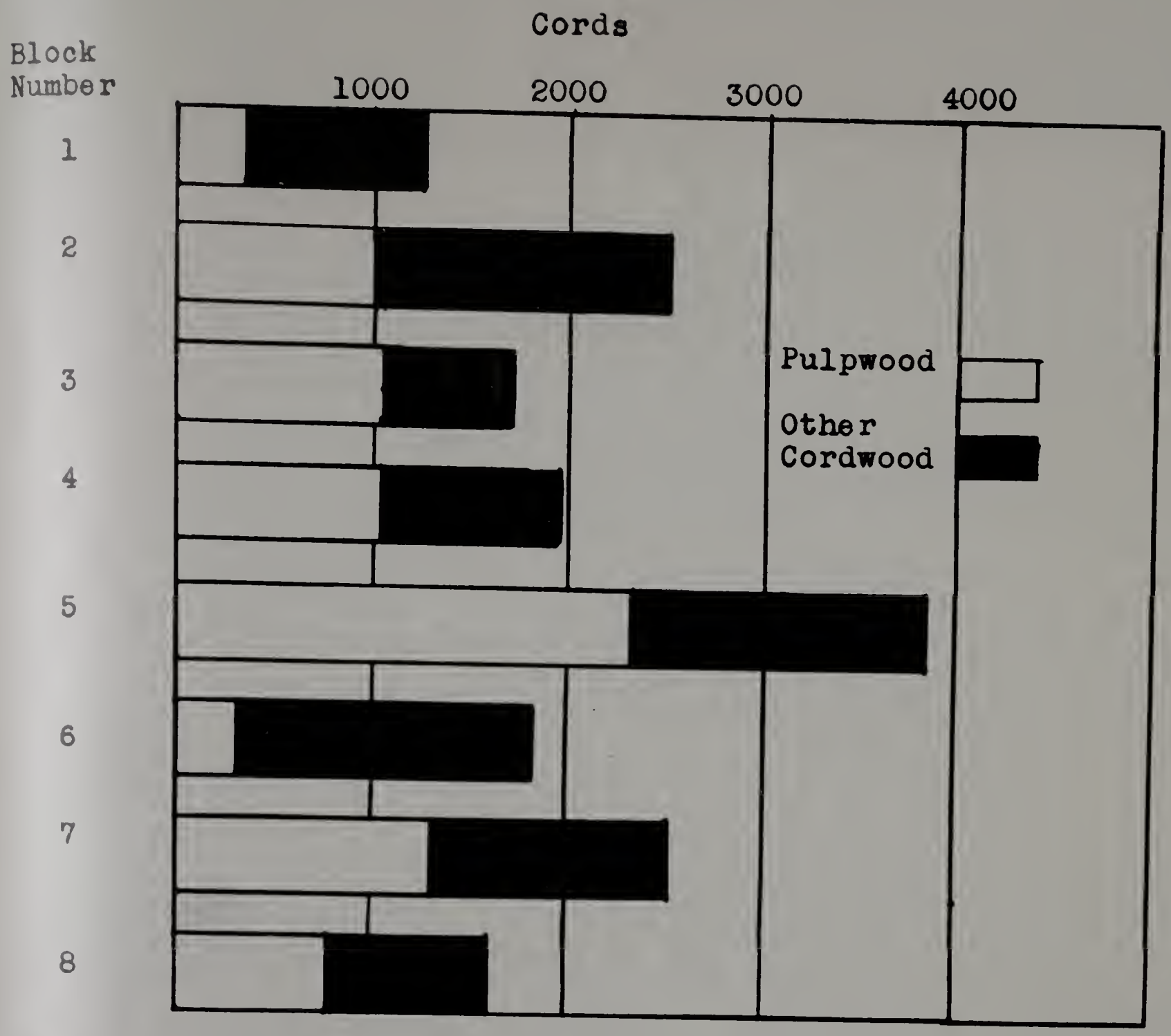

FIGURE 28

HARDWOOD CORDWOOD, RUSSELL TOWN FOREST, 1945, PULPWOOD AND OTHER BY BLOCKS IN CORDS 1,2,3.

Sources: 1. Coolidge, Philip, op. cit. p.3
2. Does not include the 629 cords of softwoods of pulp class. Hemlock 6"-9" and pine 6"-9".
3. Pulpwood includes mature or defective trees of basswood, birch, maple, poplar, in operable as well as scattered stands.

commodities,[1] the price of timber stumpage in the east has been fluctuating in an upward trend since 1900. At that time less than a dollar was the average price paid[2] per thousand for timber stumpage. By 1906 average prices had risen to well above three dollars and prices have not since dropped below three dollars, though there have been many years when these prices ranged between four and five dollars a thousand. The peak prices for stumpage in 1919 were exceeded during two substantial periods in the 1920's, but it was not until after 1940 that the average exceeded this high mark set during the inflationary boom that immediately followed World War I.

By 1941 the accumulated demand for housing, plus other expanding needs for wood, the active and growing paper and pulp industry, and the enormous wartime industrial activity set up a demand for wood that western and southern suppliers could not meet. This resulted in the acceptance of local mature lumber of all grades as had never before been seen. The prices which eastern lumber producers were largely guided by were the prices which the western products commanded as delivered to the New England consumers, for example. The western lumber price is affected even more radically by in-

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1. Information obtained by interview with the Assistant Superintendant of Westfield Water Department, Oct. 1951 during a tour of the Forest.

2. U.S.B.L. statistics.

creased labor and handling costs than is the New England product, assuming that the product is to be consumed in New England. From a combination of causes, therefore, stumpage prices moved up to an average of over eight dollars a thousand board feet. Since there is so much inferior wood being marketed at less than the average figure, an occasional case of the high quality timber lot must appear, such as the thirty-six dollar per thousand stumpage price paid by the Peck Lumber Company[1] to the Westfield [Watershed] Town Forest in Granville in 1949.

Stumpage prices as well as timber prices, shown in FIGURE 29, may vary from month to month and differ in regard to the availability of the timber stand, the ease of logging, the percentage of good crop trees, road conditions, nearness to the mill, and other factors. Since it costs more to cut and transport logs from scattered points in a woodlot, a buyer of stumpage cannot afford to pay as high a stumpage price, in a single instance, if he is required to cut with conservative selectivity and be alert for the protection of reproduction. Thus there are seen to be many balancing and counter-balancing facts to weigh. The price of stumpage tends to vary inversely with the cost of bringing the wood product from the tree to

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1. Information obtained by interview with Assistant Superintendant Angell of Westfield Water Department, Oct. 1951, during a tour of the Forest.

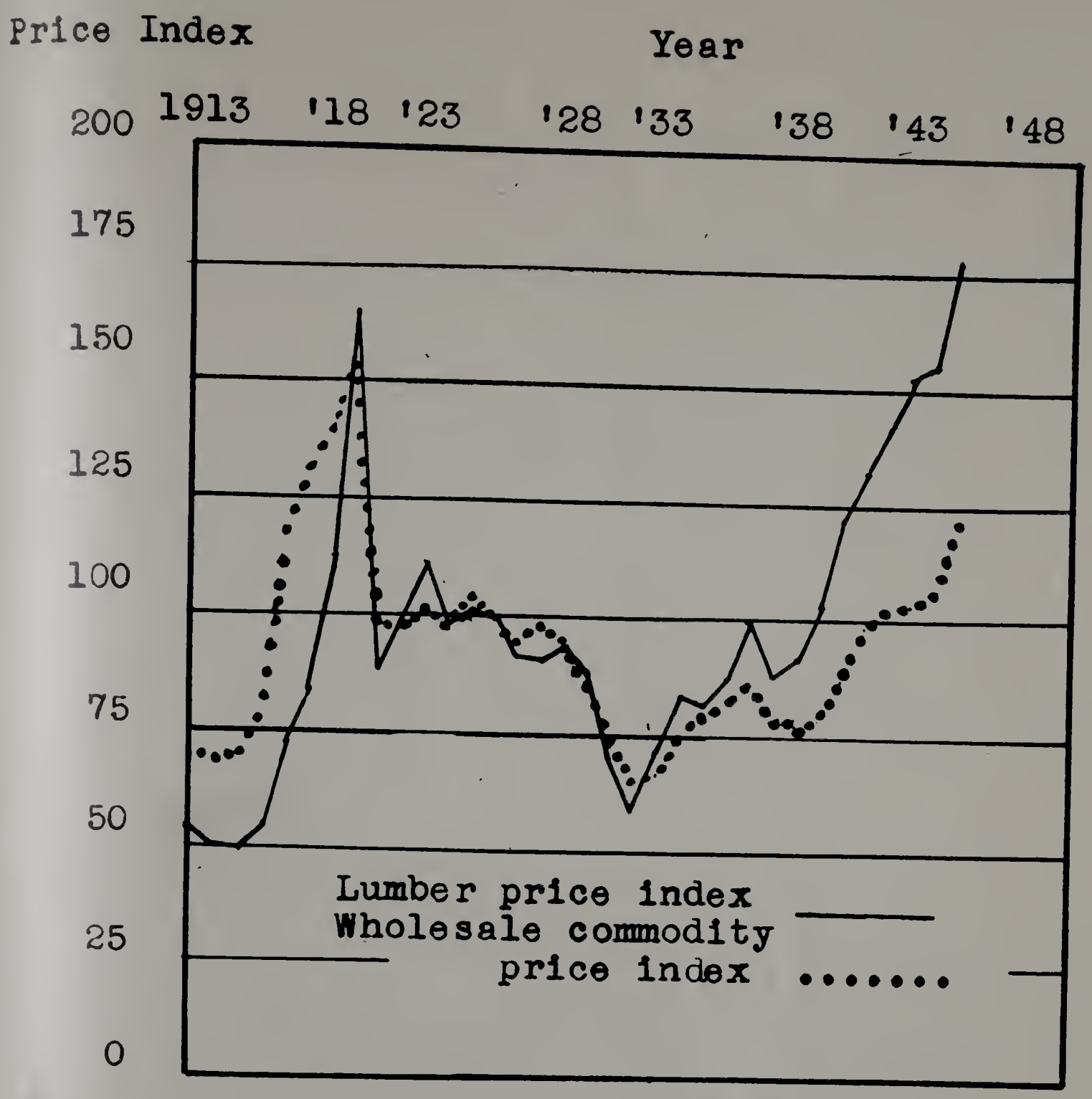

FIGURE 29

LUMBER AND WHOLESALE COMMODITY PRICE INDEXES
1914 THROUGH 1946

Source: U.S.D.A. Bureau of Labor Statistics
Survey of Current Business Supplements
1940 and 1947.

the processing plant. That these costs vary widely is shown in TABLE VII.

Stumpage values for saw timber and pulpwood have risen still further in the past ten years to an all-time high. A year before Mr. Coolidge made his survey of the Russell Town Forest, northern hardwoods as peeled pulp were given a ceiling price F.O.B. the railroad freight car of sixteen dollars per cord. The ruling in effect at the time of writing is six dollars and seventy-five cents above that 1944 restriction,[1] as indicated in TABLE VIII. Pulpwood ceiling prices may have little bearing on what a given owner can get for his stumpage. Increased costs of labor, taxation, transportation and insurance often cause the potential six-dollar increase in pulp price to be exhausted before it has raised stumpage values. The higher the prevailing wage, the lower must the stumpage price tend to be. In New Hampshire in October 1950 hardwood stumpage prices per cord varied, from seventy-five cents to three dollars.[1] Since wages are as high or higher in Russell as they are in New Hampshire the stumpage value of the hardwood pulpwood in the Russell Town Forest is not at present over three dollars per cord and is probably less.

The softwood plantation program appeared to Mr. Coolidge to be ultimately profitable for the town provided the market-

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1. Forest Market Report, 1951, Extension Bulletion 96, Nov. 1950. University of New Hampshire, Durham. p. 8.

TABLE VII.

RANGE OF OPERATING COSTS IN LOGGING IN NEW HAMPSHIRE, OCTOBER, 1950.

Type of Product	Operation		
	Felling and Bucking	Yarding	Trucking
Sawlogs	Dollars per thousand board feet		
Softwood	5 - 11	8 - 15	3 - 10
Hardwood	6 - 12	9 - 17	5 - 15
Pulpwood	Dollars per cord		
Softwood	5 - 8	2 - 5	3 - 5
Hardwood	6 - 9	2.50 - 6	3 - 7

Source: Forest Market Report, 1951, Extension Bulletin 96, November 1950, Extension Service in Agriculture and Home Economics, University of New Hampshire and State Forestry and Recreation Commission cooperating, p. 10.

Note: Custom sawing is $9.00 - $15.00 per thousand softwood and about $2.00 - $5.00 more per thousand for hardwood.

TABLE VIII.

PULPWOOD CEILING PRICES EFFECTIVE JUNE 22, 1951[1] AND CHANGE FROM MAXIMUM PRICES UNDER OFFICE OF PRICE ADMINISTRATION,[2] MARCH 25, 1944 FOR MASSACHUSETTS WEST OF THE CONNECTICUT RIVER

Type Pulpwood	Dollars per cord			
	F.O.B. R.R. Car		Roadside	
	1951	Increase since 1944	1951	Increase since 1944
Spruce and Balsam fir				
peeled	26.75	6.75	23.50	6.50
rough	21.75	4.75	18.00	4.50
Hemlock				
peeled	20.75	4.00	17.50	3.50
rough	16.25	2.75	12.50	1.50
Poplar				
peeled	19.75	4.50	16.50	3.25
rough	15.75	2.50	12.00	1.25
Northern Hardwoods				
peeled	22.75	6.75	19.00	5.00
rough	17.75	4.25	13.50	2.50

1. U. S. Office of Price Stabilization R. M. Pulpwood Ceiling Price Regulation 38, June 22, 1951.

2. U. S. Office of Price Administration R. M. P. R. 361 Maximum Pulpwood Prices, March 25, 1944.

ing is managed well when the trees are more mature. Forty to fifty years must pass before this maturity is attained, and during this time reliable supervision should be given annually to prevent serious fires and insect damage.

In 1945 it was not known that a full-time forester would be employed on the Russell Forest. In his effort to make a workable plan that could be financed within the limits of the annual growth budget of the forest, Mr. Coolidge did not calculate the value to the water supply system of the town of having a responsible agent looking after the management of the 3,000 acre property. Working within these limitations, Coolidge suggested alternative management plans:

1. An annual cut of about seventy-five thousand board feet. This should supply approximately six hundred dollars, enough to pay two or three hundred dollars for supervision and leave some cash to help defray other costs of the watershed such as tax payments to Blandford and Huntington.
2. An alternative plan given was to have a reliable contractor under the supervision of a trained forester make an immediate cut of two or three hundred thousand f.b.m. of the "mature" classes, and espect to repeat this cutting pattern about every five years.

Growth Rate of Types

Judging from statistical data gathered over thirty years, Professor Ralph C. Hawley has made tables of expected growth in a well-managed forest.[1] He found that the New Haven, Connecticut Water Co. forests of mixed hardwood stands composed principally of oak, will likely produce 200 feet board measure per acre per year. Hemlock will produce about 350 board feet per acre per year, while plantation white pine and red pine fully stocked will produce 600 and 500 board feet per acre per year respectively.

Using the conservative figure of 200 board feet per acre per year for the Russell Town Forest, since soil and climate may not be as favorable as those on the New Haven Co. watersheds, a sample calculation brings an interesting result. The total 3000 acre Russell property should in the long run, under good protection and harvesting methods, grow about 600,000 board feet per year. Mr. Coolidge did not indicate when he believed the forest would reach maximum productive efficiency, but the fact that there were open areas and thinly stocked areas in all parts of the forest indicates that it will take fifty to seventy-five years.

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1. Hawley, R. C. 1946. "Evaluation of Returns from Forest Lands." Amer. Water Works Assoc. Journal 38:1105-1110.

Results of a Long Term Management Plan in Massachusetts

A study[1] was made by Ernest Gould at the Harvard Forest of projected ninety year management plans on a 2,000 acre forest area in Petersham, Massachusetts. Budgets were prepared including physical and financial inputs and outputs in plans of operating an area whose timber value and productivity at the start were roughly comparable to those of the Russell Town Forest in 1945. Gould's forest tract had about 1060 cubic feet mature and growing trees per acre, while the Russell Town Forest had 825. A higher proportion of natural white pine and hemlock, and a larger area of sandy soil than occurs in the Russell Town Forest were real differences that would alter comparative results, but there seemed to be enough similarity to make an anology worthwhile. Until the Gould study was made little budgetary information was available for as long a period as ninety years.

Assuming a sawlog price increasing at the end of every thirty year period of the ninety year plan until the price is reached equal to one and a half times the 1942-1944 price, and assuming a limited market for the cordwood and pulpwood, Gould devised a budget. He found that with good management, a two man crew with a power chain saw, a cut off saw, a light

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1. Gould, Ernest. 1950. Economic Problems of Managing Small Woodland Holdings in New England. Ph.D. Thesis. Harvard Univ., Cambridge, Mass. p. 217-232.

truck, and various woodsmen's tools, the budget would have a net income of $608,560.00 by the end of the ninety year period. These figures were based on no capital cost of the 2000 acre woodland at the start, accumulated deficits costing three per cent interest, labor at a constant one dollar per hour, and taxes remaining constant at forty-six cents per acre per year. It is notable that in this budget a net deficit was registered at the end of every decade until the fifth, at which time operations showed a ten year net profit of over $134,000.00.

Some of the conditions outlined above fit fairly closely the pattern in the Russell Town Forest today. On that basis accumulated profits should be in the general neighborhood of $600,000.00* remembering, however, that no original costs of the land were included. In calculating the budget, no account was taken of intangible values, pleasure, recreation, water protection, or education, and factors such as these make up a very important part of current evaluation of the Russell Town Forest program year by year.

To arrive at his findings, Gould[1] set up several alternate management plans of varying intensities and for varying market

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* Estimate reflects two factors bringing proportionately lower returns to Russell: a) less softwood in forest cover, and b) restricted cutting near watershed bodies.

1. Cf. TABLE IX and FIGURE 30 for details on Gould's Budget Plans.

conditions. Physical inputs and outputs are tabulated for each management plan, for example, assuming for plan number one, two, and three, and four, that there is a rising lumber price and a limited market for cordwood, each plan resulted in a different residual stand of timber.

Budget plan number four, being the least intensive method, involved clear cutting and high grading[1] with no forest management plan. Under this plan Gould estimated there would be a net increment at the end of a ninety year period in the residual stand, of only 161 cubic feet compared to 932 cubic feet of net increment in plan number three. Also a marked superiority of the quality of the residual stands shows the advantages of plan number three. Plan number three followed good cutting practices, using a forest management plan so as to encourage good reproduction, but undertook no thinning, salvage or weeding operations. TABLE IX indicates the efficiency of plan three compared to plans four and two in growing wood. The most intensive forestry practice was called for in Budget plan number two, involving wood salvage, road building, releasing, and weeding operations. This method differed notably from the other two plans in that about 30% more board feet of timber and 50% more cordwood were harvested

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1. "High grading" means a consistent cutting policy of taking the best formed trees of the most valuable species and leaving other types to the detriment of the stand.

TABLE IX.

AVERAGE CUBIC FEET OF STANDING TIMBER PER ACRE OF WOODLAND AT BEGINNING AND END OF THE 90 YEAR PLANNING PERIOD AND THE AVERAGE NUMBER OF BOARD FEET AND CORDS HARVESTED AND MAN DAYS OF LABOR USED PER ACRE DURING THE PERIOD UNDER ALTERNATIVE MANAGEMENT PLANS.

Plan No.	Type Management	Av. Cu. Ft. per Acre at beginning	Av. No. Bd. Ft. Harvested per Acre per Year	Av. No. Cds. Harvested per Year per Acre	Av. No. Man Days spent[1] per Acre per Year	Av. No. Cu. Ft. per Acre left after 90 Years
4	Least intensive; clear cutting; high grading, No management plan	1,067	171	0.21	0.5	1,248
3	Harvesting under good forest management plan but no other work	1,067	177	0.20	0.5	2,001
2	One half area most intensive; road building salvaging, releasing, thinning, good forestry. One half the area managed as in Plan 3 above	1,067	226	0.30	0.7	2,069

1. Power and equipment costs, converted into man-day equivalents, are included.

Source: Gould, Ernest, 1950. Economic Problems of Managing Small Woodland Holdings in New England, op. cit.

on the average each year, while the average number of man days spent per acre increased about 40%. The increased stability of earnings and net returns for plan two is shown in FIGURE 30, where net cash income by decades is compared among the three management plans.

The intensive method of development in Gould's study is shown to be a feasible way of utilizing labor in what amounts to self-liquidating forest operations. The Russell Town Forest Program is a combination of the intensive silviculture type of plan in Gould's number two budget, and of his enlightened cutting program in budget number three, since a good forest management plan is being followed, some road building and improvement is going on all the time, and really intensive forestry may begin at any time when there is substantial unemployment in Russell.

Current Costs of the Town Forestry Program

The costs of the current Town Forestry Program will vary to some extent with the costs of such items as the Forester's salary, and insect control, but a pattern has been established wherein the expenses are about $4000.00 a year not including watershed taxes. The biggest single item on the budget is the Town Forester's salary which is about $3000.00. APPENDIX IV-C, EXPENSE OF TOWN FOREST, shows that $600.00 is listed as a separate item for gypsy moth control, but actually it is a

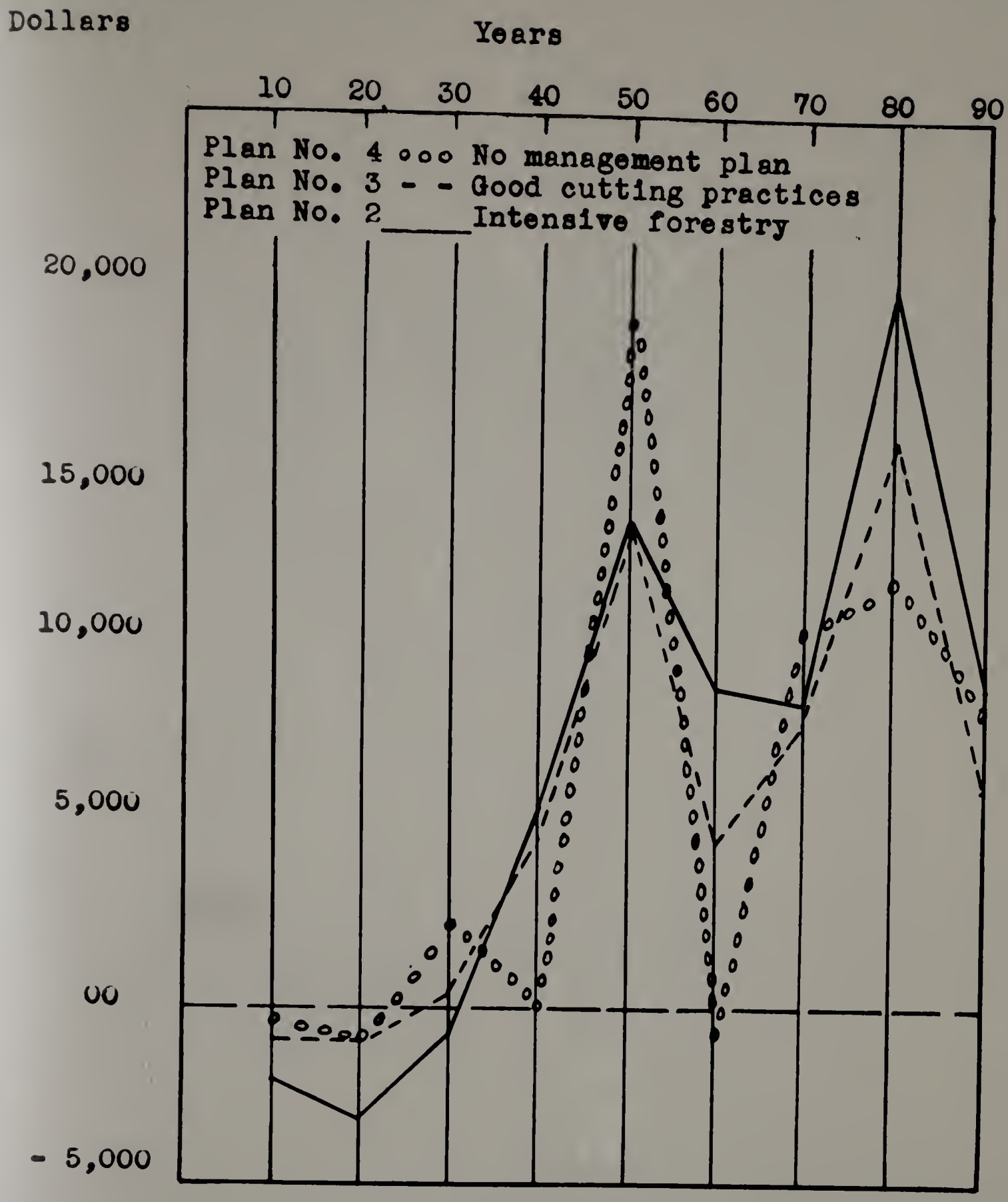

FIGURE 30

AVERAGE ANNUAL NET CASH INCOME BY DECADES AND FOR 90 YEAR PERIODS UNDER THREE ALTERNATIVE MANAGEMENT PLANS

Source: Gould, Ernest. Op. Cit. TABLE IX p. 22

Note: Real Property Taxes of $874.00 are included as an annual expense and 3% interest is compounded on deficits.

part of the annual salary of the Town Forester. Obtaining Indian back pumps and the purchase of a power chain saw has been part of the annual equipment or unspecified cost items, which were $175.00 in 1951.

Work Reservoir for the Unemployed in Russell

The cycles of business activity that have in the past eighty years affected the Town of Russell do not resemble the annual seasons of relative inactivity that characterize most farming operations. Nevertheless, the principle is the same in regard to the work in available forest land. The farmer can operate his woodlot during the slack months in the year harvesting material for fences, buildings, fuel and pulpwood. Similarly the Town of Russell, when a number of her able-bodied employable inhabitants are without work, can put them to good use in her forest.

During the business depression of the 1930's, like many municipalities such as Pittsfield, North Adams, Fitchburg, and Westfield, Russell utilized her unemployed workers to some extent in the Town Forest cutting firewood for welfare needs. Unemployed men helped plant the regular annual quota of seedling conifers in the Town Forest plantation.

Mr. Elmer Foster, the Town Forester, has prepared a forest management plan[1] that would productively absorb one

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1. Letter from Elmer Foster to J. Pullman, March 9, 1951.

hundred men for 3600 man days. The plan is ready to go into operation within a week of the development of the need, and would be to a considerable extent self-liquidating in that the pulpwood, fuelwood, posts or saw logs sold would bring some cash income to the forestry operation. The Forest would also gain in value through the improvement in the growing stock by weeding, thinning and releasing. The work is laid out in preparation of detailed assignment of the labor. Equipment, location, type and amount of labor have been listed, and progress maps of locations are available currently. The work program projected at present for the unemployed would include: road building; clearing and improvement; trail clearing; water hole development; plantation thinning and releasing; and silvicultural hardwood salvage.

The device of the Town Forestry Committee, appointed by the Town Board of Selectmen, has been treated elsewhere in this report as to its administrative functions. But the direct and indirect effect of this body on the education for wise resource use of the people in the Russell region has had a great potential. No objective methods of measuring this educational effect are available but the studies, plans, and publications which the Russell Town Forestry Committee have brought about can be mentioned.

To begin with, the example set by a democratically

selected committee representing different elements in the population working with a specialist in forest land management is educational from the standpoint of constructive community organization in action. The multiple exchange of information and ideas has resulted in a widening circle of interests and efforts, carrying over into the economic and social relationships of people in the region of Russell.

The Town Forestry Committee through the Town Forester has been accumulating statistics on the food, habitat and occurrence of wildlife and fish in the whole town of Russell and has drawn up for further exploration a list of proposals involving attempts to remove factory waste from the Westfield River during low water stages, and to maintain steady year round flow of the Westfield River by regulating the flood gates at Knightsville Dam, above Russell in Huntington. Other proposals look toward equalizing the flow from the Cobble Mountain System (which would improve trout fishing), cleaning of other trout streams, improved land use to encourage wildlife by providing natural food and shelter. Thus a dynamic public agency in a community is seen to spread its influence not merely over the territorial limits of the Town Forest, but to lead regional thinking toward long-term land-use planning.

CHAPTER XII

RECREATION IN THE VICINITY OF RUSSELL

The Green Mountain Highlands and the Berkshire Hills have been enjoyed by summer resport people since before the automobile challenged the horse. Today forests, parks, and highways are coming under increasingly heavy recreational use. Russell is certrally located for a number of desirable public recreation areas. By automobile or bicycle or on foot Russell residents can reach many interesting places that offer a wide variety of experiences. FIGURE 31 shows there are twenty-two public forests or points of interest within twenty miles of Russell. In the Chester-Blandford State Forest near Russell, for example, there is fishing, hunting, hiking, picnicking facilities, and excellent scenic views, while within about fifty miles of Russell are bird and animal sanctuaries and numerous other publicly maintained recreational land units.[1] Camping, boating, swimming, and many more opportunities have been made available on these lands for all visitors.

Recreation in Russell

Russell has long shown an awareness for the need of a recreational program by appropriating funds for playgrounds,

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1. cf. Appendix TABLE for a list of available uses of public recreational areas within fifty miles of Russell.

FIGURE 31.

PUBLIC FORESTS AND POINTS OF INTEREST WITHIN A TEN AND TWENTY MILE RADIUS OF RUSSELL, MASSACHUSETTS.

Source: Mass. Official Route Map.1950 - 1951.
Conn. State Highway Tourist Map. 1950.

parks, and good equipment. Leadership has been supplied on a volunteer basis in winter, supplemented in summer by paid workers. Although the town is located in a picturesque river valley with ample space to move around in, and in spite of the wealth of the natural beauties and outdoor activities available, some organized recreation is desirable. The three most thickly settled areas in Russell combine the somewhat congested qualities of city dwellings with the isolation of country homes in that they are dependent for high schools, banking, most merchandising and hospitals on other communities. For most commercial recreation the inhabitants of Russell turn to Westfield or Springfield and in this sense they are suburban, but for local recreation the town presents a rural problem. As George Butler[1] pointed out, the rural child does not lack materials and resources for play, but he needs leadership to help him capitalize on his resources. Many parents are unfortunately unable or unwilling to provide such leadership so there is a need in rural as well as city areas for good play leadership. In Russell this guidance is provided by the churches, a 4-H Club, and a Brownie Scout Group, three Boy Scout Groups, Boys and Girls Clubs and the official town recreation program.

Expenditures for recreation have been a regular feature of Russell finance since early in the decade of the 20's when $400.00-

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1. Butler, George, 1949. Introduction to Community Recreation. pp. 87-88.

$800.00 was allocated. For the seven years 1944-1950 over $18,000.00 was spent for recreation, including capital outlays as well as current expenses.

In addition to the school in Woronoco and the one in Russell Village, used for recreation to a small extent, the Town of Russell has two community buildings available for club meetings, dances, and such organizations as the Boys Scouts. In Woronocco the Community Club has sports, game rooms, and hobby shops equipped with excellent carpenter and mechanics tools, and the building is heavily used since it is in the heart of the thickly settled region near the Strathmore Paper Plant just east of the Westfield River. Wholesome indoor activities for restless children was rather scarce in Woronoco so the community building facilities fill a great need. The Town Hall has a library and hall which are available for appropriate use by individuals or groups, and a recreation room in the basement includes machines and equipment for craft work. This basement room is the center for winter recreational activities.

Horseshoe courts and tennis courts are popular with both children and adults of Woronoco. During the summer playground supervision is provided the juniors who have opportunity for swimming, group sports, and handicrafts. The problem of transporting children to the crowded beach at Russell Pond[1]

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1. Annual Report, 1949. Town of Russell.

led to a movement either to restrict the Town-owned beach frontage to town residents, or to provide swimming pools to each of the two major neighborhoods in the Town. It was suggested that brook, spring, or filtered water could be used for the pools so as not to overtax the drinking water supply.

Plans for a park were drawn up for Russell Village by Elmer Foster and Donald Durrell cooperating, which included a swimming pool south of Bradley Brook opposite the end of Blandford Stage Road in the Village Center. As yet these plans have not been carried out, but they were designed to bring much new beauty and enrichment to community and to family life. Bicycle paths, picnic grounds, wading pools, and decorative plantings are some of the other advantages the park would afford along with baseball and football fields with bleachers.

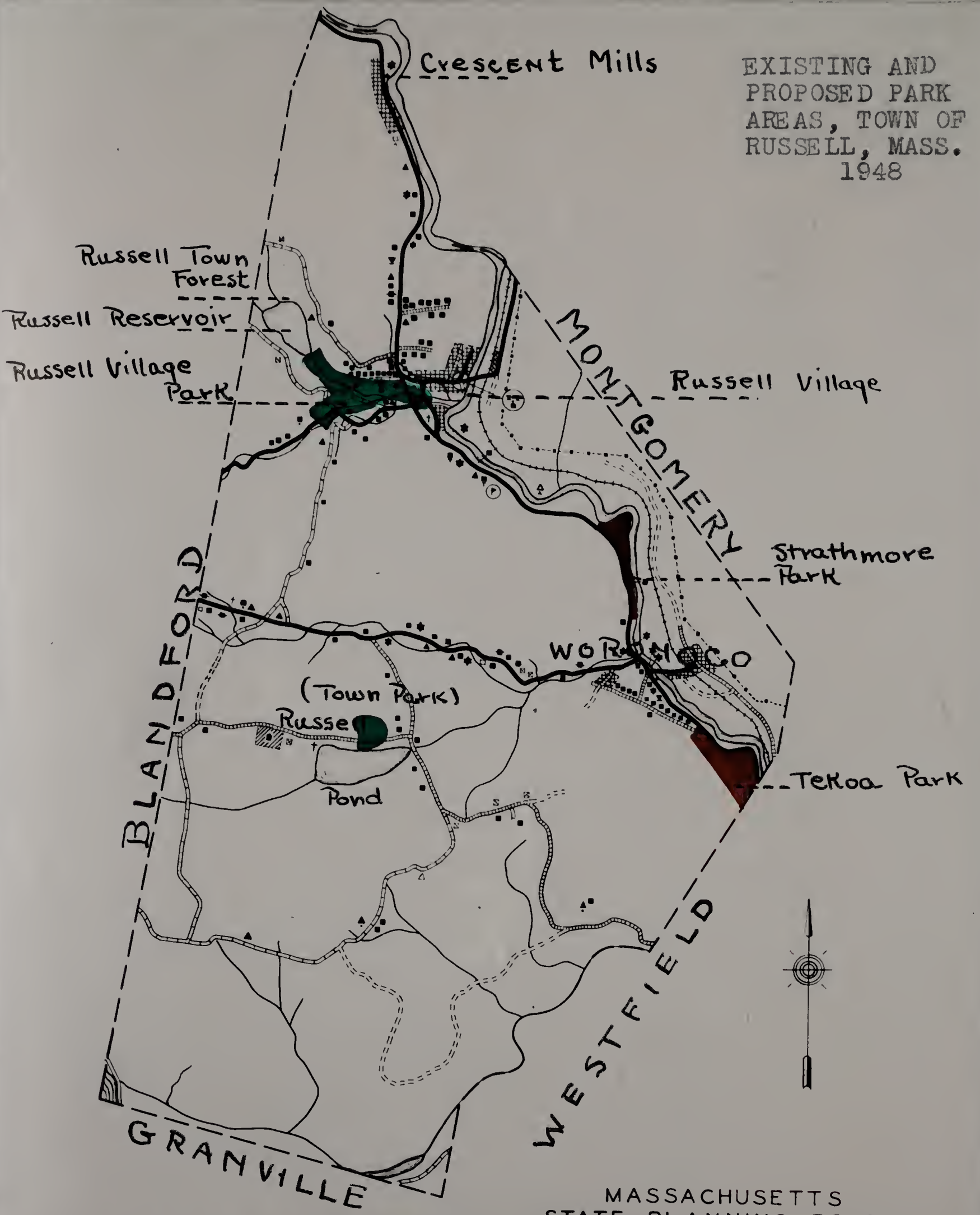
Already there are two playground and athletic sports areas in useful service near Woronoco down the Westfield River from Russell Village, namely, Tekoa Park and Strathmore Park. By location these areas are not easily accessible for citizens of Russell Village and Crescent Mills, so a practical plan has been worked out by Elmer Foster, the Town Forester, wherein land now in neglected woods lying between the Russell Reservoir and Route 20 would be converted into a wooded natural park. This land bordering Bradley Brook, Black Brook, and Reeeland Brook is largely in some stage of forest cover. There are several dwellings in the area included within the general boundaries

of the park, but apparently the private houses would not be disturbed by creation of the park. Land use by private owners within the district of the proposed park would be restricted and the town would take title to most of the land indicated in the proposed Russell Village Park areas found in FIGURE 32, EXISTING AND PROPOSED PARK AREAS, TOWN OF RUSSELL, MASSACHUSETTS. The plan involves land leading through the woods along Black Brook for about three-quarters of a mile from where the brook crosses Route 20 in Russell Village, to the dam of the Russell water supply reservoir in the Town Forest.

The route along Black Brook is not only an invitation to potentially good fishing but to interesting exploration and study, since it is liberally supplied with exposed rock formations, stream-cut erosion patterns, and historic old moss covered roads such as Stony Gutter Road. Hemlocks predominate the narrow glen through which the brook flows on its fast course from 600 foot level down to 350 foot elevation. Since this 250 foot drop occurs within three quarters of a mile, it means the stream is tumbling down an average of six vertiole feet for every hundred feet horizontally. One particularly interesting spot along this stream in the proposed park is where some resistant rock, studded with quartz intrusions form a spillway in a deep narrow glen.

The Russell Pond, a 60 acre body of water west of Woronoco in the Town of Russell has attracted summer dwellings, boating

EXISTING AND PROPOSED PARK AREAS, TOWN OF RUSSELL, MASS. 1948



Source: Foster, Elmer, 1948. Paper on natural resources in the Town of Russell p. 12

Existing parks

Proposed parks

MASSACHUSETTS
STATE PLANNING BOARD

ROADS AND BUILDINGS TOWN OF RUSSELL

W. P. A. PROJECT NO. 13684

SCALE IN MILES
1/2 1/4 0 1/2 1 2

OCTOBER 1937

51-285B

FIGURE 32.

and swimming establishments. Variously known as Woronoke Lake, Hazzard Pond, and Russell Pond, the pond is safe for swimming, and for this reason Russell citizens saw fit to acquire some shore frontage for the townspeople who have no other safe swimming facility. The land rising behind the beach was to be acquired for picnicking, bathhouses, and general recreation use.

Hunting and fishing are popular with the inhabitants of Russell, and the nearby supply of such game makes their pursuit worthwhile. In 1938 for example, 96 fishing licenses 80 hunting licenses, and 52 combination sportsmen's licenses were sold to adult male residents of the State by the Russell Town Clerk. Most of the licenses were to local people who were familiar with the privileges allowed hunters and fishermen in the Russell Town Forest. A reasonably good supply of fox, coon, deer, partridge, woodcock, and rabbit is present in this upland game territory. According to Elmer Foster[1] the resident and non-resident hunting pressure is extremely heavy, and some remedial steps may have to be taken if the trend continues. The Russell Beagle Club with 120 members, works for the husbanding and replenishment of the rabbits which are their particular interest. The State Conservation Department is cooperating in a program of repeated plantings of snowshoe rabbits in the area as an experiment to see if that breed can become locally established.

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1. Foster, Elmer, 1948. Natural Resources of Russell, Mass. p. 13.

As part of a town wide effort[1] at improving fishing conditions, it was proposed in 1948 that the Russell reservoir be stocked with trout for later release into Black Brook below the reservoir dam. Trout fishing is poor in all streams in town including the Westfield River. A combination of factors tend to keep fish populations at a low level, boosted only temporarily by the State stocking operations. The townspeople were advised that realistic efforts at stream flow correction, and a scientific stocking program would pay bit dividends in the form of better fishing.

Since the position of Town Forester was filled in 1947, about twenty-five of the Boy Scouts of troops in Russell Village and Woronoco have used the Town Forest for limited programs in forestry and camping. Scouts planted several thousands of seedling conifers in open plantations and to fill in places where previous plantings had failed. Under a cooperative arrangement they had the privilege of cutting Christmas trees in the older spruce plantations for sale to local people who had ordered trees. Of the proceeds of the sale, the Town of Russell received sixty cents a tree. These same scouts have utilized the small logs resulting from a thinning operation in a pine plantation to build a shelter off the water shed in the northwest corner of the Town Forest. To

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1. Foster, E., 1948, op. cit., p. 14.

the present time few visits and little activity have characterized the locality of which the Scouts have been given the use. Inaccessability from Russell and competition of other troop activities for available troop leaders time are given as the chief reason for the lack of use of the Scouts' Town Forest area.

Except for the Boy Scout program the Town Forest of Russell serves as a direct recreational resource only as hunting or fishing grounds for individual sportsmen. As a source of food and natural shelter for game, the Russell Town Forest makes a contribution to the hunters and lovers of wildlife. The only prohibition against hunting other than the State regulations are that no hunter is to approach within half a mile of the reservoir. The Town Forester keeps a tally of the game and vermin he sees on the Forest for purposes of policy-making in the future.

Summary

In reviewing the current recreational situation in Russell, it has been found that:-

1. The children of the three communities, Crescent Mills, Russell Village, and Woronoco have good facilities and leadership for playground and indoor recreation.

2. Adults and children, especially in Woronoco, have more or less available facilities for summer and winter sports, basketball, and baseball.
3. Supervision is by volunteers in the winter, but paid leaders are on duty, especially with the children in the summer.
4. Unorganized outdoor recreation consists largely of hunting and fishing.
5. The supply of trout is poor and the moderate sized upland game population is under very heavy hunting pressure from residents and non-residents.
6. Numerous state forests, a park, and a city forest park zoo are available within twenty miles for recreation and education in natural history. These are visited by families and occasional clubs or school groups from Russell. The town is well located both to produce and "consume" unspoiled forest and wild land recreation.
7. The accessibility of a large enough safe place for adults and children to swim is a problem for the inhabitants of Russell Village and Crescent Mills.
8. A natural wooded park is being considered for the Town of Russell embracing both banks of Black Brook from the Russell reservoir downstream to Route 20.

9. A playground, ballfield, picnicking area is being considered as an intensively developed park in Russell Village, to equalize the facilities present in Woronoco.
10. Organized recreation has not progressed to the point where the woods and wilds around Russell are much utilized through hiking or nature interpretation programs.
11. The Boy Scouts have the use of a certain area off the watershed in the Town Forest for camping, but little use is made of it.

CHAPTER XIII

DEVELOPMENT OF THE EDUCATIONAL PROGRAM IN RUSSELL

Recent Educational Activities

The Annual Reports of the Russell Town Forests since 1946 have carried a broad educational message. These reports have included attractive photographs, graphs and succinct basic principles, calculated to make for community pride and interest in the constructive land use program under way in the Town Forest.

The 1946 report, for example, took up four pages of the Town Report, two pages of which carried photographs. Captions under the pictures such as, "A well-marked boundary is essential to good forest management," --- "Pruning your plantations in their early stages will yield a better grade commercial product in the years to come,"[1] and "Protect your forest with well-maintained fire roads and trails." On one of the other two pages the Town Forester inserted a map of the town forest with the cover-type described, and on the other a list of work he accomplished in his duties and a graph showing the man-hours devoted to seven classes of functions. It is interesting to note that nine hundred eighty hours were devoted

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1. Russell Town Report, 1946, p. 48.

to the general heading of "survey" out of a total of eighteen hundred and forty hours' work. It indicates the seriousness with which good forestry management principles were undertaken at this time. Boundaries were clarified and marked, detailed maps of the area were prepared. Forest management, field studies and plans were made, and historical records were brought up to date.

Thus during the year 1946 the primary principle of making accurate maps, inventory and management plans was well carried out and described to the taxpayers of the town. Not only good techniques for wood production, but education in wise land administration has marked the reports of the Town Forester, in areas such as forest-fire prevention, wildlife management research, fire-prevention, soil and water conservation.

In 1946 field trips were conducted through the forest to show and explain to five different Scout groups and three other groups what the forest consisted of and what the program was.

A regular mutual benefit plan has been worked out with the Boy Scout Troop from Russell Village whereby the Scouts have been planting seedling on the Town Forest under the guidance of the Town Forester, Mr. Elmer Foster. In return the troop members take a harvest of young spruce trees suitable for sale as Christmas trees. Only such trees are cut as is consonant with good silvicultural techniques, and the number

out is calculated not to supply any more than the local market demands. The town receives a small payment for each tree.

In 1947 the Hampden County Boy Scouts were given a demonstration of forest principles and practices, as were other interested groups, important among them the Vocational Agriculture students from the Westfield High School.

In 1948 the Town Forestry Committee broadened the scope of the Town Forester's service and educational work. He was authorized to "advise and assist any citizen of the Town in practical problems of forestry",[1] and this function has been actively pursued. Each year several townspeople have had on-the-spot advice concerning the care of their woodlots. At the present time the Russell Town Forester is permitted to answer requests for investigations and advice on the community forests of towns other than Russell. Here is a clear indication of how firmly the town voters and the Town Forestry Committee believe in the importance of spreading information about wise woodland management. It is obviously appreciated that the cumulative interest in and enlightenment about woodland management throughout the region is of great importance. Not only in regard to such protective measures as insect and fire control, but in the area of cooperative marketing, it is important to have timberland owners work toward the same ends.

Beyond the limits of advising various people about woodland

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1. Russell Town Report, 1948, p. 52.

management, Foster, the Russell Town Forester, is striving to promote thinking and study on a regional basis. One line his efforts have been following, for example, is to explore the need and potentialities of creating a Westfield River Valley Conservancy District fashioned somewhat after the Muskingum project in Ohio.[1]

Conservation Education

The Town Forestry Committee and the Town Forester, Elmer Foster, together with Dana Webber, superintendent of schools, helped install a five week conservation course in the social science courses taught at the Russell schools in 1949. At the end of the conservation teaching course, the male students twelve years old or older in grade school or secondary schools compete in an essay contest on the subject of conservation. The two winners are given the opportunity of attending the Conservation Camp in Great Barrington, Massachusetts during the summer. The operation of this plan has met wide and inthusiastic support from the students.

During the first summer of the program, in 1950, members of the Forestry Committee themselves contributed the cost of sending the winners to camp.

Mr. Foster, the Town Forester, indicated he hopes to see

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1. For details on Muskingum Watershed Conservancy District, Browning, Bryce, 1949 "The Muskingum Story." Journal of Soil and Water Conservation, 4:13-20. Also Frank, Bernard and Anthony Netboy 1950, Water, Land and People, 198-200.

the school conservation teaching course further enriched by field trips to locations where the processes of man and nature can be seen first hand, for example, in the Town Forest.

Russell School System and Local Natural Resources

At the present time the Russell School system operates two grade schools, the Woronoco school and the Russell Village school, kindergarten through eighth grade, and pays tuition for those students from Russell who are attending either Huntington or Westfield High School. Reflecting the lowered birth rate during the thirties, the enrollment of all students dropped from 201 in 1944 to 173 in 1949.[1] Of these the number attending High School ranged from fifty to sixty.

The school committee has been energetic and cooperative with the superintendent in developing more efficient methods of learning, such as the greatly increased use of audio-visual aids material. More realistic teaching has accompanied the adoption of the so-called unit plan in the grade schools. Through this device the grade school subjects are taught in the class room around samples or segments of life experiences such as "life on the farm" or "How clothing is made". One interesting program of study has been centered around a six week unit on

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1. Annual Reports, Town of Russell. 1944, 1949.

conservation in the upper two grades of both schools.

The conservation education program in the schools, strongly influenced Mr. Dana Webber, superintendent of schools, and by the Town Forest Committee, was stimulated by advice and materials contributed by the Town Forester. The Town Forestry Committee has established the policy of awarding a prize for the winner of a school essay contest. For the boys the prize is a summer stay at Conservation Camp, operated jointly by the State Department of Conservation and sportsmen and conservation groups in the State. Mr. Foster, the Town Forester is one of the judges of this essay contest. He indicated that very creditable work has been done and that there has been aroused a real interest in conservation. Girl students, who are not eligible for the Conservation Camp, are awarded other prizes for superior essays.

The next logical step in promoting life adjustment and effective school work is to bring the students out of the class room into the community and the surrounding woodlands at appropriate times. There the learning process can be stimulated by using plants, earth, animals in actual situations. Mr. Webber hopes to develop a pro ram of teaching which will mean more field trips and outdoor education. He realizes the wealth of learning materials there is in the woods and streams around the town.

However, the change cannot be made in a year. He cautioned that not only must teachers become convinced of the worth of the method but they must be equipped to handle a more demanding role. Parents may also be difficult to persuade of the value of using the out of doors as a classroom. One of the teachers at the Worronoco school indicated in a conversation that learned that the children were learning a great deal about birds and nature even within the school yard grounds. Trips outside the school yard with the children did not appear necessary or practical to this experienced teacher.

The students attending High School in Huntington and Westfield are somewhat limited in their ability to engage in after-school activities such as varsity team play or Biology Club. Mr. Ralph Haskins,[1] Principal of the Westfield High School said that one of the reasons that more use is not made of the field trip device in his school was that the students who have to travel from long distances by school bus, for example, those from Tolland, Massachusetts have to leave promptly at the close of normal class sessions. Mr. Haskins suggested that outdoor education fitted in well with the Vocational Agriculture course, but the innumerable scheduling conflicts that would arise by trying to bring the regular academic course classes out of the school building for course work made this process impossible.

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1. Interview, 1950, Westfield High School.

The school as a whole had participated in a tour of the Town of Westfield's places of industry and trades in 1950, and this program will be repeated periodically. According to Mr. Haskins the Massachusetts Department of Education imposes no controls over activities such as field work or school work projects provided the students are checked in at the school for the requisite number of days in the school year.

Arthur Frellich, Vocational Agriculture teacher at the Westfield High School mentioned in a conversation that his students regularly were brought out to such projects as orchards, woodlots, pountry farm or terracing operations to acquaint them by seeing and doing actual farm operations. During the stormy and winter weather background study work is done in the school building, but field work is considered a vital part of the program.

No forest land is owned by the Westfield High school, so for demonstration forestry Mr. Frellich takes his classes to such places as the Russell Town Forest. Mr. Foster took this group on a tour of the Russell Forest in 1947. Then the out of doors is used as a class room by the eight or ten student enrolled in the Vocational Agriculture course. The other corps of students enrolled in the Westfield High School among them the youth of Russell, Blandford, and Montgomery, do not have the outdoor laboratory experience or the exp rience

in solving community problems.

Summary

1. Russell operates two grade schools - one in Woronoco, the other in Russell, with a total enrollment of about 140 students.
2. Russell pays tuition for those of her students who wish to attend High School in either Huntington or Westfield.
3. Audio-visual aids are being used extensively, hot lunches are served, and playground supervision is provided.
4. Conservation is taught as part of an important unit in the uper grades, all done in the classroom.
5. The Town Forestry Committee has been active in furthering conservation education in the schools, offers a prize for superior essays on the subject.
6. Actual outdoor education is still to be developed. There is no actual use of the Town Forest as outdoor classes in grammar schools as yet, but the superintendent is working towards this possibility.
7. Westfield High School where the majority of Russell secondary school students go, has no outdoor education program, other than physical education. ~~Nor does that~~

CHAPTER XIV

SUMMARY - PART I

Community Forests in General

1. Community forests have long been a successful tradition in many European countries, especially Switzerland, Germany, France, and Czechoslovakia. In Europe, due to good intensive management, high demand and price for products, and proportionately cheap labor, the forests have often proven great financial assets to their owners. Recreation, hunting, and wood gathering are common supplementary uses in Europe's rural wooded regions where community forests are most common. Large urban forests support extremely heavy reacreation uses.
2. In the United States particularly in the last seventy-five years there has arisen a movement toward conservation of human and natural resources. One of the direct outgrowths of this movement has been the acquisition of public and private bodies on all levels of lands to be managed according to sound ecological principles.
3. Communities have shown that they profit from a careful study of their local and regional; resources, so that realistic plans may help them avoid waste and disorganization and gain a better life.
4. Community forests have been developed in the United States

chiefly since 1910. The size, type, origin, and use of these forests varies widely and changes with the evolving local needs.

5. The success of a community forest tend to be determined by the cultural good health and balance of its owners.
6. Community forests have been created to withdraw roads and inhabited areas from use as residences in order to save on the maintenance of roads and transportation of school children.
7. The flexible work program in a community forest lends itself to use as a work reservoir for excess labor or seasonal unemployment.
8. The needs of communities vary so widely that it is not possible to visualize adequately what the long term plan for a community forest will be until that community has made a master plan. Some plans place education and recreation ahead of erosion control or the production of wood products. The most important fact that has emerged in this connection is the necessity of making a well-reasoned land use plan, and carrying it out.
9. The extensive establishment of community forests does not indicate that State Forests are not needed. The State areas tend to be larger, and to occupy ground which small, poor communities would not be able to manage adequately. The limited financial resources of many rural communities make

it impossible for them to wait until such time as the timber crop becomes available for a cash return.

10. Municipal watershed forests are most common in the northeast, but several other public forest types are represented in other areas; the school forests are most common in Wisconsin, Michigan, and New York; county forests grew largely to retire submarginal land and the town forests in which Massachusetts was a pioneer are commonest in the New England area.

11. There are two primary types of Town Forest, that of watershed protection, and that of production of wood products.

12. Multiple use techniques are being increasingly used in the community forests.

13. Watershed forestry is a profitable use of watershed lands in forest-growing regions. Intensive forestry is becoming more common on these lands.

14. Watershed management is using more flexible devices to make efficient use of the land, some of which uses are for public enjoyment.

15. The degree of public pressure to use watershed areas for recreation tends to determine the use arranged for. Water treatment by sand filtration is the most reliable form relied on when waters known to be polluted are to be used for domestic water supply.

16. Recreation in forests and natural wooded parks has encreased enormously in the last generation, and the local public forest serves this need for the greatest numbers.
17. The managed forest, compartmentalized into natural and timber-growing areas is an effective device for both recreation and profit.
18. Changing aims and methods of education have led to the use of the community and the woodlands as laboratories and work projects for helping students gain knowledge and social responsibility.
19. Local public forests or school forests make excellent permanent areas for ecological studies and demonstration areas.
20. School camping has been proven to be a strong aid in the learning process and also in the social development of the student both in high school and in grade schools.

SUMMARY - PART II

The Russell Town Forest

1. Russell is a paper manufacturing town on the Westfield River about fifteen miles west of the metropolitan center of Springfield. The population has shown marked stability, at about 1250 persons. To the south, and west, and north Russell is surrounded by small towns which like herself are about 80% in woodland of some sort, and whose populations are well below what they were in 1900 or very little above it.
2. The paper companies in town pay approximately 65% of the property taxes in Russell, and enable the townspeople to have a much lower tax rate than would otherwise be the case. Other factors tend to require less town expenditure per capita such as the short highway mileage the town must maintain compared with such towns as Blandford and Huntington.
3. Beginning in 1912 and chiefly in the decade of the 1920's Russell acquired land to protect the Black Brook Watershed, until now she owns 3,000 acres of brushland and woodland, almost wholly in the town of Blandford. This woodland has been protected from fire and insects, and thirty open fields were planted to some 280,000 trees over the years 1923-1938. This planting has covered 237 acres. Russell's reservoir is well protected from siltation and rapid runoff by the watershed forest.

4. The topography in the Town Forest rises as high as 1400 feet, and is largely gently sloping plateau, above the 900 feet level, but the low point, at the reservoir, is 600 feet above sea level, while the majority of the inhabitants live on the valley bottom at the 245 foot elevation. Schist bed rock throughout the Forest makes a heavy soil, favorable for timber growth.
5. Cover types in the town forest include all the common transition forest types, such as red oak, hemlock, beech, hard and soft maple, white ash, black, yellow, white and grey birch, ironwood, popular, pine and black cherry, white and red pine.
6. The Town Forestry Committee, created in 1923 with the Russell Town Forest, plans the program and hires currently a trained forester whose duties are primarily to safeguard the watershed forest from fire, insect and disease attack. His work also involves marketing forest products, silviculture, education of visitors, and services of forest management to individuals.
7. The fact that this Town Forestry Program has a full time Forester sets this program apart from most other town forests.
8. Watershed considerations on 2500 acres of the forest requires the leaving of 75% of the overhead canopy in all operations.
9. Russell Town Forest has at present only about 800 acres of the timberland dense enough to operate profitably in normal logging operations.

10. About 3,000,000 feet of available saw timber of all qualities is present.
11. Mature timber is accumulating at about the rate of 75,000 board feet per year and cordwood at the rate of 400 cords a year.
12. Hemlock makes up the largest amount of saw timber which is merchantable with about 1,500,000 board feet of timber growing and mature, while the mature natural white pine growth is of a poor quality and pine reproduction is not competing successfully with the hardwoods.
13. Considerable areas are still open enough to plant.
14. Red oak is the dominant merchantable hardwood species but in large areas the understocked hardwood stands contain the tolerant tree types like gray birch, pin cherry, and poplar. Soft maple is present in very large supply and measured in cords numbered 5,550 cords.
15. Providing that there is a market self-liquidating improvement cutting was recommended by an expert and has been shown to be economically sound.
16. Markets for pulpwood have developed a great deal in the past fifteen years and prices for pulp have risen along with the lumber so that stumpage values in general are near their highest figures in history.
17. As a result the time seems near when Russell will have

an active self-liquidating improvement cutting program.

18. Eventually Russell should be able to harvest an annual crop of 200 board feet per acre from those areas which are safe to lumber, provided that the Town maintains its record of insect control, fire control, and other conservational methods.

19. The plantation program will not yield the 500 board foot average of quality timber that is common in some European conifer groves because of ice breakage, in the case of red pines. Because of the damage done to the white pines by the weevil, those trees have become bushy and blister rust has weakened or killed others.

20. Russell has felt the need of a recreation program and the town has provided outdoor and indoor facilities in the two centers of population. Paid recreation workers are employed during the summer months while numerous volunteer organizations, groups, and individuals carry on with the children during the rest of the year.

21. The present two town parks in Woronoco, the southern center of Russell's population, may be augmented by a playground-picnicking park in Russell Village according to plans under consideration.

22. A natural park is also proposed to extend from Route #20 in Russell Village to the Town Forest line on Black Brook.

This is a beautiful area and would be well used in this way.

23. The Town Forest is used by informal, unorganized recreationalists such as hikers, hunters, and those who enjoy the out-of-doors.

24. The Boy Scouts have been given the privilege of using an area in the northwest corner of the Town Forest off the watershed. There is a shelter on this area, but due to remoteness of the spot and difficulty in transportation to the area, it is little used by this group.

25. At the present time Russell grammar schools do not use the outdoors or the Town Forest as a learning device. However, Mr. Dana Webber, the Superintendent of Schools in Russell looks forward to bringing these methods into use.

26. The school course has a conservation unit for its seventh and eighth grades and lasts about five weeks. The Town Forestry Committee has shown its concern for the interest of its young people in conservation by sponsoring an essay contest on conservation.

CHAPTER XV.

CONCLUSIONS.

1. As a watershed protection forest, the Russell Town Forest is successful in that the reservoir water is clear, potable and has resisted the stress of drought. Water rates for town water users are low.
2. The Town Forest acreage is successful in that it provides food and cover for upland game which proves to be a source of enjoyment to hunters and recreationists from the surrounding towns.
3. Forestry operations have accumulated a large deficit which will not be materially reduced for several years. However, since the Town is not dependent on short-term financial considerations, the planting program and other efforts at good forest management should eventually be rewarded by substantial average annual returns.
4. The acreage of the Russell Town Forest off the watershed could well be made available for camp craft, nature trails, demonstration forestry, and camping zones of varying degrees of remoteness providing there could be adequate supervision.
5. The fact that Russell has a good forest and a Forester, and the fact that the Town is solidly behind the Town

Forest Program, creates an ideal situation for furthering conservation thinking within the community, and an ideal medium for furthering education through the use of outdoor learning opportunities.

6. One important discovery made was that, contrary to many previously published and widely read articles, the Russell Town Forest was not acquired for the retirement of submarginal land, but rather for a watershed protection forest. Similarly it was not created to reduce the amount of road mileage that had to be maintained by the Town of Russell.

7. Another fact seldom mentioned in the Town Forest literature about Russell is that over 2600 acres of the land is in the Town of Blandford and that is the town which benefited most from reduced road mileage and elimination of the rural school problem.

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APPENDIX I.

LEGAL AND GENERAL MATERIAL ON TOWN FORESTS.

Community Forest Record

Programs
Community Forests

Name:* _____ Location _____ County _____ State _____

Area: Acres ___ Date established ____ Additions ____ No. Units _____

Kind: Municipal ___ Watershed ____ County ____ Township ____ Town ____
School _____ Other _____

Type (in acres): Old Growth ____ Second Growth ____ Reforested ___
OPen _____ Water _____

INCOME			PLANTING RECORD		
Year	Products	Value	Year	Species and Spacing	Total

Who owns title ?

Person in Charge _____ Address _____

Date Visited _____ By _____

How Acquired: Purchase ____ Gov't ___ TaxTitle ____ Other _____
Sponsored by _____ Cost _____

Objective : Timber ___ Water Protection ___ Recreation ___ Education __
Relief ___ Erosion ___ Beautification ___
Wildlife Refuge ____ Other ____

Improvements: _____

Management and Use: Mapped ____ Written Plan _____

Record of Thinning, Cuttings, Prunings, and other cultural improvements:

Other miscellaneous data:

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* Copy of the schedule sent by the United States Forest Service to administrators of community forests, 1947.

ACTS PERTAINING TO TOWN FORESTS

TERCENTENARY EDITION OF GENERAL LAWS

COMMONWEALTH OF MASSACHUSETTS

1.

G. L., c. 132, 35. Forests in cities and towns. Towns may acquire by purchase, gift or bequest lands for the purpose of forestation and may reclaim and plant such lands. The said department may upon application in such form as the forester may prescribe furnish such towns free of charge with seedlings for the planting of their lands.

2.

G. L., c. 45, 19. Laying out and use of public domain. A town, by a two-thirds vote at an annual town meeting, or a city, by a two-thirds vote of the city council, may determine to take or purchase lands within its limits, which shall be a public domain, and may appropriate money and accept gifts of money and land therefor. Such public domain shall be devoted to the culture of forest trees, or to the preservation of the water supply of such city or town, and the title thereto shall vest in the city or town in which it lies, except that cities or towns owning land within the territorial limits of other cities and towns for water supply purposes may, as herein provided, convert such land into a public domain and retain the title thereto.

3.

G. L., c. 45, 20. Taking by eminent domain. If a city or town has determined to take land for a public domain as provided by the preceding section, the aldermen or the selectmen shall within ten days adopt an order for the taking of such land in fee by eminent domain under chapter seventy-nine.

4.

G. L., c. 45, 21. Management of town forests. The management and care of that portion of the public domain known as the city or town forest, excepting lands held within the watershed of any pond, stream, reservoir, well, or any water used by a city or town as a source of water supply, in a town shall be in charge of a special town forest committee appointed by the

selectmen, and in a city shall be in charge of a forester or of such other board or officer as the mayor or city council may determine. The special town forest committee shall be composed of three members who shall choose their own chairman, and shall serve without compensation. One member of said committee shall be appointed each year for a term of three years, except that, when first appointed, one shall be appointed for a term of three years, one for a term of two years and one for a term of one year.

5.

G. L., c. 45, 22. Building on town forests. Any city or town owning a public domain may lease any building thereon, and it may erect thereon any building for public instruction and recreation. All sums derived from rents or from the sale of the products of any such domain shall be applied, so far as necessary, to the management thereof.

6.

G. L., c. 45, 23. Expenditure limited. No land shall be taken or purchased for a public domain, no building erected thereon and no expenditures authorized or made or liability incurred therefor until an amount sufficient to cover the estimated expense thereof has been appropriated therefor as provided in section nineteen, and all contracts made for expenditures in excess thereof shall be void. The expenditures shall not exceed the appropriations therefor.

7.

G. L., c. 44, 7. Incurrence of debt for acquiring public domain. Cities and towns may incur debt, within the limit of indebtedness prescribed in section ten, for the following purposes, and payable within the periods hereinafter specified: (2) For acquiring land for public parks or playgrounds or public domain under chapter forty-five, thirty years; but no indebtedness incurred for public domain shall exceed one-half of one per cent of the last preceding assessed valuation of the city or town.

Policy on Multiple Use of Society of American Foresters

By the principle of multiple use of forest and other wild lands the Society of American Foresters means a conscious effort to manage each unit of land for its highest substained productivity. ( ) A 1947 referendum ballot of the large majority of members approved this statement of policy.

"In all cases the development of --- plans requires adequate recognition of all resources and benefits, with due consideration of the relative social and economic values of each resource present and of the effects of utilizing one resource upon the stability, value, and appreciation of the others."

1. Satisfactory conditions of soil, cover, and water flow are basic, and all forest lands regardless of type or purpose of ownership should be so managed and protected as to maintain fully those conditions.
2. Management policies, plans and practices governing the use of a principle resource such as timber should take into account and make specific provisions for all the resources capable of use or appreciation, not just the principal resource alone.
3. Methods or intensities of practice, as in timber harvesting, livestock and big game grazing, recreation

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( ) "Policy on Multiple Use"/ Journal of Forestry, Vol. 46;15 ~~#1, Jan., 1948, page 16.~~

and road and trail construction which may bring about soil instability or adversely affect runoff and streamflow conditions, should be modified or avoided. ( )

4. "Knowledge and skill in multiple use management are as yet inadequately developed. Research on different phases of wild land use should be more effectively coordinated on the same experimental areas, and the study of multiple use problems should be made on integral part of such research;"
5. "Foresters, as managers of wild lands, have a professional obligation to keep abreast of scientific findings on the characteristics and inter-relations of forest resources, and of the effects of developing any one of them upon the others,"

( ) Ibid, page 15.

APPENDIX II.

PUBLIC HEALTH STATISTICS AND WATER SUPPLY POLICY.

APPENDIX II - A.

United States Public Health Service Standards for Drinking Water

On February 6, 1946 the United States Public Health Service adopted a revised Drinking Water Standard for use not only on federally controlled public health problems, but for a guide to other public health agencies. Since the American Public Health Association and American Water Works Association, & New York City concurred in the standards, it is valid to base some reasoning on these standards in controversies between members of these same associations. Recreational use of watersheds is one live issue of disagreement.

The Standards of U.S.P.H.S. 1946, insofar as they might relate to that issue follows:

1. "Definition of Terms, ( )

For the purpose of these standards the terms designated herein below shall be defined as follows:

1.1 Adequate protection by natural agencies implies various relative degrees of protection against the effects of pollution in surface waters; dilution, storage,

( ) United States Public Health Service "Drinking Water Standards - 1946" Journal of American Water Works Assoc., ~~Vol.~~ 38; ~~No.~~ 3, ~~March, 1946, pages~~ 363-369.

sedimentation, the effects of sunlight and aeration and the associated physical and biological processes which tend to produce natural purification; and in the case of ground waters, storage in and percolation through the water-bearing material.

1.2 Artifical treatment includes the various processes commonly used in water treatment, both separately and in combination, such as storage, aeration, coagulation, sedimentation, rapid or slow sand filtration, chlorination and other accepted forms of disinfection. Rapid sand filtration is commonly understood to include those auxiliary measures, notably coagulation and sedimentation, which are essential to its proper operation.

1.3 Adequate protection by artifical treatment implies that the method and degree of elaboration of treatment are appropriate to the source of supply: that the works are of adequate capacity to support maximum demands are well located, designed and constructed, and are skilfully and carefully operated and supervised by properly trained and qualified personnel, and are adequately protected against floods and other sources of pollution. The evidence that the protection thus afforded

is adequate must be furnished by frequent bacteriological examinations and other appropriate analyses showing that the purified water is of good and reasonably uniform quality, a recognized principle being that irregularity in quality is an indication of potential danger. A minimum specification of good quality would be conformance to the bacteriological and chemical requirements of these standards, as indicated in Sections 3 and 4.

1.4 Sanitary defect means any faulty structural condition, whether of location, design or construction of collection, treatment or distribution works which may regularly or occasionally prevent satisfactory purification of the water supply or cause it to be contaminated from extraneous sources. Among the extraneous sources of contamination of water supply are dual supplies, bypasses, cross-connections, interconnections and back-flow connections.

1.5 Health hazard means any faulty operating condition, including any device or water treatment practice, which, when introduced into the water supply system creates or may create a danger to the well-being of the consumer.

1.6 Water supply system includes the works and auxiliaries for collection treatment and

distribution of the water from the source of supply to the free-flowing outlet of the ultimate consumer.

1.7 The coliform group of bacteria is defined, for the purpose of these Standards as including all organisms considered in the coli-aerogenes group as set forth in the Standard Methods for the Examination of Water and Sewage, current edition prepared and approved and published jointly by the American Public Health Association and the American Water Works Association, New York City.

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2. As to Source and Protection

2.1 The water supply shall be

(a) Obtained from a source free from pollution; or

(b) Obtained from a source adequately purified by natural agencies; or

(c) Adequately protected by artifical treatment.

2.2. The water supply system in all its parts should be free from sanitary defects and health hazards, and all known sanitary defects and health hazards shall be systematically removed at a rate satisfactory to the reporting agency and to the certifying authority. Approval of public water supplies by the reporting agency and the certify-

ing authority will be conditioned by the existence of:

(a) Rules and regulations prohibiting connections or arrangements by which liquids or chemicals of unsafe, unknown or questionable quality may be discharged or drawn into the public water supply.

(b) Provisions to enforce such rules and regulations effectively on all new installations; and

(c) A continuing program to detect health hazards and sanitary defects within the water distribution system.

2.21 Applications - For the purposes stated in these Standards, responsibility for conditions in the water supply systems shall be considered to be held by:

(a) The water purveyor from the source of supply to the connection to the customer's service piping, and

(b) The owner of the property served and the municipal, county or other authority having legal jurisdiction from the point of connection to the customer's service piping to the free-flowing outlet of the ultimate consumer.

3. As to Bacteriological Quality

3.1 Sampling - The bacteriological examination of water considered under this section shall be of samples collected at representative points throughout the distribution system. The frequency of sampling and the distribution points shall be regulated jointly by the reporting agency and the certifying authority after investigation by either agency or both.

The minimum number of samples to be collected from the distribution system and examined by the reporting agency --- each month should be in accordance with the number as determined from the graph presented (omitted here) (or from the table):

Population Served	Monthly minimum no. samples
2,500 and under	1
10,000	7
25,000	25
100,000	100
1,000,000	300
2,000,000	390
5,000,000	500

3.2 Applications 3.21 and 3.22 given below shall govern when ten milliliter portions are used and applications 3.23 and 3.24 shall govern when one hundred milliliter portions are used.

3.21 Of all the standard ten milliliter portions examined per month in accordance with the specified procedure, not more than ten per cent shall

show the presence of organisms of the coliform group.

3.22 Occasionally three or more of the five equal ten-milliliter portions constituting a single standard sample may show the presence of organisms of the coliform group, provided that this shall not be allowable if it occurs in consecutive samples or in more than:

(a) Five per cent of the standard samples when twenty or more samples have been examined per month.

(b) One standard sample when less than twenty samples have been examined per month.

Provided further that when three or more of the five equal ten-milliliter portions constituting a single standard sample show the presence of organisms of the coliform group, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality. (Footnote - When this occurs, and when waters of unknown quality are being examined, simultaneous tests should be made on multiple portions

of a geometric series ranging from ten-milliliter to one-tenth milliliter or less.)

3.23 Of all the standard one hundred milliliter portions examined per month in accordance with the specified procedure, not more than sixty per cent shall show the presence of organisms of the coliform group.

3.24 Occasionally all five equal one hundred milliliter portions constituting a single standard sample may show the presence of organisms of the coliform group, provided that this shall not be allowable if it occurs in consecutive samples or in more than:

(a) Twenty per cent of the standard samples when five or more samples have been examined per month.

(b) One standard sample when less than five samples have been examined per month.

Provided further that when all five of the standard one hundred-milliliter portions constituting a single standard sample show the presence of organisms of the coliform group, daily samples from the sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfact-

ory quality.

4.1 Physical characteristics - The turbidity of the water shall not exceed ten p.p.m. (silica scale) nor shall the color exceed 20 (standard cobalt scale). The water shall have no objectionable taste or smell.

4.2 Chemical characteristics - The water shall not contain an excessive amount of soluble mineral substance, nor excessive amounts of any chemicals employed in treatment. Under ordinary circumstances the analytical evidence ... satisfies the physical and chemical standards given in Sections 4.1 and 4.21 ... will be sufficient for certification.

4.21 The presence of lead (Pb) in excess of one tenth p.p.m. of fluoride in excess of 1.5 p.p.m. of arsenic in excess of .05 p.p.m. ... shall constitute grounds for rejection of the supply.

APPENDIX II - B.

Water-borne Diseases

Mortality and Causes

A review of an anonymous article in the periodical Public Works, Vol. 78, #11, page 24, November, 1947 gave United States Public Health Service reports on water-borne disease outbreaks.

During the 8 year period 1938-1945:

116,292 persons were affected,

84 deaths resulted

2,047 of the 116,292 cases were typhoid, making a 40% reduction in typhoid cases compared with the previous 7 year period

Towns of 1,000-5,000 population had greatest number outbreaks:

46,477 cross-connections and back siphonage

29,288 untreated polluted lake water

13,138 inadequate and interrupted chlorination

12,770 inadequate control of filtration

About 300 outbreaks all told:

148 of outbreaks were from use of well and spring supplies and caused

792 - greatest number typhoid cases.

_____. 1948. Jour. Amer. Water Works Assoc., 40:2:265.

APPENDIX II - C.

ANALYSIS OF DRINKING WATER SUPPLIES

Year	Samples	Percent with Coli in 3 or more tubes	Number of tubes with B. Coli	Percent of tubes	Samples Monthly Basis
Town of Russell - Treatment by Filtration					
1950	13	7.7	6	9.23	2
1949	10	0	2	4.0	2
1948	0	0	2	3.3	2
1947	27	7.4	17	12.6	5
1946	26	0	6	4.5	0
1945	25	0	6	4.8	1
1941	26		2	1.5	1
Town of South Deerfield - Treatment by Hypochlorination					
1950	16	18.8	14	17.5	3
1949	16	31.	24	30.	1
1948	13	7.7	6	9.2	3
1947	18	27.7	27	30.	4
1946	21	4.7	10	9.5	3
1945	28	3.5	8	5.7	1
1941	23	3.	29	25.2	3

Source: Annual Water Supply Records, Commonwealth of Massachusetts, Department of Public Health, Western Massachusetts Division, Amherst, Massachusetts.

APPENDIX III.

DATA ON NUMBER AND TYPES OF COMMUNITY FORESTS.

APPENDIX III - A.

LIST OF ALL TOWN FORESTS IN MASSACHUSETTS IN 1950 INCLUDING SIZE, METHOD OF ACQUISITION, AND NUMBER OF TREES PLANTED.

Town	Year Begun	Acres	Trees Planted	Method of Acquisition*
Acton	1926	72		p
Adams	1925	50	10,000	ws
Amesbury	1938	40		p
Ashburnham	1922	35		g
Ashland	1942	507	41,600	g, p
Athol	1928	965	200,390	tf, ws
Ayer	1929	100	28,500	tf
Barnstable	1924	210	216,000	tl
Barre	1926	40	2,000	tf
Bedford	1930	170	1,500	ws, g
Bernardston	1923	100	5,500	tf
Billerica	1924	230	5,000	g, ws
Blandford	1934	70	25,500	ws
Boxford	1938	52		tl
Braintree	1942	120		txl
Brookline	1914	408	90,000	ws
Canton	1936	30	20,100	p
Carlisle	1923	72	25,000	tf
Chelmsford	1941	125		g
Chester	1932	950	97,800	ws
Concord	1935	70	28,000	g
Conway	1922	160	45,500	tf
Cummington	1940	100	3,300	tl
Dalton	1926	100	40,000	g
Danvers	1949	50		g
Dartmouth	1924	110	58,000	p
Dedham	1927	70	13,900	p
Deerfield	1925	110	12,500	g, p
Dennis	1933	40	10,500	tl
Dighton	1922	100	112,000	p, tl
Dunstable	1929	160	95,000	p, g
Duxbury	1923	33		tf, tl
East Bridgewater	1940	16		tl
Easthampton	1935	75	26,600	p
Easton	1936	50	20,000	tl
Fairhaven	1941	47	6,900	tl
Falmouth	1923	605	400,000	p, g, ws
Fitchburg	1914	2,067	557,500	p, ws
Gardner	1931	122	135,450	ws
Goshen	1923	100	10,000	g

Town	Year Begun	Acres	Trees Planted	Method of Acquisition*
Granville	1925	100	14,000	p
Great Barrington	1923	275	10,000	ws
Greenfield	1925	528	65,000	ws, tl
Groton	1922	382	57,000	tf, g
Groveland	1923	33	30,000	tf
Hanson	1931	35		tl
Harvard	1923	70	8,000	tf
Hingham	1922	110	94,500	g, p
Holden	1929	126		g
Holliston	1925	175	15,500	tl
Hopkinton	1926	125	10,250	g
Hudson	1930	547	217,000	g, p, tf
Ipswich	1940	113	7,000	ws, tl
Lancaster	1946	150	3,000	g, tl
Lanesborough	1925	422	5,000	p
Lee	1934	65	5,000	g
Leominster	1929	883	270,000	ws
Lexington	1930	10		tl
Ludlow	1925	112	112,500	p
Lunenburg	1924	120	9,000	p
Mansfield	1929	200	81,500	ws, tl
Marion	1940	12	8,000	p
Marlborough	1926	62	418,000	p, tf
Mendon	1944	119	3,000	txl
Merrimac	1924	394	225,000	ws, p
Methuen	1924	76	43,500	tf
Middleborough	1928	24	3,000	tl
Millville	1938	250	35,000	g, txl
Monroe	1941	102		txl
Monson	1924	230	95,500	p, ws
Natick	1930	110	38,500	tf, g
Needham	1941	109	30,000	ws, g
Newburyport	1940	83	30,000	txl
New Salem	1925	33	18,000	tf, p
North Adams	1925	6,720	456,000	ws
Northampton	1940	2,464	642,200	ws
North Andover	1926	112	52,000	tf
North Attleborough	1923	219	65,000	txl
Northborough	1926	19	4,700	tl
North Brookfield	1923	124	175,000	ws
Norton	1923	179	86,000	p, tf, g, ws
Norwell	1925	29	10,100	tf, tl, g
Oxford	1927	130	42,500	tf
Peabody	1923	140	12,500	ws
Pembroke	1923	105	22,000	tf
Pepperell	1923	100	21,000	p, tf
Petersham	1920	135	23,300	p, tf

Town	Year Begun	Acres	Trees Planted	Method of Acquisition*
Pittsfield	1925	145	60,000	g
Plainville	1931	105	47,000	txl
Plymouth	1924	230	200,000	ws, p
Reading	1930	200	149,000	p
Rehoboth	1945	54		txl
Rockport	1936	366	34,000	ws, tl
Russell	1924	3,035	252,475	ws
Sandwich	1928	16	15,400	tf
Saugus	1944	200	11,000	tl
Scituate	1924	44	31,000	p
Sharon	1929	101	20,000	tl
Sherborn	1938	500	10,000	g
South Hadley	1923	50	23,500	tl, g
Spencer	1930	178	16,000	tl, ws
Sterling	1926	144	19,500	p
Stoughton	1938	109	60,000	tl, ws
Templeton	1940	158	50,000	tl
Topsfield	1940	70	55,000	g
Townsend	1924	50	11,000	tf
Upton	1924	30	7,500	tf
Uxbridge	1925	117	11,000	p, g
Wakefield	1925	109	30,500	ws
Walpole	1915	360	127,800	g, p
Ware	1928	102	149,000	g
Warwick	1925	98	36,000	p
Webster	1929	6	6,000	tl
Wellfleet	1925	26	4,000	Il
Westborough	1926	20	28,500	g
West Bridgewater	1934	10	4,500	p
Westfield	1929	5,887	831,963	ws, tf, p
Westford	1926	539	9,000	g
Westminster	1923	100	2,500	g
West Newbury	1925	18	23,000	tf
Westport	1925	40		g
Weymouth	1922	392	45,000	ws, p
Whitman	1940	15	2,500	txl
Williamstown	1925	198		g
Winchendon	1925	609	154,250	ws
Winchester	1941	23	2,000	p
Woburn	1932	193	60,000	ws, tl
		39,839	8,517,978	

* Key
- ws - watershed
- p - purchase
- g - gift
- tf - town farm
- tl - town land
- txl - tax land
- Il - Indian lands

Total number of Town Forests by method of acquisition wholly or in part

Purchase	37
Gift	36
Watershed	33
Town Land	28
Town Farm	27
Tax Land	9
Indian Land	11

Source: Annual Reports, Town Forest Committees, A Survey of the Town Forests in Massachusetts, Bulletin No. 171, The Massachusetts Forest and Park Association, 1950, pp. 10-11.

APPENDIX III - B.

CLASSIFICATION OF NUMBER OF COMMUNITY FORESTS IN THE UNITED STATES BY SPONSORING AGENCY, 1948.

State	Number	Area	Classification				
			Municipal	Municipal Watershed	Twp. County	School	Organization
Alabama	9	3,697	1	(1)	4	2	2
Arizona	-	-	-	-	-	-	-
Arkansas	64	2,193	5	(5)	-	21	38
California	2	2,703	-	-	1	-	1
Colorado	23	37,165	23	(8)	-	-	-
Connecticut	27	44,657	27	(24)	-	-	-
Delaware	1	60	-	-	1	-	-
Florida	62	4,200*	1	-	1	51	9
Georgia	18	11,184	5	(2)	7	2	4
Idaho	6	1,789	5	(3)	-	1	-
Illinois	93	54,446	25	(15)	10	37	21
Indiana	16	2,505	5	(2)	4	1	6
Iowa	10	14,100	6	(1)	3	1	-
Kansas	-	-	-	-	-	-	-
Kentucky	5	6,220	1	-	1	-	3
Louisiana	8	4,963	3	(1)	1	3	1
Maine	45	15,000*	9	(8)	31	4	1
Maryland	7	24,551	7	(7)	-	-	-
Massachusetts	140	50,110	139	(31)	-	1	-
Michigan	846	165,000	95	(1)	124	627	-
Minnesota	123	723,929	85	(1)	29	7	2
Mississippi	5	1,278	-	-	-	5	-
Missouri	4	3,800	-	-	-	3	1
Montana	2	20,230	1	-	-	1	-

* Estimated area.

State	Number	Area	Classification				
			Municipal	Municipal Watershed	Twp. County	School	Organization
Nebraska	2	680	1	-	1	-	-
Nevada	-	-	-	-	-	-	-
New Hampshire	167	64,723	9	(9)	156	2	-
New Jersey	9	52,033	8	(8)	-	1	-
New Mexico	-	-	-	-	-	-	-
New York	658	150,000*	298	(51)	114	246	-
North Carolina	57	57,171	41	(19)	-	16	-
North Dakota	1	140	1	-	-	-	-
Ohio	97	29,679	36	(1)	7	52	2
Oklahoma	6	2,738	3	(3)	-	2	1
Oregon	47	239,286	21	(14)	16	3	7
Pennsylvania	112	131,279	92	(56)	15	3	2
Rhode Island	6	12,487	6	(5)	-	-	-
South Carolina	23	31,911	9	(5)	7	5	2
South Dakota	22	398	17	-	5	-	-
Tennessee	10	2,312	4	-	-	6	-
Texas	12	3,607	10	(2)	-	2	-
Utah	8	46,998	7	(4)	-	1	-
Vermont	64	15,570	64	(2)	-	-	-
Virginia	50	50,987	25	(20)	17	8	-
Washington	13	90,016	8	(8)	-	5	-
West Virginia	3	656	1	(1)	1	-	1
Wisconsin	321	2,392,485	14	-	62	233	12
Wyoming	-	-	-	-	-	-	-
Total	3,204	4,568,936	1,118	(318)	618	1,352	116

* Estimated area.

Source: United States Forest Service Census of Community Forests, July, 1948.

So. Hadley School Department

So. Hadley Falls, Mass.

C O P Y

A School Forest

Objectives

The Primary purpose of establishing a school forest is to provide a laboratory where flora and fauna may be studied in their natural habitats and to provide an area where good land conservation may be practiced.

General Work Law

I. A forest survey will be made and a map drawn up containing the following features:

A. Boundaries, roads, trails, ridges, topographical features streams and ponds will be located.

B. Timber Types

1. Kinds of trees
2. Age of stands
3. Density of stands
4. Acreage of types or stands

C. Silvicultural data

1. Condition of stands
2. Soil
3. Slope
4. Moisture
5. Treatment recommended
6. Ground cover and reproduction

II. A management plan for forestry and wild life will be drawn up based on the forest inventory and executed. Among the operations to be done would include:

A. Forest Protection

1. Fire hazard reduction
2. Fire breaks around boundaries
3. Establishment of water holes
4. Insect and disease control

B. Silvicultural operations

1. Weedings
2. Improvement cuttings
3. Liberation cuttings
4. Thinnings
5. Tree planting
6. Salvage cuttings

C. Wild Life operations:

Only modified forestry conducive to wild life development would be done on the area.

1. Wild life population studies
2. Food studies
3. Improvement of environment for wild life by good modified forestry
4. Stream improvement
    1. Pools
    2. Dams

3. Deflectors

4. Cover improvement

Source of Labor:

All labor is to be done by high school students and boy scouts under the supervision of a trained technician.

APPENDIX IV.

TREE TYPES AND PHYSICAL AND FINANCIAL BUDGETS, RUSSELL TOWN FOREST.

APPENDIX IV - A.

A PARTIAL LIST OF TREE SPECIES COMMON IN THE RUSSELL TOWN FOREST.

Common name	Scientific name
Aspen big-toothed	Populus grandidentata
Ash, white	Fraxinus americana
Basswood	Tilia glabra Ventenat
Beech	Fagus grandifolia, ehrhart
Birch, black	Betula lenta, L.
Birch, gray	Betula populifolia Marshall
Birch, paper	Betula papyrifera Marshall
Birch, yellow	Betula lutea Michaux
Butternut	Juglans cinerea
Cedar, red	Junipenes virginiana
Cherry, black	Prunus serotina
Cherry, pin	Prunus pennsylvanicus
Elm, American	Ulmus americanus
Hemlock	Tsuga canadensis L. Carriere
Hickory, shagbark	Carya ovata
Hop hornbeam	Ostrya Virginiana
Maple, hard	Acer saccharum Marshall
Maple, red	Acer rubrum
Oak, black	Quercus velutina Lamarck
Oak, scarlet	Quercus coccinea Muenchausen
Oak, red	Quercus borealis Michaux
Oak, white	Quercus alba
Pine, white	Pinus strobus
Pine, red	Pinus resinosa Solander
Pine, Scotch	Pinus sylvestris
Poplar	Populus spp.
Spruce, Norway	Picea abres L. Karst
Spruce, red	Picea rubrens
Sumac	Rhus spp.
Willow	Salix spp.

Source: Sudworth, George B. 1927. Check list of the forest trees of the United States; their names and ranges. U.S.D.A. Misc. Cir. #92.

APPENDIX IV - B.

ALL SAWTIMBER IN THE RUSSELL TOWN FOREST BY SPECIES.[1),2)]

Species	Growing M.f.b.m.	Mature M.f.b.m.	Total M.f.b.m.	
Hemlock	874	939	1,813	
White Pine	283	308	591	
Total	1,157	1,247	2,404	2,404
Oak	238	579	817	
Ash	86	120	206	
Hard Maple	29	143	172	
Yellow Birch	12	103	115	
Bass	6	30	36	
Beech	-	42	42	
Black Birch	-	15	15	
Black Cherry	8	29	37	
Total	379	1,061	1,440	1,440
Grand Total				3,844

1) Philip T. Coolidge, Report on Russell Town Forest, 1945, p. 2.

2) Note. "Growing" is potentially merchantable, "Mature" is mature or defective. Since Beech and Black Birch are inferior in value they are all classified as "mature". All poplar and soft maple are classed as cordwood.

APPENDIX IV - C.

EXPENSE OF TOWN FOREST, 1946-1951

Town Forestry Program	1946	1947	1948	1949	1950	(Estimate) 1951
Forester's Salary	$1765.00	$1665.00	$2650.00	$2130.00	$2130.00	$2380.00
Equipment and rental	142.03	216.76	37.23	11.60		
Survey	176.40					
Telephone and travel		92.34	198.00	192.34	159.55	200.00
Nursery			74.72	122.85	12.00	15.00
Dutch Elm disease control			622.56	95.89	54.92	75.00
Gypsy Moth control				600.00	600.00	600.00
Cordwood salvage					166.72	250.00
Other or unspecified			16.70	136.72	30.60	175.00
Total	$2083.43	$1974.10	$3599.21	$3289.40	$3153.79	$3695.00
Tax on Watershed	700.00	930.60	1002.28	1003.09	1144.96	1200.00

Source: Annual Reports, Town of Russell, 1946-1951.

APPENDIX V.

FINANCIAL AND PHYSICAL BUDGETS, NEW ENGLAND FORESTS AND LUMBER PRICES.

APPENDIX V - A.

INDEX OF LUMBER AND WHOLESALE COMMODITY PRICES, 1913-1946.

Year	Price index		Year	Price index	
	Lumber	Wholesale commodity		Lumber	Wholesale commodity
1913	54	70	1930	86	86
1914	50	68	1931	70	73
1915	49	70	1932	58	65
1916	55	86	1933	71	66
1917	72	118	1934	84	75
1918	84	131	1935	82	80
1919	113	139	1936	87	81
1920	165	154	1937	100	86
1921	89	98	1938	87	79
1922	99	97	1939	93	77
1923	112	101	1940	103	79
1924	99	98	1941	122	87
1925	101	104	1942	133	99
1926	100	100	1943	141	103
1927	93	95	1944	153	104
1928	91	97	1945	155	106
1929	94	95	1946	178	121

Source: U. S. Dept. of Agriculture, Bureau of Labor Statistics, Survey of Current Business Supplements, 1940 and 1947.

APPENDIX V - B.

ANNUAL FIXED CHARGES USED IN THREE MANAGEMENT PLANS OVER THE 90 YEAR PERIOD.

Plan Number	Realty Taxes in Dollars	Annual Equipment Charges in Dollars	Additional Management in Dollars
4	$74	0	0
3	$74	0	0
2	$74	400 1),2)	$00

Source: After Gould, Ernest, op. cit., TABLE V.

1) Includes $100. for vehicle insurance and registration. Depreciation provides for equipment being replaced every five years.

2) Equipment:

Power chain-saw and cut-off saw	$400.
Power unit (2nd hand light truck)	$00.
Miscellaneous woods equipment for use of 2-man crew	300.
Total	$1500.

APPENDIX V - C.

NET CASH INCOME[1] BY DECADES AND FOR 90 YEAR PERIOD; INCREASE IN RESIDUAL VALUE AND TOTAL NET RETURN FROM ALTERNATIVE MANAGEMENT PLANS.

Plan No.	Net Income by Ten Year Periods									Increase in Residual Value	Total Net Return
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90		
	Average Annual Net Income, Assuming Rising Sawlog Prices										
4	$389*	$931*	$2,322	$31	$19,483	$846*	$10,831	$12,247	$8,050		
3	932*	987*	419	4,864	13,569	4,650	8,174	16,640	6,391		
2	2,086*	3,184*	819*	5,788	13,737	9,177	8,771	20,452	9,020		
	Cumulative Net Income at End of Each Decade Assuming Rising Prices										
4	3,890*	13,200*	10,020	10,330	205,160	196,700	305,010	427,480	507,980	$9,123	$517,103
3	9,320*	19,190*	15,000*	33,640	169,330	215,830	297,570	463,970	527,880	88,965	616,845
2	20,860*	52,700*	60,890*	3,010*	134,360	226,130	313,840	518,360	608,560	108,945	717,505

Source: Gould, Ernest, op. cit., TABLE IX, p. 22.

1) Real property taxes, 45 cents per acre per year, included in expense and 3% interest compounded on deficits.

* Deficits for the decade.

APPENDIX V - D.

PROBABLE FUTURE INPUTS OF LABOR[1] AND OUTPUTS OF THOUSANDS OF BOARD FEET OF SAWLOGS AND CORDS OF WOOD BY DECADES UNDER DIFFERENT MANAGEMENT PLANS.

Plan Number	Unit of Measure	Years in the Future									
		0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	Total
4	f.b.m.	447	0	2,738	630	11,869	0	4,596	5,388	3,635	29,303
	cords	0	1,474	0	564	18,909	470	6,309	6,578	1,760	36,064
	man days	451	1,914	3,004	1,398	41,911	658	2,934	14,937	5,941	83,148
3	f.b.m.	51	96	1,578	3,255	8,292	3,170	3,525	6,912	3,463	30,342
	cords	0	1,474	0	1,277	15,898	3,501	3,759	7,167	1,840	34,916
	man days	51	2,010	1,709	5,215	32,943	8,724	8,182	16,119	7,966	82,919
2	f.b.m.	604	922	2,030	4,324	8,381	6,673	4,098	7,703	3,854	28,589
	cords	2,684	4,250	3,273	3,560	14,777	6,502	8,336	5,398	2,873	51,053
	man days	5,375	9,232	6,780	9,547	30,744	16,428	18,334	15,221	7,959	119,620

Source: After Gould, Ernest, op. cit., TABLE IV, p. 12.

1) Power and equipment costs, converted to man-day equivalents, are included.

APPENDIX VI.

FINDINGS IN COMMUNITY FOREST LITERATURE.

APPENDIX VI.

FINDINGS IN COMMUNITY FOREST LITERATURE.

The United States Forest Service has for many years added what encouragement it could to the growth of the community forest movement. It has sponsored research, gathered statistics,[1] lent experts for technical advice, and published many bulletins and pamphlets furthering the cause of town, county, school district, or other locally administered forest areas. As early as 1930 the U.S.F.D. had prepared a bibliography on community forests which showed that short articles in magazines and pamphlets made up practically all of what had been written.[2] A thirty-six page booklet Community Forests[3] was published by the U.S.F.S. with Professor Nelson Brown collaborating in 1938. This booklet explains the progress of the community forests in the United States and the comparative situation in communities abroad. Many good illustrations highlight this pamphlet and there are examples given of all the chief types of community forests. As the author points out, the problem of obtaining accurate data on inputs and outputs and use is a primary

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1. See Appendix I, the sample schedule "Community Forest Record", sent out to all community forest administrators by the U.S.F.S. 1947.
2. Collingwood, G. H. 1930. "The Making of a Town Forest", American Forests, 36:587-590.
3. Brown, Nelson C. 1938. Community Forests, U.S.F.S.

stumbling block when it comes to analyzing a given community forest realistically.

In the case of the writings dealing with the Town Forest of Russell, for example, a misleading group of statements appeared identically in two publications which had wide circulation throughout the country. Some of the earliest discoveries made in the present study was that the greater part of the Russell Town Forest lies in neighboring Blandford to the west of Russell, that the watershed lands were acquired by Russell for watershed protection, not to achieve resettlement, and that such resettlement as there was benefited Blandford almost exclusively. The article which seems to abuse the facts is quoted in full.

> "Russell, Mass. - The forest owned by the town of Russell was started twenty years ago with less than 100 acres and an appropriation of $100.00. A serious social and economic situation had existed in the uplands and mountainous areas surrounding the town. Some of the landowners were disturbed because they could not make a living and local officials were alarmed because they were not getting sufficient tax income to maintain the roads and to keep them open in the winter and to operate the rural schools. Some of the families were moved from worn-out farms to better land near the village. The abandoned hill farms were converted into a town forest. School and road expenditures were thereby reduced. Much of the land was already wooded and the open fields and abandoned farms were planted with red, white, and Scotch pine. The forest has already yielded some returns in the form of cordwood." 1

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1. Anonymous, "Community Forests in Other States", County Forests for Indiana, Indiana Economic Council Bulletin No. 1, Sept. 1944.

The identical passage just quoted also appeared in the pamphlet entitled Community Forests, published by the Department of Agriculture Forest Service in 1938 with Nelson Brown as collaborator. Apparently the writings either both drew from the same source and were misinformed, or the Forest Service publication reworded statements made to it by sources close to the Russell Town Forest and these statements were in turn used by the Indiana Economic Council.

APPENDIX VII.

SOCIAL, ECONOMIC AND PHYSICAL DATA ON RUSSELL AND BLANDFORD, MASSACHUSETTS.

APPENDIX VII - A.

POPULATION OF RUSSELL, BLANDFORD, HUNTINGTON, MONTGOMERY, AND WESTFIELD IN CERTAIN YEARS OF THE 18TH, 19TH, AND 20TH CENTURIES.

Date	Populations				
	Russell	Bland-ford	Hunting-ton	Mont-gomery	West-field
1765		406			1,324
1776		772	742		1,488
1790		1,416	742	449	2,204
1800	431	1,778	959	560	2,185
1810	422	1,613	968	596	2,130
1820	491	1,515	849	604	2,668
1830	507	1,590	765	579	2,940
1840	955	1,427	750	740	3,526
1850	521	1,418	756	393	4,180
1855	677	1,271		371	4,575
1860	605	1,256	1,216		5,055
1865	618	1,087			5,634
1870	635	1,026	1,156	318	6,519
1875	648	964			
1880	823	979	1,236	303	7,587
1885	847	954			
1890	879	871	1,385	266	9,805
1895	846	949			
1900	793	836	1,475	273	12,310
1905	1,053	746			
1910	965	717	1,473	217	16,044
1915	1,104	623			
1920	1,237	479	1,425	229	18,604
1925	1,398	437			
1930	1,237	545	1,242	141	19,775
1935	1,283	469			
1940	1,242	479	1,340	178	18,793
1945	1,221	521	1,241	137	
1950		597	1,257	157	20,962

APPENDIX VII - B.

COMPARISON OF ECONOMIC, SOCIAL, AND PHYSICAL FACTORS IN THE TOWNS OF RUSSELL, BLANDFORD, HUNTINGTON, AND MONTGOMERY.

	Year	Russell	Bland-ford	Hunting-ton	Mont-gomery
Population per square mile	1940	70.2	9.1	51.1	11.9
Percent area in woodland	1941	90.	91.2	81.4	91.6
Percent area in improved land	1941	4.2	4.	10.7	6.6
Percent soil suitable for agriculture	1941	25.1	43.4	37.	28.4
Value per acre farm land and buildings	1935	$45.56	$33.36	$23.88	$25.26
Average size of farms	1935	67.3	164.5	144.4	143.8
Cows per square mile	1940	4.2	3.4	11.1	15.8
Poultry per square mile	1940	36.8	44.4	102.7	116.1
Percent farmland improved	1935	16.5	27.2	19.	17.9
Employees, percent of population	1940	37.6	0.0	6.3	0.0
Population	1940	1242	429	1340	178
Number of dwellings assessed	1940	267	263	358	93
Tax rate, dollars per $1000 assessed valuation	1940	17.	23.	34.	25.50
Per capita tax	1940	32.	33.	45.08	49.84

Source: Rozman, David, 1941. "Analysis of Agricultural, Economic, and Social Data," op. cit.

Town of Russell

Population by Age Groups - (1930, 1940)

1930

Years	Number	Percentages
Under 5	136	11
5 - 14	258	20.9
15 - 24	196	16
25 - 34	217	17.5
35 - 44	148	11.9
45 - 64	210	17
65 and over	70	5.7
Unknown	0	0
Total	1,237	100

1940

Years	Number	Percentages
Under 5	87	7
5 - 14	212	17.1
15 - 24	227	18.3
25 - 34	186	15
35 - 44	193	15.6
45 - 54	114	9.2
55 - 65	123	9.9
65 and over	100	8
Total	1,242	100
21 or over	789	63.6

Table :

Source: U. S. Census, 1930, 1940

APPENDIX VII - D.

Town of Russell

Farms and Acres in Farms, 1925 - 1945

Date	Number of Farms	All Land in Farms	Improved Land
1925	44	4,787	572
1930	23	2,993	449
1935	23	2,961	488
1940	37	5,715	518
1945	82	6,860	1,147

Source: Rozman, David, 1941 - Op. Cit. Table VI

Town of Russell

Agricultural, Economic and Social Data, 1880 - 1945

Date	Population	Value of personal property assessed in thousands	Value, real estate assess- in thousands	Total assessed value in thousands
1880	823	143,000	274,000	416,000
1885	847	172,000	296,000	468,000
1890	879	156,000	336,000	492,000
1895	846	156,000	355,000	511,000
1900	793	132,000	359,000	491,000
1905	1053	187,000	426,000	614,000
1910	965	243,000	570,000	813,000
1915	1104	544,000	1240,000	1,784,000
1920	1237	714,000	1543,000	2,257,000
1925	1388	1,320,000	2508,000	3,828,000
1930	1237	1,426,000	2551,000	3,983,000
1935	1263	1,382,000	2575,000	3,957,000
1940	1242	83,000	2254,000	2,338,000
1945	1221	86,000	2371,000	2,457,000

Source: Rozman, David; 1941 "Analysis of the Agricultural Economic and Social Data of the Town of Russell"; Report for the Department of Agricultural Economics at Massachusetts State College. Table IV.

APPENDIX VII - F.

Town of Russell, Mass.

Taxes Collected, Tax Rate, Per Capita Tax

1880 - 1945

Date	Total tax Collected	Tax Rate Dollars per Thousand	General Property Tax	Tax Per Capita
1880	6,000	12.50		
1885	7,000	13.50		
1890	7,000	13.50		
1895	7,000	13.00		
1900	9,000	17.00	8,344	10.52
1905	9,000	13.90	8,531	8.10
1910	13,000	15.10	12,477	12.72
1915	27,000	15.00	26,685	24.17
1920	40,000	17.00	38,363	31.01
1925	47,000	12.00	45,904	32.84
1930	64,000	16.00	63,675	51.84
1935	74,000	18.50	73,203	51.06
1940	41,000	17.00	39,744	32.00
1945	35,000	14.00	34,400	28.17

Fig:

Source: Rozman, David, 1941, "Analysis of the Agricultural, Economic and Social Data of the Town of Russell"; Report for Department of Agricultural Economics at Massachusetts State College
Table V
Currently corrected in ink.

APPENDIX VII - G.

Town of Blandford

Population from 1765 - 1945

Date	Population	Date	Population
1765	406	1880	979
1776	772	1885	954
1790	1416	1890	871
1800	1778	1895	849
1810	1613	1900	836
1820	1515	1905	746
1830	1590	1910	717
1840	1427	1915	623
1850	1418	1920	475
1855	1271	1925	437
1860	1256	1930	545
1865	1087	1935	469
1870	1026	1940	429
1875	964	1945	521

Fig:

Source: Massachusetts Census, 1895
Massachusetts Decennial Census, 1925, 1935
U. S. Census, 1940
Massachusetts Census, 1945

APPENDIX VII - H.

Town of Blandford

Population by Age Groups, 1930 - 1940

1930

Years	Number	Percentages
Under 5	40	7.3
5-14	88	16.2
15-24	85	15.6
25-34	77	14.1
35-44	79	14.5
45-64	129	23.7
65 or over	47	8.6
Unknown	0	0
Total	545	

1940

Years	Number	Percentages
Under 5	33	6.9
5-14	83	17.3
15-24	78	16.3
25-34	65	13.6
35-44	61	12.7
45-54	44	9.2
55-64	56	11.7
65 and over	59	12.3
Total	479	100
21 or over	309	64.5

Table:

Source: U. S. Census, 1930, 1940

APPENDIX VII - I.

Town of Blandford

Land Use (1925-1945)

Date / Item	1925	1935	1945
Number Farms	98	37	57
Total Land area	33,729	33,729	33,729
All Land in Farms	15,197	6,085	10,095
Improved Land	2,017	1,353	1,639
Crop land harvested	1,966	914	1,527
Crop land; idle or failure	---	167	89
All crop land	1,966	1,081	1,616
Plowable Pasture	51	272	23
Woodland Pasture	6,211	1,982	1,489
Other Pasture	665	242	730
Total Pasture	6,927	2,496	2,242
Woodland not used for Pasture	5,945	2,457	6,006
Total Woodland	12,156	4,439	7,495
All other land in Farms	359	51	231

Table:

Source: U. S. Census of Agriculture: 1925, 1935, 1945.

APPENDIX VII - J.

Town of Blandford

Property Exempt from Taxation

Date	Commonwealth	Charitable	Agri-cult-ure	Houses Wor-ship	Property of town
1931	7515	2,500	4,200	10,400	100,500
1932	8515	2,500	4,200	10,400	108,700
1933	7515		4,200	10,400	111,200
1934	8515		4,200	10,400	74,200
1935	9715		4,200	10,400	69,200
1936	10,065		4, 200	10,400	113,650
1937	10,215		4,200	10,400	114,700
1938	10,065		4,200	10,400	114,700
1939	10,065		4,200	10,400	114,600

Fig:

Source: Massachusetts Public Document, 16

Report of Commissioner of Corporations and Taxations

APPENDIX VIII.

AVAILABLE USES, MASSACHUSETTS STATE AND PUBLIC RECREATION AREAS WITHIN 50 MILES OF RUSSELL.

APPENDIX VIII.

AVAILABLE USES, MASSACHUSETTS STATE AND PUBLIC RECREATION AREAS WITHIN 50 MILES OF RUSSELL.

Name	Classification	Location	Boating	Bridle Trails	Cabins	Fishing	Hiking	Hunting	Picnicking	Scenic	Winter Sports	Swimming	Tent Sites	Trailer Sites	Points of Interest
Robinson	State Park	Westfield		x		x	x		x						
Skinner	" "	South Hadley					x		x	x					
Wahconah Falls	" "	Dalton				x			x	x					
Bash-Bish Falls	State Forest	Mt. Washington				x	x	x		x					
Beartown	" "	Great Barrington	x	x		x	x	x	x		x	x			
Brimfield	" "	Brimfield				x		x							
Campbell Falls	" "	New Marlborough				x			x	x					
D. A. R.	" "	Goshen	x			x		x	x	x		x			
Chester-Blandford	" "	Chester, Blandford				x	x	x	x	x					
East Mountain	" "	Great Barrington		x		x		x							
Granville	" "	Granville				x	x	x	x	x		x	x	x	
Mass. Fed. Womens Club	" "	Petersham				x		x	x						
Mohawk Trail	" "	Charlemont			x	x	x	x	x			x	x	x	
Monroe	" "	Monroe				x		x		x					
Mt. Toby	" "	Leverett							x				x		
October Mountain	" "	Washington		x		x	x	x		x					
Otis	" "	Otis													x
Pittsfield	" "	Pittsfield				x	x	x	x	x	x				
Sandisfield	" "	Sandisfield	x			x		x	x			x			
Savoy Mountain	" "	Savoy		x	x	x	x	x	x	x		x	x	x	
Tolland	" "	Tolland	x	x		x		x	x			x	x	x	
Windsor	" "	Windsor				x	x	x	x	x		x	x	x	
Quabbin Reservoir	Metropol. Dist. Comm'n.	Ware				x			x						x
Acadia Bird Sanctuary	Mass. Audubon Society	Easthampton					x								x
Pleasant Valley Sanctuary	" "	Stockbridge													x
Deer Hill Reservation	Miscellaneous	Cummington					x		x						
Mt. Greylock Res.	" "	Adams					x		x	x	x				x
Mt. Sugarloaf Res.	" "	Deerfield					x		x	x					
Mt. Tom Res.	" "	Easthampton		x		x	x		x	x	x	x	x	x	x
Forest Park	Municipal Park	Springfield	x	x			x		x	x	x				x

Source: Massachusetts Official Route Map, 1950-1951.

Approved by:

Charles P. Alexander

Robert O. Hollingworth

Margaret Russell

Date: _____