

PLANNING ONE TOWN



Petersham

A Hill Town in Massachusetts

JOHN D. BLACK | AYERS BRINSER

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PREFACE

This is the third in a trilogy of reports based on studies in the land-use economy of New England. The first study embraced all New England, and was published two years ago under the title *The Rural Economy of New England*. The second study will be reported presently under the title *Planning One County: Worcester County, Massachusetts*. The first study concentrates upon the broad background for the economy of the region and a careful analysis of all its important types of rural land-use. It does not single out particular area units for analysis except in general terms. The second study continues by dividing one big Massachusetts county of sixty-three towns into area units and considering the alternatives for each unit. This third study maps out the area units in much greater detail and explores the alternatives more carefully. The first and second levels of analysis are needed as a background for this third; but not until the third level is reached is a sufficient basis laid for policies and programs of local governments, community organizations, and individual operating units.

For those living outside New England, a word of explanation is needed as to the town as a unit of government in Massachusetts and in New England generally. The town in this region ordinarily includes in one voting unit both the rural and urban populations. In general, only the larger cities are separately incorporated. As a consequence of this, both in the past and today, the town is commonly regarded as a more important unit of government than the county.

This study has been worked out in close coöperation with the people of the Town of Petersham. The report is therefore town-minded from its opening to its final page. It has been jointly financed by the Village Improvement Society of Petersham, by the Rockefeller Foundation for the Committee on Research in the Social Sciences of Harvard University, and by the University of Massachusetts through its Agricultural Experiment Station and Extension Service. By far the larger part of the effort has been contributed by members

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of these three organizations, by citizens of Petersham, and others, who considered it a part of their regular duties or an extension of them.

The research upon which this report is based is largely the work of students in the 1948-1949 and 1949-1950 subgroups in Land Use in the Seminar in Agriculture, Forestry, and Land-Use Policy of the Graduate School of Public Administration, working under the direction of Professor John D. Black and Dr. Ayers Brinser, with special guidance from Professor G. Holmes Perkins, then of the Department of Regional Planning in the School of Design, Professor Charles Cherington in the Department of Government, Director Hugh Raup of the Harvard Forest, and Professor Bradford Crossmon and Extension Economist George Westcott of the University of Massachusetts. A majority of the students doing detailed work on this project were enrolled in the School of Design and this report has benefitted greatly from their training in that school. The final report, which summarizes the more detailed work of the individual student reports, was drafted mainly by Professor Black and reviewed by his colleagues before being submitted to the Petersham Village Improvement Society, which sponsored the study. The list of students who have done intensive work on this project includes:

Robert Barre
William Barton
Sanford Farness
Roscoe Jones
Donald Kimmel
George Kolinsky

Charles Lettek
Blanche Lemco
Ian McHarg
Vincent Oredson
Harold Raubin
Caleb Warner

J. E. Zemanek

J. D. BLACK
AYERS BRINSER

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CHAPTER 1 THE TOWN AND ITS PROBLEMS

The task set before the group that developed this report was to analyze the situation in the Town of Petersham, Massachusetts, in terms of its physical, economic, government, and other social factors and lay the results of their analysis before the people of Petersham so that they may in consequence be better able to chart a wise program of action based on these findings. As a final step, these results will be expressed in terms of actual plans and possible programs of action for each phase of the town's private and public affairs.

Ordinarily one plan or program will be presented in more detail than any other. But this is done only to serve as an illustration. An attempt will be made in each case to state alternative plans and programs and indicate how they will work out. The last thing which this report wants to do is to tell the citizens of Petersham what they should do with their town.

Even if those making this analysis wished to determine what the best course of action is in each case, they could not do it. At the most, all they could do would be to find the plan that is best in the sense of giving the largest economic return. But life is made up of much more than economic returns no matter how broadly these are defined, and social science has made little progress in measuring the noneconomic ones. Progress in achieving the latter consists at present mainly in developing means by which the people of a community more nearly get what they really want and not something that they did not ask for; or if they did ask for it, did so because they did not really know what they were doing. This report is designed to assist them in finding out what they really want and then getting it.

Let us begin by getting in mind the major facts about the Town of Petersham. Figure 1 shows the boundaries of the Town of Petersham and of the village within the town. The town now contains 34,733 acres, or 54 square miles. Petersham Village is nine miles from Athol to the north and twenty-nine miles from Worcester to the southeast.

First of all, Petersham is one of a large number of towns in New England that have declined in almost everything except area in the last hundred years.

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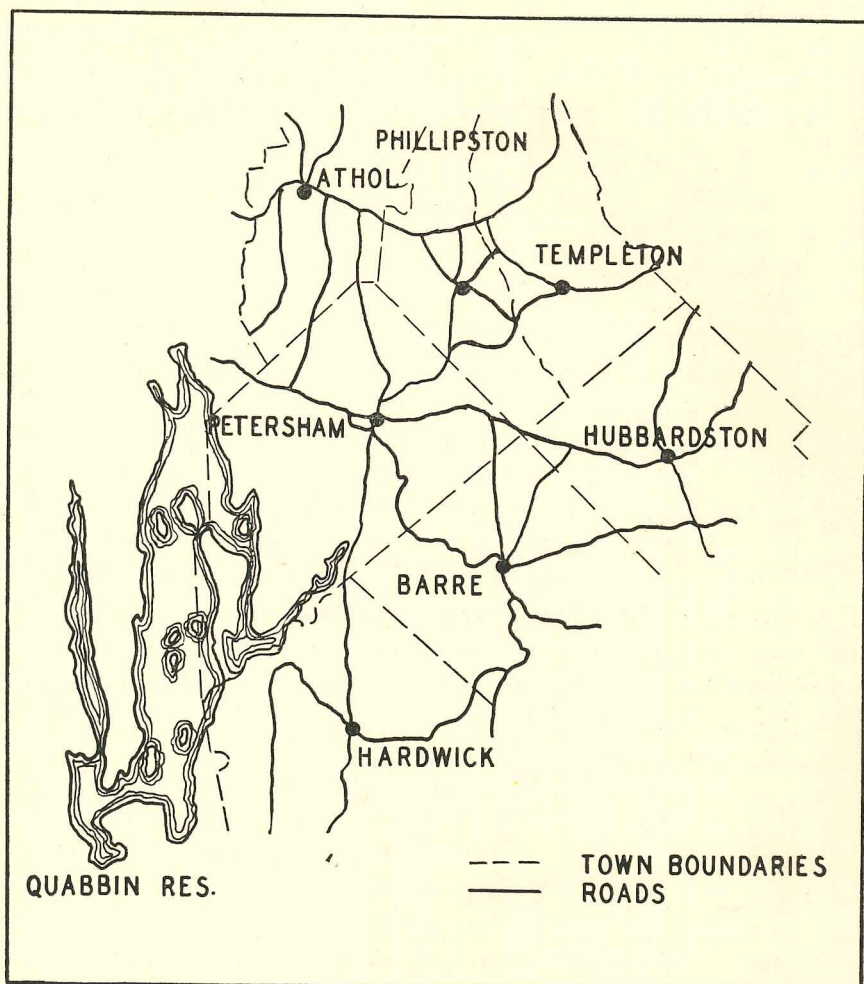


Figure 1. Petersham Town and Village, and Adjoining Towns

At its peak, probably in 1840, the town had 1,775 people and perhaps four fifths of its land was in farms. In 1940, its population was 923, and in 1945 only 37 per cent of its land was in farms. At its low point in 1920, its population was 642. In 1936, a good part of what was left of the Town of Dana after the building of the Quabbin Reservoir was added to Petersham. This added ten thousand acres, but no real farms or population.

In many New England towns which lost agriculture after 1840, manufacturing began or some other activity presently expanded to take its place and more. In Petersham, the only offsetting increases of any kind were as follows:

1. Some growth of timber on the lands going out of crops and pasture. Unfortunately, however, the 1938 hurricane destroyed much of this timber.
2. Development of the Harvard Forest and a few other very small forest reserves.
3. The building of homes by well-to-do summer residents beginning around 1850. The number of these is declining now.
4. In the 1930's especially, as indicated in the foregoing, an increase in homes for families from near-by industrial cities. Not all of these, however, are industrial workers.
5. A small development of recreational use of the land.

All these increases combined have compensated very little for the decline in agriculture. In consequence, the town now has too small a tax base to support its present program of public services and is faced with the necessity of doing one or the other of two things, or working out some combination of the two:

- A. Expanding somehow its present volume of private activity. This in turn can take the form either of expanding or reviving some of its present lines of activity, or finding some new ones to develop, or a combination of the two.
- B. Reorganizing its public activity in such a way that it can be financed by taxes on its present volume of private activity. This, in turn, can take the form of setting up its public activities on a more efficient and lower-cost basis, or of cutting out some of them, or a combination of the two.

If part of the solution of the town's problem is to expand or revive some of its present lines of activity, its people, individually or collectively, need to decide what these lines should be and where in the town they should be, and how it is to be done. It is they who must decide upon the possible new lines of activity to be developed.

If part of the solution is making present public activity more efficient, the townspeople need to decide which public activities to reorganize, and how. And surely it is they who must decide which if any are to be added or eliminated.

Also related to the general decline of the town is the shrinking numbers of its young people. With more of the population in the older age groups, fewer children are born. And those that are born and reared in the town, seeing little prospect for themselves in its declining enterprise, seek employ-

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ment elsewhere at an early age. The high school in 1939 had an enrollment of 56, of whom 60 per cent were boys. The enrollment had fallen to 26 by 1949. Under these circumstances, social life among the young people loses spirit and interest.

GEOGRAPHIC LOCATION

Petersham Town lies slightly to the north and west of the geographic center of Massachusetts. Its average elevation is 920 feet, but the central ridge is over 1200 feet at the northern boundary. This elevation gives it a mean annual temperature of 47° F., the same as that of the central Maine coast and the Champlain Valley of Vermont. The frost-free season averages from around May fifth to October fifth. The average precipitation is 42 inches, and the snowfall 58 inches. The drainage is into the Connecticut River. The early settlement, and most of the present intensive land use is along a ridge running north and south through the center of the town.

The map in Figure 2 shows the railroads, cities, and main highways of the surrounding territory. It will be noted that the railroads when built passed to the north and to the south of Petersham, and this largely determined which villages became cities and which did not. In 1840 and 1940 the population count reported by the Census for a sample of these towns was as follows:

	<i>1840</i>	<i>1940</i>		<i>1840</i>	<i>1940</i>
Petersham	1,775	923	Templeton	1,776	4,601
Worcester	7,497	193,694	Hardwick	1,789	2,154
Fitchburg	2,604	41,824	Hubbardston	1,784	1,022
Athol	1,591	11,180	Barre	2,751	3,528
Gardner	1,260	20,206	Phillipston	949	481

BACKGROUNDS

A brief review of how the Town of Petersham came to be what it is will help us to understand the problem as stated, and particularly to evaluate the noneconomic factors necessary to its solution. The first settlement was in 1733, when a grant was made by Massachusetts to 71 proprietors who were given "house lots" ranging from 55 to 100 acres along the central ridge, mostly surrounding a "common." The remainder of the land, including some of the common land, was assigned to these same proprietors in four subsequent subdivisions, the last being in 1770. The proprietors did not themselves settle on these house lots in most cases, but relatives or other representatives came instead.

Agricultural development was rather slow. There was land much easier to cultivate in the Connecticut Valley to the west. But by 1840, enough beef

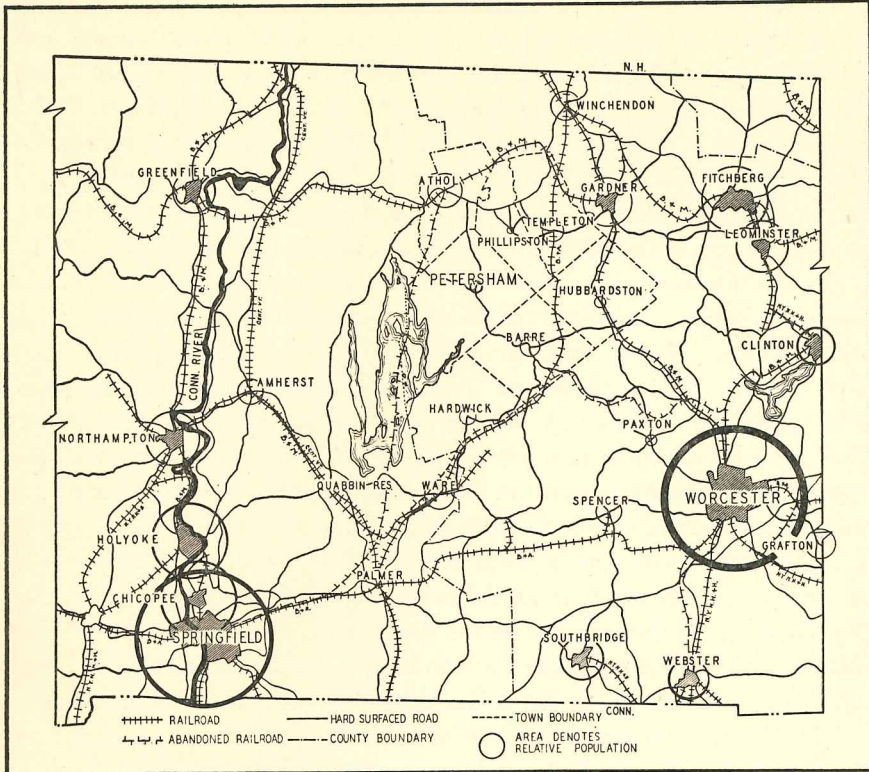


Figure 2. Geographic Location of Petersham

production, with some sheep, small grain, and fruit had developed along with timber cutting, saw milling, and a little industry, to give the town a population of 1,775. Each succeeding census after that showed fewer people until the 642 of 1920. Since then the population of the original town, except as above explained, has remained close to this level. The emigrants went to northern New England and the west in the early years, and more to the cities of New England in later years. Beef and small grain production in this part of the country could not compete, even in near-by New England consuming centers like Worcester and Springfield, with that from the Midwest coming in over the railroads and the Erie Canal. The virgin timber was presently all cut off, and by 1910 the second growth and the old-field pine that had grown up in the abandoned meadows and pastures was pretty well cut.

Beginning about 1850, however, a new type of activity developed in the town. The ridge-road part of it, especially in and near the Village of Peters-

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ham, became a kind of summer colony. It was cool in summer and close enough to rail lines so that people from Boston could get to it easily.

This development introduced a kind of social dichotomy in the town—in one group, the old families who had lived on the farms and in the village, in many cases for more than a hundred years; in another group the summer colonists and those whom they brought as domestics. The differing points of view and attitudes of these two groups brought conflicts and tensions which still persist and come strongly to a head on some issues.

About this time, also, the near-by industrial towns of Athol and Gardner began to develop, and this provided jobs for members of farm families living close to them. Some of these families came to rely very largely on their city jobs and became "part-time" or "residential" farmers. On the other hand, some urban families moved into the houses on the farms being abandoned and perhaps did a little farming on the side. The coming of the automobile greatly expanded this movement. Families could live in Petersham and wage-earners could drive or ride to work as far away as Gardner.

This latter development was not peculiar to Petersham—it existed wherever mill towns or urban centers were developing anywhere in New England and the Northeast. But the summer colony development was limited to towns on the seashore or inland lakes, or to a small number of towns with attractive villages on top of the ridges and on or near the railroads.

The families which moved into the town in the 1930's were largely unemployed families who built small substandard houses, mostly on the backroads leading into Athol. Those who left the town in the second World War and after included especially the families living in such houses. But a few of the families used their enlarged incomes to convert these poor buildings into comfortable homes. Also some families in the higher-income brackets from Athol and other cities near by began to make their homes in Petersham. Between 1940 and 1949 at least a dozen homes for families of urban-employed were built or rebuilt within the boundaries of the town.

By this time, it is apparent, the town had acquired a third social group, the urban-employed, with points of view and attitudes sometimes differing sharply from those of either of the other two groups.

A few other pertinent details of history also need to be borne in mind. First, in agriculture, for a period after beef and wool production declined, orchard farming prospered here and there on the high ridges and slopes of the town. But with the regrowth of the pine and hardwood on the slopes, the air drainage was impeded and the frost-hazard became too great.

As in most of New England, the form of livestock farming that succeeded beef cattle and sheep was dairying. The dairy herds provided a market on

the farms for whatever small grain and corn was still being produced. But Petersham and surrounding towns were too far from large cities in these decades for any market for milk except in the form of butter and cheese. Then, about the beginning of the century, the milk began to be sold in the form of fresh cream. Even this meant that the dairy farmers remaining tended to receive only as much more for their milk than the Midwest dairy farmers as it would have cost them to transport fresh cream from Detroit and Chicago to New England. Actually no cream was shipped from Chicago to Boston until the 1930's when the freight was around \$2 per hundredweight, equal to around \$.30 per hundredweight of milk equivalent. It was not until around 1940, and especially the second World War, that out-of-town trucks came into Petersham and picked up fresh milk to be sold mostly at Class I prices in Worcester and Boston.

During all this period, more and more cultivated land became old meadows or pasture, and more pastures and meadows were allowed to run down and revert to brush and then trees. But in 1951, producers shipping Class I milk to the Worcester market were receiving around \$1.40 more per hundredweight as the blended price for their milk than those shipping to the Chicago market from central and northern Wisconsin, and around 20 cents more even than those in the town shipping to the Boston market. The economy of dairy farming in Petersham is therefore now on a very different basis than it was in 1920-1940 and especially before 1900. New developments in agricultural technology may or may not favor New England more than the Lake States of the Midwest. They are surely promising much for New England. On the other hand, land that has once reverted to brush and trees requires a new investment in clearing and rehabilitation, and the new market outlets may not compensate for all these extra costs.

Since perhaps a fifth of the town was in timber outside the farms even at the 1840 peak of development, and always a half or more of the land in farms was in timber, income from timber has been an important secondary source of income in Petersham. It has provided employment more than in proportion to income, since a considerable part of the receipts from timber sales have been compensation for the labor of harvesting and hauling to market. The harvest of old-field pine provided unexpectedly good returns in the decades from 1880 to 1910. The land in timber has been largely owned in small holdings ever since it was taken up and divided among the proprietors in 1773 to 1770. Much of it was distributed as timberland holdings in another part of the town from the house lots. There was much buying and selling of these extra tracts soon after they were acquired in 1740 to 1770. Also in the period from 1840 on, when agriculture was declining rapidly,

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a large fraction of these timber holdings were sold, commonly for no more than the mortgage against them. In this way, these numerous small timber holdings came into the hands of persons with a very small investment in them, and the taxes collected upon them have necessarily been low. Consequently, the small returns from sale of timber from time to time have often been considered enough to warrant continued ownership.¹ The destruction in the 1938 hurricane of much of the young timber expected to yield these small future returns destroyed this balance of income and investment expenditure for the time being. It also removed a source of supply of types of timber being used in local industry in surrounding towns and cities. The chestnut blight, pine weevil, and blister rust had the same effect. If improvement cuttings are made in the woodlands in the next five or ten years, this general area, like much of New England, will have a much larger potential supply than can now be marketed of inferior wood materials and an inadequate supply of the kind of product that will be available twenty to fifty years from now.

Before the railroads came, Petersham had as much industry as most of the inland towns. Its industry was based largely on its agriculture and its timber, and included the small tanneries running from 1770 on, the flour mills, saw mills, and a series of factories producing casks, boxes, chairs, plows, and, for several decades, wagon boxes from hard pine. The only other factories mentioned in the records are a woolen mill and a tinware factory. The largest of these factories employed nine men. Most of them used from two to four men. In addition, until around 1870 many of the farm families employed themselves in the winter by making boots and shoes and palm-leaf hats under the "putting out" system. All this manufacturing had vanished by 1900. Athol's primary industry is making machine tools, an enterprise which booms in a period of capital expansion and subsides with the first signs of reaction. Its shoe factory makes low-priced shoes and also suffers from business fluctuations. Gardner and Worcester have more stable employment.

The Harvard Forest occupies three tracts of land totaling 2300 acres, located as indicated in Figure 3. It was established in 1907. It now furnishes employment for three to five local residents.

The Quabbin Reservoir is the main source of water for Boston, seventy miles away. The reservoir and the land owned by the Metropolitan District Water Commission represent in area the equivalent of three ordinary towns. About 12,000 acres of this Commission land is within the present Town

¹ Other factors, such as sentimental family attachment, have also figured largely in such decisions.

of Petersham. But this land adds more to public expenditures than to tax income. Petersham has been compensated for this, but perhaps not enough.

Petersham's public finance has rested upon a very unusual basis since it acquired its summer colony. Like many other towns in Massachusetts in these early years, Petersham had what amounted to an income tax of its own. The town collected rather liberal taxes on investments and similar property from its summer residents. When the state set up an income tax in 1915, Petersham shifted its tax system to a real property basis, and put a high assessed valuation on its summer places. (These valuations average around \$30,000 at present.) But the town has never depended altogether upon public funds to finance its public services. Whenever its well-to-do summer residents have felt strongly enough that the town needed facilities that could not very well be provided out of public income, they have provided the funds. Thus the building of the public high school was in part financed out of such contributions, as was the public library. Many of the books in the library today are from the private collections of the summer residents. The Village Improvement Society, organized about 1860, has commonly assumed leadership in such undertakings. It also helps to maintain the common and build sidewalks in the village. At the time of the 1938 hurricane, contributions from summer residents made it possible to establish the Petersham Forest Coöperative Association which salvaged the blown-down timber in the town. This fund was also used to set up the Petersham Agricultural Association which conducts the annual Petersham Fair. Contributions of land and money made it possible to establish the Harvard Forest in Petersham.

But the summer colony is now dwindling rapidly. The old families have not reproduced themselves, and no new supply of families from Boston or other cities is taking their place. Modern transportation is bringing much more distant summer places within reach of today's urban populations. The Petersham summer houses on the market are selling at depression prices if at all. The new families—even of those who are not factory workers—coming in from Athol and elsewhere have lower incomes and prefer smaller and more modern homes. As a result, the tax base is shrinking still further.

The town still maintains a rather elaborate governmental organization with three selectmen, three assessors, a Director of Poor Relief, a Director of Veterans' Payments, and so on—in fact, 23 elected officials and 45 appointed ones—one for every three voters. It has a large mileage of roads to maintain and keep open in the wintertime.

Although the population is divided into social groups, all of them are able to get together on occasion—the annual fair, which had 800 exhibits last

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fall, all from people in the town; the big Christmas supper and party which everybody attends and at which every child gets a present; and the Levee, the big New Year's supper and dance that has been held practically every year since 1780.

From the point of view of the future situation of the town, the most important recent development has been the resurfacing and widening of the state highway running between Athol and Worcester through the center of Petersham. This enlarged highway makes possible more stores, roadside stands, and service stations within the village and on the road to the north of the town center. When completed, this road may also lead to the building of homes along its course for people working in Athol. Either of these developments, however, is likely to make this part of the town much less attractive to the types of families who have provided a good part of the assessed valuation of the town in the past. Much of this valuation is concentrated along the highway. The problem is one of balancing the gain in tax revenue from such new developments against the loss of revenue from the decreased value of the present property. A possible middle course is to restrict, by a zoning ordinance, the really undesirable types of development along the highway. Even such restrictions would not, however, compensate for the losses to present residential property from the increased volume, weight, and speed of traffic.

A second new development has been the building of a new school gymnasium at an approximate cost of \$21,000. Paying for this out of taxes in the years just ahead stands in the way more or less of other improvements that may be considered, such as a consolidated high school for Petersham and adjoining towns, or the development of recreational facilities for the whole community.

It will appear later in this report that the future of Petersham, like that of much of New England, depends greatly upon the kind of local leadership it gets. It is therefore important that the town people themselves have organized the Petersham Agricultural Association, Inc., which grew out of the Petersham Forest Coöperative Association. With adequate leadership and support, this Association can promote a variety of developments that will mean much for the future of the town. This is far more important to the life of the town than the momentary disagreement between townspeople and summer residents over the building of the new highway.

PRESENT ORGANIZATION

It will be well at this point to get a more definite idea of the present organization of the town. The 1945 Federal Census of agriculture gives the

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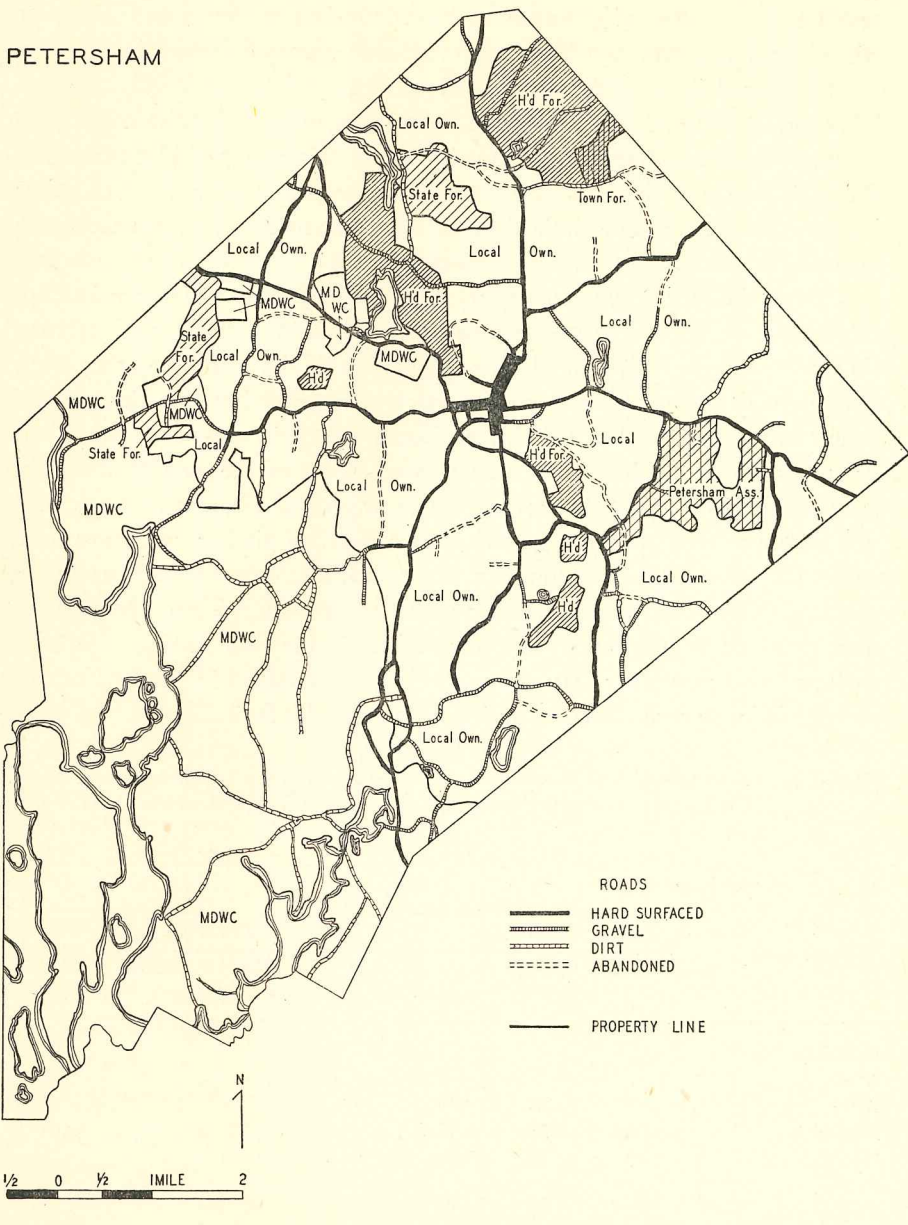


Figure 3. Roads and Ownership of the Land, Petersham

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figures in Table 1 for Petersham, some of the near-by towns, and for Worcester County. Most of these towns have less land in farms and less of it still improved than have the towns in other parts of Worcester County. Hardwick and Barre to the south have much more farming left than Petersham, but Phillipston and Templeton to the east and Athol to the north have about as much woodland as Petersham. The farming land of Hardwick and Barre is largely of the same soil types and topography as that of the better lands of Petersham. The timberland of the other three towns has about the same soils as the timberland of Petersham.

One half of the 28 per cent of so-called open land in Petersham is cropland or plowable pasture, and two thirds of this is in hay, much of it pretty thin because of the acid and leached condition of the soil. The other open land is relatively open stony pasture. It was improved at one time to the extent of cutting most of the timber, but much of it was never cleared of its stones and hence has never been plowed. Some of the woodland within the present farms and even some of that now outside farms was once classified as "improved" because it had been cleared of timber and its surface stones had been piled into stone fences, or "walls," to use the local name for them. In New England as a whole, well on toward ten million acres of land once classified as "improved" has returned to timber since 1840.

The only crops other than hay reported for Petersham in the 1945 census were as follows: corn, 38 acres; grain, 3; potatoes, 40; fruit, 29.

TABLE 1. Percentages of land in different use in Petersham and surrounding towns, as reported by the Federal Census of 1945, before the addition of part of the Town of Dana to Petersham

	<i>All land</i>		<i>Farm land</i>					
	<i>in town</i>	<i>Open</i>			<i>Woodland</i>		<i>Other land in farms</i>	
		<i>in farms</i>	<i>All</i>	<i>In crops</i>	<i>In pasture</i>	<i>All</i>		<i>Not pastured</i>
Petersham	37	28	14	14	64	55	9	8
Athol	33	34	24	10	62	33	29	4
Barre	65	53	23	30	38	21	17	9
Hardwick	60	66	23	43	34	22	12	0
Hubbardston	77	37	28	9	58	46	12	5
Phillipston	41	19	14	5	78	65	13	3
Templeton	40	30	17	13	68	6	62	2
Worcester County	44	49	31	18	45	16	29	6

Table 2 reports 99 Census farms in Petersham Town in 1945, and a

farm population of 328, or 3.3 per farm. The average farm had 128 acres, of which only 16 were in hay or other crops and another 18 were in some kind of more or less open pasture. Only 44 of the 99 farms had any cows or heifers, and most of the 376 cows and heifers on the 44 were on the eleven farms with ten cows or more. Nine more farms had 3 to 10 cows, and the rest were farms with usually one cow. Similarly, most of the 2,800 chickens were on five or six farms.

TABLE 2. Farms and population of Petersham and surrounding towns, reported by the Federal Census of 1945^a

	<i>Number of farms^b</i>	<i>Total population</i>	<i>Farm population</i>	<i>Percentage of farm population</i>
Petersham	99	743	328	44
Athol	76	11,804	359	3
Barre	176	3,485	779	22
Hardwick	102	2,115	405	19
Hubbardston	91	1,019	354	4
Phillipston	85	475	279	59
Templeton	153	4,435	484	11
Worcester County	5,505	198,741	25,614	5

^a Supplied by the New England office of Division of Agricultural Statistics, U. S. Department of Agriculture.

^b A farm for Federal Census purposes in 1945 was any tract of land of 3 acres or more upon which farming operations were conducted, or of less than 3 acres if the value of products was \$250 or more. The amount of farming on the 3 acres or more was not specified. Apparently it can be very little. The 1950 Census used a much more restricted definition, which reduced the number of farms in Massachusetts by a third.

Thus most of the Census farms were pieces of land largely covered with trees or brush with only an acre or a few acres of open land, each with some kind of gardening, with a cow or a few chickens, which caused the Census enumerator to call them farms.

A similar description would fit Athol, Phillipston, and Templeton, except that Templeton and Athol had more poultry farms. Hardwick and Barre had many more family-sized or larger dairy or poultry farms.

The differing characteristics of the farms classified as such for Census purposes is clearly evident in Table 3. Hardwick still has a good deal of first-class farming; Phillipston and Templeton very little. Barre is intermediate, and Petersham and Athol half way down from Barre toward the bottom. We shall see later that the proportion of part-time and residential farms figures largely in these averages, and even more in those for population per farm.

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TABLE 3. Size and valuation of farms of Petersham and surrounding towns, 1945

	<i>Acres per farm</i>		<i>Farm population per farm</i>	<i>Census valuation per farm</i>
	<i>Open land</i>	<i>Woodland</i>		
Petersham	36	82	3.3	\$6,200
Athol	32	58	4.7	4,800
Barre	55	40	4.4	5,800
Hardwick	99	49	4.0	7,800
Hubbardston	23	37	3.9	5,700
Phillipston	14	58	3.3	3,300
Templeton	16	36	3.2	4,300
Worcester County	39	35	4.7	6,600

A rough classification of the 99 Census farms in Petersham would probably have put not more than 20 in the class of commercial family-sized farms. It would have put perhaps another 20 in the class of "part-time" farms, and the rest of the 99 in the class of "residential farms," that is, farms with incomes almost wholly from other sources and with no farming except gardening and/or keeping a few hens.² Even the family-farm households included, if we take the 1938 survey made by the Country Life Commission as a basis, 7 members who worked at jobs outside of agriculture. The part-time farms average, by definition, at least one person thus employed 150 days per year or more. The residential farms averaged only 0.6 of an off-farm worker per farm, according to the 1938 Country Life Commission survey. This would indicate that many of them had sources of income other than current earnings, or were at least temporarily unemployed.

At the time of the 1938 survey, half of the so-called farm population of Petersham lived on the residential farms—3.4 per farm; and one fourth on the part-time farms—6.6 per farm. The full-time farm households averaged 5.7 persons per farm. With the fuller employment during and since the war years, these proportions have probably been changed considerably. Over half the off-farm workers in this so-called farm population were skilled or professional workers.

The Town of Petersham had 242 occupied dwellings and 117 unoccupied ones in September, 1950. Its population was approximately 800. An occupation census classification of the village population in the summer months would show 8 or 10 operators of stores and service agencies and employees, and 46 publicly employed workers, of whom 23 receive all or a large share of their total income from public employment.

² These figures are estimates — any actual count would be out-of-date in a few months.

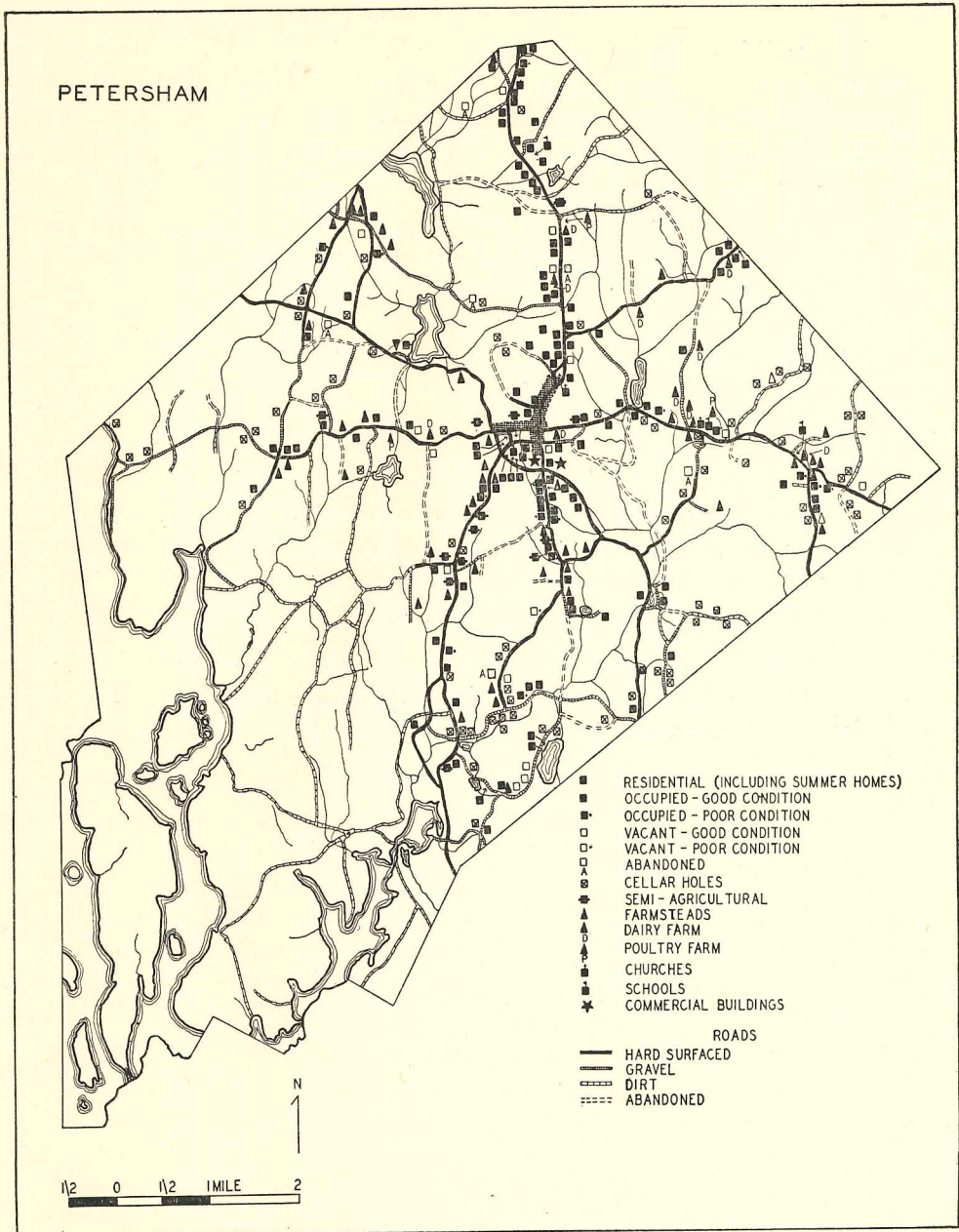


Figure 4. A Map of the Town of Petersham

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OWNERSHIP OF LAND

Figure 3 shows the boundaries of tracts in the town owned publicly, by Harvard University and by certain other groups. All the ownerships not marked "local" in Figure 3 are in timber. The remainder of the town in tracts of 5 acres and over is owned by 212 owners in tracts varying in size as follows:

	<i>Number of owners</i>	<i>Percent of land in each group</i>
5 to 10 acres	32	1
10 to 20 "	22	2
20 to 50 "	53	9
50 to 100 "	51	21
100 to 200 "	32	25
200 to 500 "	16	25
500 to 1000 "	5	17

If these 212 owners of 5 acres or more own a total of 18,148 acres, the average is 86 acres per owner. The tax rolls show 71 owners of less than 5 acres. The larger ownerships are by no means all on single tracts: those of 500 acres or more are composed of 7, 16, 10, 6, and 6 tracts respectively.

On page 15 is a map of the Town of Petersham, showing roads, the Village of Petersham, location of all dwellings outside the village, classified as farms, residences, and so on.

CHAPTER 2 AGRICULTURAL POSSIBILITIES

Let us now review the possibilities of developing present lines of production in Petersham, beginning with agriculture. The physical resources of an agricultural area, assuming adequate rainfall and a suitable climate, are determined in large measure by its soils and topography. The dominant soils *series* of Petersham with agricultural possibilities are the Gloucester and Charlton so common in southern New England,¹ but unfortunately they are dominant only along the ridge running through the center of the town and on its slopes and in the eastern corner of the town, as shown in Figure 5. Part of them are classified by *type* as loam and part as stony loam on the soil maps.

The Charlton loams produce excellent hay and pasture when properly cared for. To produce really good pasture, they need to have their surface stones removed so that they can occasionally be reworked with a plow or bog harrow and reseeded. They require occasional liming and frequent fertilization for high productivity. They can be fertilized at a rate that will make them easily support a cow to the acre during the pasture season.

The Gloucester loams that are fairly level and reasonably free of stones also make good hay and pasture, but are usually more porous and may require slightly heavier fertilization than the Charlton loams; also, they do not stand droughts so well. Unfortunately, the Gloucester loams of Petersham are mostly stony land, occurring on the western slope of the central ridge, and in patches on the slopes of the lower western ridge that parallels the main ridge. The classification in Figure 5 of the land as Good and Fair is in accordance with the ratings commonly given the different soil series and types in southern New England.

It will be noted that the soils classified as Good are: Charlton loam (Cl), Charlton fine sandy loam (Cf), Gloucester loam (Gl), Gloucester fine sandy loam (Gf), and Merrimac sandy loam (Msa). Those classified as Fair are

¹ The *series* to which a soil belongs is determined by its origin, as indicated by a profile of its topsoil, subsoil, etc. The *type* is determined by the texture of the topsoil.

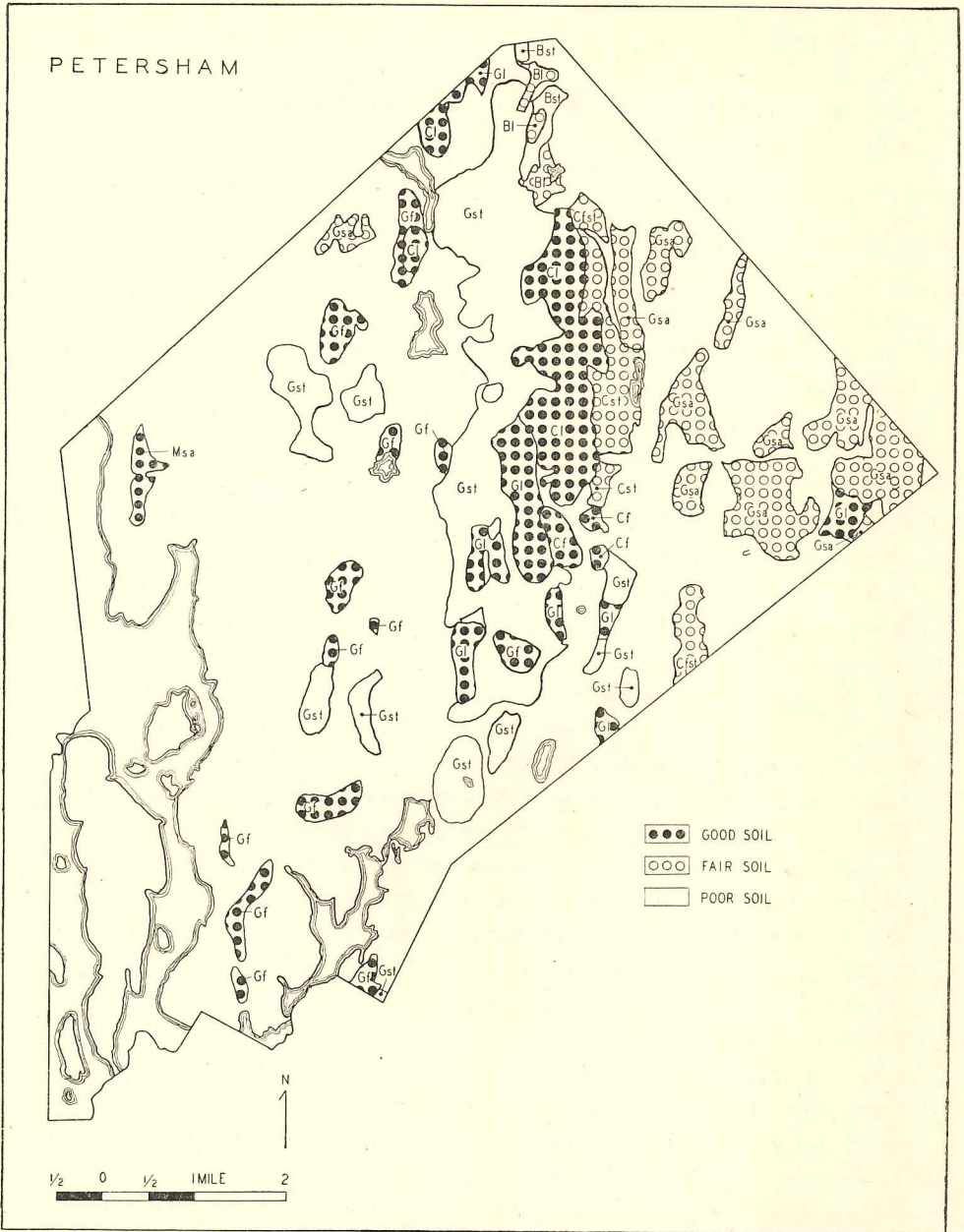


Figure 5. The Principal Agricultural Soils of Petersham

Charlton stony loam (Cst), Charlton stony fine sandy loam (Cstf), Gloucester sandy loam (Gsa), and Brookfield loam (Bl). Gloucester and Brookfield stony loams (Gst and Bst) are classified as Poor. None of the other soils classified as Poor is shown separately on the map. In the eastern part of the town there is a good deal of Gloucester sandy loam classified in Figure 5 as Fair; it is not as good a soil as the patches of Gloucester loam and fine sandy loam also classified as Good. The town also has some narrow strips of Merrimac alluvial stream-bed loams, which, however, tend in this area to be too coarse and gravelly for general agricultural use. The Brookfield soils are like the Gloucester, but not quite so good.

It is interesting to compare this map with that in Figure 6 to see what lands classified as Good are not now in crops or in pasture, and likewise for the Fair soils. In 1840 when 80 per cent of Petersham was in farms, not only the Fair but also part of the Poor soils were within farms. The Poor soils, however, were nearly all in woodland within farms.

That quality of soil has by no means been the only factor in determining which lands have gone out of crops and pasture is evident from the situation in several places in the town. Nothing more than the history of a particular family or group of families or special advantage of location may have made the difference. By no means is all the Good soil along the central ridge near the village in crops and pasture. No doubt the main reason for this is that much of this land came into the hands of summer residents who were not much interested in farming. More land is in farming use on the southwest road to Hardwick than the soil map alone explains. Once the stones are largely removed from soils designated in the Soil Survey as stony, they may be as productive as those not so classified, but this will not be true if the subsoil is shallow. That the early settlers reclaimed much stony land in this way is plain for all to see on the road to Hardwick. A good part of the Gloucester sandy loam classified as Fair in the eastern part of the town is still in crops and pasture, but not in the extreme eastern corner. Nearer to Petersham Village on the same road, but north of it, is a considerable block of farming land, much of which appears on the soil map as Poor. The Soil Survey designates it as Gloucester stony sandy loam. Evidently the early settlers must have done a good bit of stone picking in this section.

MARKETS

It is clear from the history of Petersham that loss of markets has played a major role in the decline of its agriculture. What role do markets play today?

Vegetables. About the only outlet for fresh vegetables is among the families in the village, except as farms in the north end of the town may

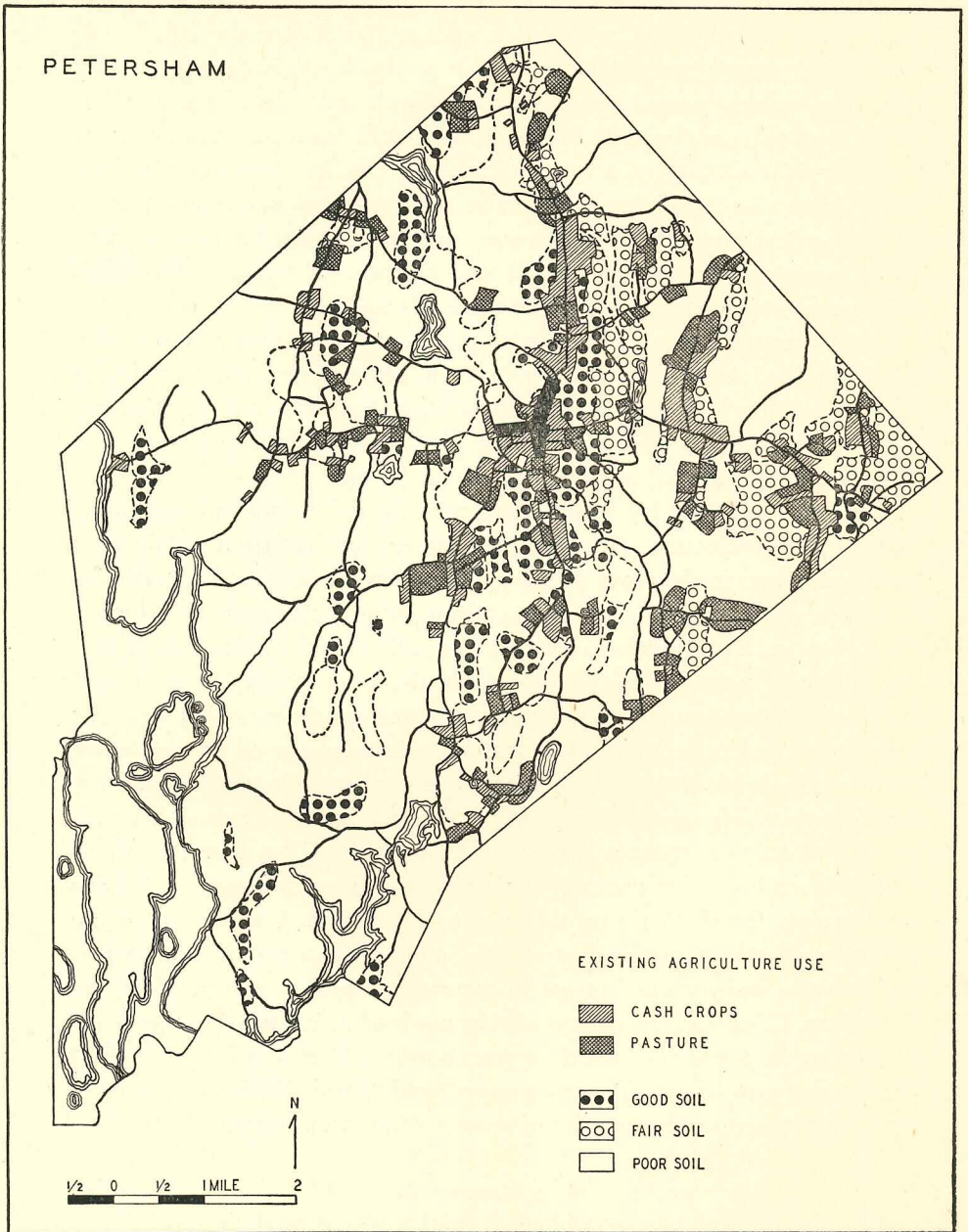


Figure 6. Land in Crops and Pasture in Petersham Compared with Distribution of Soils in Figure 5

break into the Athol market. Worcester and Gardner can be abundantly supplied by farms nearer to them.

Fruits. Small fruits—same as for vegetables. As for orchard fruits, southern New England has enough orchard sites better than those of Petersham to supply all the local markets for apples, pears, and peaches which New England is likely to retain.

Poultry. In general, the nearer a poultry farm is to a large city market outlet, and to some distribution point for feed, the better able it is to compete. Another ten or twenty miles of hauling distance, however, is not enough of a handicap to keep a good poultryman from succeeding in Petersham if poultrymen generally are succeeding in southern New England. There are a good many successful poultry farms in adjoining towns. Poultry production about doubled in Massachusetts and surrounding territory during the war years. It has maintained this advance since. A large factor in this development had been the forwardness of New England poultry farmers in adopting the new technologies of feeding, breeding, and sanitation that have been developed in the past decade or two. New England will need to continue to lead in this respect if it is going to maintain its present position. This is even more true for Petersham and adjoining towns than for locations nearer to large markets and feed distribution centers.

Dairies. If Petersham expands its agriculture, most of this expansion will be in dairy farming. It now has an outlet in Worcester and other near-by industrial centers for its milk in fluid form, except as irregular seasonal production forces some of it into fresh cream use at the flush season. Total milk receipts in the Worcester market, however, were only 10 per cent higher in May 1950 than in January 1950. Of the January receipts, 79 per cent were from producers in Worcester and near-by Massachusetts counties; in May, 90 per cent. Two Vermont plants and one New York state plant were supplying the outside milk. In January, 87 per cent of the milk received was sold as Class I (fluid milk), in April, 82 per cent of it, and in June, 77 per cent of it. The 13 per cent of Class II in January is practically no more than needed to put on the delivery trucks each day to be sure that all have enough and to take care of day-to-day variations in consumption. Even the 33 per cent in June leaves very little to be processed into cream. Therefore Worcester has to depend largely on outside sources for its fresh cream.

The contrast with the Boston market is very pronounced—Class II was 55 per cent of the total receipts in Boston in April 1950, and 60 per cent in June.

The prices received by Worcester County producers in the Worcester

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market and Zone 1 and Zone 20 shippers to the Boston market, with transportation and other costs deducted, may be compared as follows:

		<i>Class I prices at city plants</i>	<i>Class II prices at city plants</i>	<i>Blended prices at city plants</i>
January				
Worcester County		\$5.51	\$3.05	\$5.24
Zone 1	— Boston	5.51	3.73	5.24
Zone 20	— Boston	—	—	5.01
June				
Worcester County		\$5.07	\$2.77	\$4.66
Zone 1	— Boston	5.07	3.087	4.42
Zone 20	— Boston	—	—	4.19

The blended prices received at two country plants in Vermont and one New York plant in January were \$4.31, \$4.28, and \$4.26 respectively; in May, \$3.73, \$3.70, and \$3.68 respectively. Producers in Worcester County receive a location differential of forty-six cents per hundredweight, the same as those within the 40-mile limit of Boston. The prices received by Vermont shippers to Worcester are almost the same as these producers would receive shipping to Boston.

Before the war, the Worcester market tended to meet any deficits by buying more milk from Vermont instead of from Massachusetts farms farther out from Worcester. It was, of course, simpler to do it in this way. Now that truck routes into Petersham are established, Petersham is not likely to lose its market to Vermont producers.

Not all the milk produced in Petersham, however, goes to Worcester. One group of farmers is selling milk to one of the Petersham dairy farmers who operates a retail milk route in Gardner. For some reason not at all obvious, another group ships to Boston, in spite of the higher hauling costs and higher percentage of Class II milk in the Boston pool and the resulting price differential in favor of shipping to Worcester.

It is apparent that the supply of milk produced in the Worcester area is not likely to exceed Worcester fluid milk consumption very much. Should it ever do so, the shifting of more producers from the Worcester market to the Boston market on the east would take care of the situation. Shifts of this sort have not taken place too readily in the past, but the Worcester and Springfield markets are now under Federal Orders and under more or less unified administration with the Boston market. Class II prices can be expected to move in close parallel in the two markets.

The main interregional competition in eastern milk markets is in cream

and not in milk. Before the war, Boston was getting around 30 per cent of its annual cream receipts from outside New England. In the period of milk shortage during and following the war, this percentage rose to 85 in 1946. It fell to 35 per cent in 1949. Worcester milk distributors obtain their outside supply of cream from Boston cream jobbers, who get their supplies from northern New England, and in seasons of short supply, partly from the Midwest.

As for other near-by outlets for milk, Athol and Orange get a small percentage of their milk from neighboring farms and the remainder from Vermont. As was stated earlier, Petersham does provide some milk for the Gardner market. Both Gardner and Fitchburg, however, depend to a considerable degree on milk shipped in from out-of-state sources.

Dairy-woodland farming farm products. Dairy farming in Petersham will generally have more or less woodland farming associated with it, although it may take the form of nothing more than letting the cattle run in the woodland and cutting a little fuelwood and a few fence posts from time to time. After we have discussed the forestry possibilities of Petersham, we shall consider the possibilities of dairy-woodland combination farming.

Part-time farming farm products. So far as commercial sales are concerned, the market outlets for part-time farms are those already outlined, provided the farms are so situated that they have marketing facilities. If the part-time farms are grouped along one road, trucks will collect their milk or eggs or poultry. Usually an important outlet for the product of such farms, however, is in the household. And what we have called residential farms produce little or nothing in addition for the market.

FARM REORGANIZATION

If the agriculture of Petersham is to expand, it will take the form, at the start at least, mainly of increasing the output from existing farms. With this in mind an analysis was made of the business of five farms in the town, one of these being a specialized dairy farm selling its milk wholesale, and another a farm selling its milk mostly at retail in the summer, combining poultry with dairy farming, and keeping a few hogs to use the skim milk by-product of cream. The other three were part-time farms with 5, 7, and 10 cows respectively, along with the off-farm work. The last of these three part-time farmers has no regular off-farm job, but works about the equivalent of half-time at snow removal and other occasional jobs. Two of these three sell their output as cream and feed the skim milk to hogs, and one of them grows a few strawberries for the local market. These five farms are thus a pretty fair sample of farming in the Town of Petersham.

The analysis showed that all five of these farmers could easily expand their farm businesses by improving their hay and pasture and the feeding of more cows. One can increase his dairy herd from 31 to 40 cows by fertilizing more adequately part of the 70 acres of tillable land on the farm and reseeded some of it to alfalfa and ladino clover mixtures. Another can increase his dairy herd from 23 to 29 cows by better fertilization and reseeded of 27 acres of hay and converting another 8 acres to ladino pasture. The third one, a part-time farmer, can increase his herd from 7 to 12 cows by converting 20 acres of poor hay into good ladino hay and pasture. The second part-time farmer can increase from 5 to 13 cows by reseeded and fertilizing much of 35 acres of poor hay and pasture. The other part-time farmer can increase from 10 to 16 cows by increasing the grass silage crop from 3 to 8 acres and improving somewhat 47 acres of poor hay and pasture. These 29, or 38 per cent, more cows, would produce, as a result of the better quality of forage, and other easily possible improvements in the rations, 50 per cent more milk. Other changes that are easily possible are shifting from selling of cream to selling fluid milk wholesale on two of the part-time farms, and using artificial breeding in place of keeping a bull on two of the farms. All these changes, assuming wages and cost-rates at the 1943-1945 level, and prices at around 90 per cent of parity, would increase the gross receipts from sales of these five farms from \$32,600 to \$41,800, or 28 per cent. The total purchased feed costs of these farms, although reduced from \$92 to \$75 per cow, and from \$1.60 to \$1.15 per hundredweight of milk, would be raised from \$7000 to \$7850, and the other expenses for labor, fertilizer and lime, seed, gas and oil, depreciation and upkeep of equipment, taxes, and so on, from \$17,500 to \$18,700. The resulting net cash returns would be increased from a total of \$8,150 to \$13,600. The off-farm incomes of the three part-time farmers would be reduced only from \$6000 to \$5800 by expansion of farm output. Surely the increase in net income of \$5450, or nearly 40 per cent, would be well worth the small additional investment and managerial effort involved.

Nevertheless, when these farmers were interviewed and asked about plans for increasing farm income, one of them was sure he did not want to keep any more cows, even though he had the extra barn room for them, and all the equipment needed, and really more labor than was necessary with this equipment. Accordingly, a plan was worked out for him that would increase the output from the same herd at less cost for purchased feed and labor, which if carried out promised to increase his net cash income from \$1,800 to \$3,100. This is a choice which of course any farmer is entirely free to make. The point is, however, that he and his family should know as clearly as possible what they are giving up when they make a decision. The purpose of planning analysis is to supply them with this information.

One of the part-time farmers stated that what he would really like to do is give up his off-the-farm work and convert his farming from dairy to beef cattle, and if this was not feasible, to keep his job and make the shift to beef cattle anyway. Although the farm has 240 acres, only 25 are now tillable and 10 are in open pasture. The expense involved in clearing additional land would not be repaid out of beef cattle returns. Shifting his part-time dairy herd to beef cattle, if accompanied by the same improvements in forage production and pasture as planned for the dairy herd, would make possible a cow-and-calf herd of 9 cows, 1 bull, and 4 heifers, and net returns of \$200 more than present returns, but \$1400 less than the net returns from a dairy herd.

The plans for the other three farms included in the foregoing summary are closely in line with those which the farmers had suggested. It should be emphasized that all these farm reorganizations are conservative. Larger expenditures upon land improvements, thus bringing more land into a higher order of use, plus additional investment in barns and equipment, would have made possible considerably larger incomes for them.

These estimates of returns do not include additional income from the woodland management plans that were combined with the dairy plans on these farms. Estimating future incomes from farm woodlands is an involved process, as will appear later. Woodland improvements on amounts of woodland such as included in most dairy farms in Massachusetts will ordinarily add very little to cash income of dairy farms in the next ten years, and usually not more than 10 to 20 per cent after they come into full productivity after 50 to 80 years. The woodland plans developed for these farms were very simple, consisting largely of fencing the cattle out of the timber in order to give it a chance to develop and selective cutting in the next five to ten years designed to remove inferior trees and give the better trees a chance to develop into crop trees.

On two of the part-time farms, an analysis was made of the possibilities of shifting to full-time work on the farm. In neither case did the resources of the farm, even with rather drastic land improvements, warrant this shift. This is likely to be true on a majority of part-time farms in New England, unless the farmer is in a position to buy or rent additional land near by. In general, as New England has shifted to livestock farming since 1840, larger acreages than before have been needed. The full-scale dairy farms remaining therefore tend to be consolidations of two or three smaller farms. Others have become full-scale farms by shifting in whole or in part to more intensive types of farming, such as poultry, fruit, or truck crops. The remainder have continued as farms only by combining off-the-farm work with the farming. On many of the full-scale farms of New England, on the average

1 in 4, the owner works full time or somewhere near it on the farm, but one or more members of his family have off-farm jobs. For New England as a whole, the combined per-farm farm and off-farm net cash earnings of part-time farmers equal those of full-scale farms. In southern New England, they tend to run a little higher. Part-time farming therefore can be looked upon as a well established and acceptable mode of living in this region.

A naïve reader may think that the potential net cash income from all sources of \$13,600 plus \$5,800, or per farm \$3,900 for these five farms after reorganization is after all pretty low. They fail to recognize that the families have in addition a house to live in and food and fuel from the farm. Let the urban family with \$5,000 of earnings figure out what it has left after paying its rent, half its fuel bill, and about half its grocery bill, and compare this with the \$3,900! One of the major reasons these five farmers have not expanded their farming as fully as possible is that they are living pretty well on the \$2,500 or so of cash income they have been getting since around 1941.

The net incomes were, of course, much lower than this in 1936-1940, but so were urban incomes, and nearly a fifth of the nonagricultural labor force was still unemployed in 1940. How the levels of incomes varied over the years may be judged from Table 4, which reports the receipts and expenditures for some typical farms in the same general area of southern New England. The incomes in 1942-1947 had a purchasing power about equal to \$2,500 in the 1936-1940 dollars that we remember fondly in these days. It will be noted that the large dairy farm has had a more variable income than the one-man dairy farm; that the retail dairy farm has had a highly stable income; the fruit farm the most erratic income; and that the poultry farm was relatively better off in 1931-1933 than in 1936-1940.

TABLE 4. Net cash farm incomes for groups of years of typical farms in southern New England, 1920-1947^a

	1920-24	1925-29	1931-33	1936-40	1942-47
Two-man Worcester County dairy farm	\$ 980	\$ 980	\$ 320	\$ 980	\$2640
One-man Worcester dairy farm	610	550	280	540	1450
Two-man eastern Connecticut dairy farm	750	855	520	745	2270
Retail dairy farm, eastern Connecticut	1330	1550	1465	1670	2800
Southern New England family poultry farm	810	1090	970	840	2255
Eastern Massachusetts fruit farm	6575	4050	1480	1020	3915

^a Source: J. D. Black, *The Rural Economy of New England*, pp. 661 ff.

The analysis of these five farms in Petersham is supported by analysis of a much larger group of Worcester County dairy farms, all delivering milk to the Worcester market, and many of them in towns adjoining or near to Petersham. A group of 75 Worcester County farms were analyzed in 1938 in connection with the Worcester County Land-Use Planning Project. Of this group, 56 were analyzed again in 1946, and 25 were chosen to be included in the Charles H. Hood Foundation study of dairy farming. The plans worked out with the farm operators in 1938 called for a good deal of land and pasture improvement and increased use of lime and fertilizer, with building improvements as needed to store the additional forage and house the additional cattle. When these farms were revisited in 1946, they were keeping 34 per cent more cows per farm, raising a half more replacements, and producing 38 per cent more milk with only 23 per cent more purchased grain. They had increased their cropland from 41 to 57 acres per farm. They had not, however, improved as much pasture and hayland as their 1938 plans had called for. They had more than doubled the number of tractors and milking machines in use per farm and reduced the number of horses by a third.²

The revised plans worked out for the 25 farms in 1946 call for an increase from 11 to 23 acres per farm in seedings with alfalfa mixtures to improve the quality of the hay and from 2 to 24 acres of reseeded pasture. Nine of the farmers are planning boulder removal on crop or pastureland. This particular group of 25 farms increased their herds from 22 to 33 cows from 1938 to 1946. The revised plans call for a further increase to 42 cows, with a doubling of the number of replacements raised. Production per cow is to be increased 700 pounds on top of the 400-pound gain in 1938-1946 with a slight decrease in the grain ration. Additional equipment will be needed on part of the farms, and the labor force will be increased from 2.6 to 2.9 per farm. Net farm incomes are scheduled to be increased by a half.

Now what about developing new farms in Petersham and perhaps gradually restoring the agriculture of Petersham to its 1840 level? The obvious answer is that the world is not short enough of food to warrant this. If Petersham were in India, China, or Korea, about all of its land would be cleared of timber and stones and brought into food production in short order. But taking these countries as they are, they have no dollars to pay for what it would cost to produce food on this type of land in the United States. They had no dollars for it even in the 1920's and 1930's. These countries keep

² Most of the analysis of these Worcester County dairy farms has been done by Dr. W. H. Brown, now on the staff of the Bureau of Agricultural Economics of the United States Department of Agriculture.

as many people alive as they can by growing intensive hand-labor crops, like rice and vegetables, and eating these very close to where they are grown. Even if they were to industrialize, they would do this very largely on the basis of such foods produced close to the industrial centers.

If Petersham were in Greece, Italy, or Spain, perhaps three fourths of it would be cleared and farmed; if it were in West Germany, perhaps a half of it. The pressure of the population of the United States on the land in 1800-1840, before the Midwest was brought into production, was probably as strong as in Western Europe today. These European countries would gain by importing more food, and letting some of their poorer land go back to trees, were it not for the constant danger of war. But they could scarcely pay enough for such imports to warrant breaking very many farms out of the woods in Petersham and similar areas.

But is not the population of the earth increasing at the rate of 55,000 a day? Will it not soon need all the food that be grown on such lands? Probably no greater nonsense has been spoken and written in the last five years than on this subject. We are not "one world" in matters of food supply. We are not so many billions of people feeding like hogs out of one big food trough. China has its own trough and in the main feeds as many people as it can produce food for; and so with India and Indonesia. And it is in these countries that the big increases in population are coming at this time. India alone gained over fifty million between 1931 and 1941. She added these numbers mainly because she had increased her food supply enough to feed this many more.³

More than 40 per cent, however, of the peoples of the world are living in countries where the population increase is kept within such control by the families themselves that the food supply is increasing faster than the population, and consequently standards of living are rising. In the future history of human civilization probably more countries, and more families within these countries, will be added to the 40 per cent, until even India and China reach this stage. In the meantime, the countries that have not passed this stage will not generally be able to import much food. Or even if they could, they would not for military reasons.

This does not mean that there will be no international trade in food. First of all, some countries in Western Europe, including the United Kingdom, built economies in the last century that were based on exchanging factory goods for food. They were able to do this because they led the world in industrialization. (It needs to be added that they are having a hard time

³ The rest of it was mainly based on exchanging larger quantities of manufactured products for rice from Burma.

continuing on such a basis at present—all of them now need to export part of their factory workers to the countries which have the foods.) Secondly, some countries or parts of countries have found it advantageous to specialize in large measure in one food, like sugar or coffee, and exchange this for other foods. Thirdly, if peace could be restored in the world and countries with more than their share of the better lands were able to supply the food for the less favored countries, and those with more than their share of supplies of coal, iron, and other industrial materials, or of skilled artisans, or of both combined, were able to produce factory or handmade goods and market them abroad, the exports of food from the United States would increase. But no developments in prospect in the world, including population growth, promise any large new outside demand for United States foods and fibres.

As for the demand for food at home, even though the population of the United States reaches 250 million within the next fifty years, as a few now say, in place of the 175 million ordinarily predicted before the war, we have every reason to expect that the food and fibre needed can be produced more advantageously in the main by increasing the yields per acre of land now in crops and pasture rather than by bringing abandoned farm land back into such use. Samples of the possibilities along these lines are the recent increases in yields of corn and cotton in the south made possible by new technologies, of corn in the midwest, of potatoes in the northeast, and of pasture lands in the east and midwest.

Nevertheless, some increase in the number of farms in Petersham is entirely reasonable to consider—not much of this in full-time family farms, however. The small increase in the latter would have to result almost entirely from expanding what are now part-time farms into farms that will use enough of the time of the operator and/or of members of his family to provide full-time work for one man or the equivalent. In a few cases, the off-farm work can be dropped after such expansion, but in more cases the operator will do the extra work by putting in more hours on his farm after a short work-week, or by making fuller use of labor-saving equipment, or having other members of the family help more with the work.

There are four types of situations in which this is feasible. The first is one in which the land now in crops and pasture is badly run down but will support a full-time farming operation or its equivalent if its productivity is restored. The second situation is where the farm has within its boundaries some old fields and pastures that have only recently been abandoned and hence are easily rehabilitated. The third situation is one in which a part-time farm can be enlarged by adding fields from other farms being abandoned, or

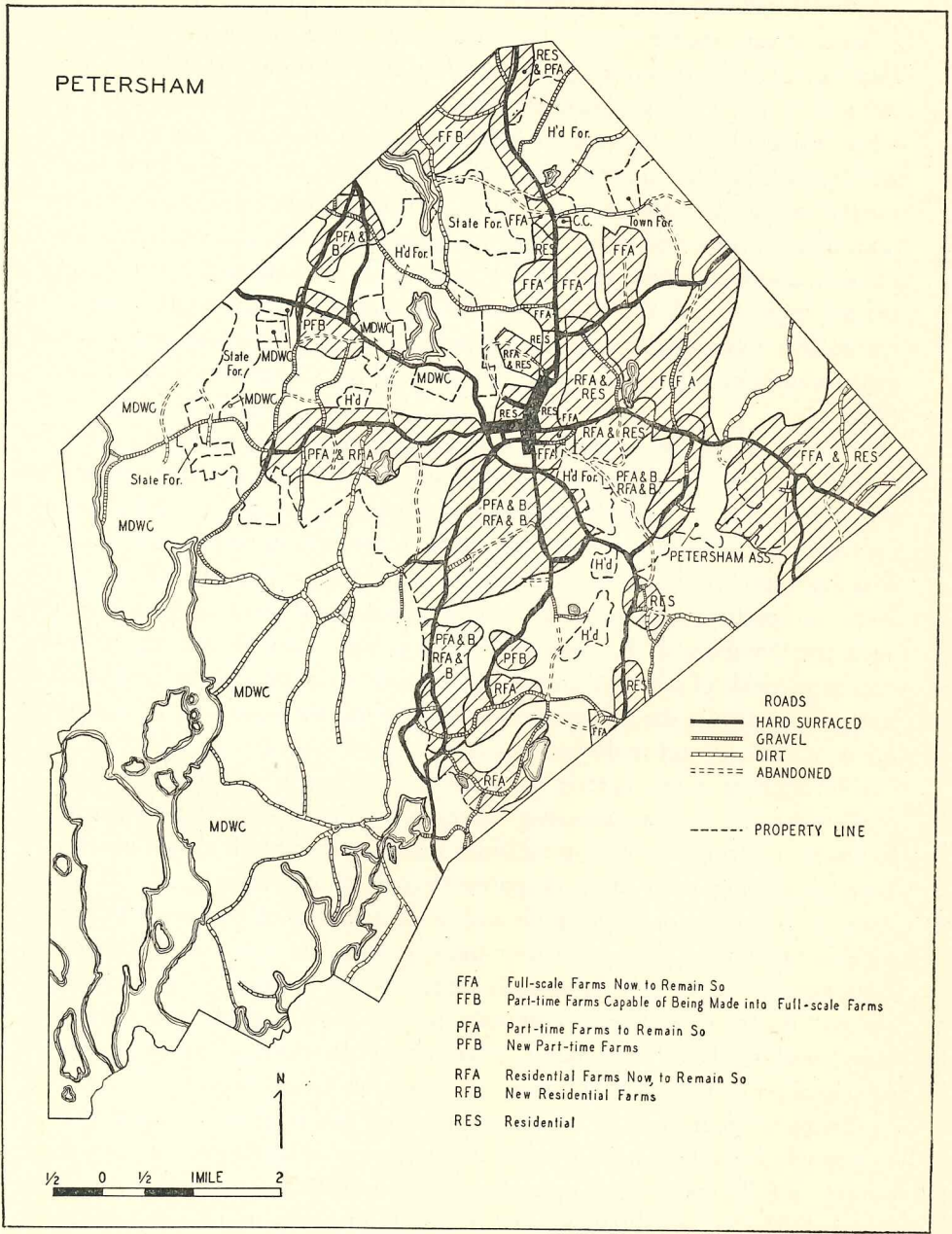


Figure 7. Zoning Map of the Town of Petersham

part-time farms can be combined. An expansion of dairying is clearly indicated in all these three cases. The fourth situation is one in which the land base cannot be enlarged to advantage, but a poultry enterprise can be added, or possibly even a vegetable or small fruit enterprise. Market outlets will be important in both these cases, but especially in the latter.

The Zoning Map (Figure 7) indicates the most likely location in the town for new full-time farms or the equivalent developed out of part-time farms under these four situations. On this map, the present full-scale farms are indicated by FFA and the part-time farms capable of being made into such farms or the equivalent are marked FFB.

Besides such expansion of part-time farming into full-time farming or the equivalent, the only other possibility for more full-time farming is that some blocks of land still have enough open or half-open land so that an expenditure of \$30 to \$50 per acre in clearing and rehabilitation will convert it into cropland and pasture. No blocks are thus marked on the Zoning Map.

More important, especially in terms of numbers of families and population, will be changes within the part-time farming group; first, in the form of expanding somewhat the agriculture on existing part-time farms, and second, in the form of developing some new ones. A large fraction of present part-time farms can readily increase their output by the same general type of improvements as indicated for the three part-time farms analyzed. Others can do it by adding a poultry enterprise of a few hundred hens. The reasons that present part-time farmers may expand their farming at this time are as follows:

1. The work-week has been shortened.
2. New equipment suited to small operations is being developed.
3. More custom hiring is now possible.
4. New technologies increase the output with less labor—for example, the prepared feeds and sexed chicks available to poultrymen, and the use of artificial insemination in dairying.
5. Part-time farmers are in a position of comparative advantage because of being able to operate farms as a supplement to off-the-farm work.

The factors that may work against an expansion of part-time farming operations are the following:

1. Workers with off-farm jobs have divided interests and do not give enough attention to their farms.
2. They are less likely to have the requisite farming skills.
3. They are less likely to keep informed as to new technologies.
4. They may be handicapped by the small scale of their operations.

These four reasons against expansion of part-time farming have always

operated and have not acquired any new force of late. The reasons for expansion nearly all represent new developments favoring part-time farming. Hence, there seems to be reason to expect somewhat larger-scale part-time farming operations. Most of the part-time farms, however, are considerably smaller than the three analyzed, and after expansion will still have no large volume of output for sale—less than \$500 gross in a majority of cases.

The Symbol PFA on the Zoning Map indicates locations of part-time farms that may reasonably enlarge their operations. The Symbol PFB represents good locations for new part-time farms. Any new farms established in these latter locations are likely to have to content themselves with a few acres of already open land, or of land made available by clearing. They will tend, therefore, to be small-scale part-time farms, with the family living, including use of the dwelling, being clearly the larger part of the enterprise. Commonly one line of production only will be expanded to commercial scale.

The amount of part-time farming that develops in a community is dependent somewhat upon marketing and other facilities. Hence there are definite advantages in concentrating part-time farms on certain roads.

There may, of course, be a large growth of part-time farming in this country, or even in Massachusetts, and yet very little of it in Petersham. There must be off-the-farm jobs before there can be part-time farming. Most of the part-time farmers of Petersham will have their jobs in Athol or Barre, or in the Village of Petersham. Gardner and Ware are too far away.

What is likely to happen to the number of off-farm jobs in this area will be discussed later.

RESIDENTIAL FARMING

It seems best to deal separately with what we have called *residential farming*, as distinguished from part-time farming, in this study. The two, of course, merge into each other. For the purposes of this analysis, we shall say that residential farming ends and part-time farming begins when the family sells more than \$50 worth of some farm product actually produced on the farm.

Within residential farming thus limited there is still possible a wide range in production; at one extreme, families with only a small garden, and at the other those who grow their own potatoes, cut much of their own fuel-wood, and keep some chickens, a few pigs, and a cow, and perhaps even raise a heifer calf now and then. A few of these farms may have attached to them two or three hundred acres of woodland. Most of them, however, if they have any appreciable woodland at all, have only the amount that one

would have found on a *small* farm 50 to 100 years ago, for many of these residential farms are nothing more or less than what has become of a farm too small to give a family a decent living after 1840. The remains of the old barn may have been made over into a garage. In some cases, the cropland was added to near-by farms sometime between 1840 and 1920, and the woodland may or may not have been bought along with the cropland. Many of the residential farms of today, however, have only one to two or three acres of land. The new ones established in the future will tend to have no more than an acre.

How many of the present residential farms will be continued, and how many new ones will be established, depends upon several major factors, as follows:

1. How many of our city families come to prefer having plenty of space, and rural surroundings, with a car to get them to town and back, to living on a city lot nearer to jobs, stores, movies, and so on.
2. How much industry and trade spreads out into the suburbs and smaller cities. Workers living five or ten miles out from Athol or Gardner are likely to be nearer to their jobs in time spent in travel than those living in Arlington or similar towns in Greater Boston.
3. The public utilities and other facilities that rural towns make available to rural residential districts.
4. Most important of all, how interested the particular family is in producing fresh food for its own use, and commonly much more of it than it would think it could afford to buy.
5. Associated with No. 4 is, of course, how much time the family is willing to put into this kind of living rather than in leisure. With present working hours, most families have an abundance of time for such production for home use if they care to use it in this way. (The senior author of this report spends, in addition to a 50- to 60-hour work-week 11 to 12 months of the year, enough time on a city lot adjoining his home to grow more fruit and vegetables than a small family cares to consume in season, and over winter in the case of small fruits. He grows eight species of small fruit, and five of orchard fruit, plus asparagus and rhubarb.)

As with part-time farming, the number of jobs within easy driving or commuting distance is also a major factor in determining the amount of residential farming. Only a small percentage of urban families are likely to prefer this way of living. The attractiveness of the Petersham countryside, however, may call out more than the usual fraction.

In the Zoning Map, the present residential farming sites are marked RFA,

and additional potential sites RFB. The RES on the map indicates purely residential areas.

We have discussed what is possible for Petersham agriculture. What are the chances that these potentialities will be realized?

The main factor in this is the desire for a better living and the ambition to satisfy this desire among the rural people of Petersham. The second most important factor is a realization of what can really be achieved. The third is a public education program that will supply the people with the information they need to go forward along the lines indicated. The fourth is the development of needed marketing facilities. The fifth is the availability of credit. The sixth is public services of various sorts, probably including marketing and credit, to make up for those not provided by private firms. And the last but by no means the least is strong local community leadership to keep such a program as here suggested moving forward steadily. About all this report can do is the second of these. The Agricultural Extension Service has a large role in the first and third. The desire for better living is by no means fixed—home economics education can do much to kindle and feed such desire.

Any program such as suggested by the foregoing starts out with a big handicap almost anywhere in New England. Its rural people have lived through three generations of decline, and have acquired as a result almost a fatalistic attitude toward New England agriculture. The evidence is clear that New England agriculture rounded the turn in the 1920's and has been headed upward since. But its people's minds and attitudes have not yet rounded the turn. One could scarcely expect those of the old folk to do so, since they lived most of their lives during the decline. Most of the young folk are still more under the influence of their elders than they are under that of their economic environment. The point has been reached where the young people need to get their ideas from what they see going on around them now and assume a bold leadership of their own.

CHAPTER 3 WOODLAND POSSIBILITIES

A major difficulty in analyzing forestry possibilities is the ownership pattern. The forest lands of Petersham, as in much of the United States, are not owned in size units adapted to management. The following analysis will be in terms of units adapted to management and ways of integrating the management of ownerships too small for individual management.

RESOURCES

The character of the timber on the Petersham woodlands is indicated by the following data obtained by a careful sampling of stands made by the staff of the Harvard Forest in connection with the Worcester County Land-Use Planning Study in 1939, just after the hurricane.¹ These figures do not include the land added to the town from the Town of Dana. They do include the 2,100 acres in the Harvard Forest and the 1,560 acres in State and Town Forests.

	<i>Acres</i>	<i>Per cent</i>
Better Hardwood	5,650	33
Softwood-Better Hardwood	2,192	12
Softwood	1,130	6
Inferior Hardwood	2,047	12
Softwood-Inferior Hardwood	3,642	21
Indeterminate	2,828	16
Total	17,489	100

The "indeterminate" in this classification includes recently cut-over forest land and stands destroyed by the hurricane and whose future character was uncertain. From the small remnants of original forest and from such scattered documentary evidence as is obtainable, it is clear that the primeval forest here was almost everywhere a mixed and many-aged stand containing largely oak, chestnut, birch, beech, and maple, with lesser amounts of pine

¹ This study was a joint undertaking of Harvard University, the University of Massachusetts, and the United States Department of Agriculture. Preparation of the results for publication was postponed until after the second World War and is now being resumed.

and hemlock. The economic history of central New England has completely altered the forest composition. As explained earlier, by 1820 farms occupied approximately 80 per cent of the total land area of the town. The farmed areas extended east and west from the ridgetops, sparing the bulk of the forest on the lower slopes and along the valley margins.

In the natural reforestation that followed swiftly and steadily on the withdrawal of land from cultivation or pasturage after 1840, large areas of field and pasture came up to pure stands of white pine, which prior to the 1938 hurricane made the bulk of the commercial timber of the town. This old-field pine was a temporary type and stood in sharp contrast to the original forest. On some areas in the town where white pine seed was not promptly available, weed species such as gray birch, poplar, and red maple came in to produce stands clearly inferior in value to the old-field pine. On cut-over forest land, whether original forest or second growth, and whether predominantly pine or hardwood, the forest reverted to a larger and larger percentage of broad-leaved species except on light, sandy soils. In the Better Hardwood forest types, the red oak, white ash, and red maple combination was dominant. With the destruction of the chestnut by blight, the oaks, mostly red and white, gained ascendance, but they are not nearly as prevalent as farther south in the United States. Petersham, located as it is in a transitional forest zone between the Northern Forest and Central Hardwood Forest, has an intermingling of Northern Forest species, such as hard maple, yellow and paper birch, and beech, and of the Central Forest species, such as the oaks and hickory.

As indicated, white pine was the most important commercial tree in Petersham prior to the 1938 hurricane. Practically all the pine stands are over forty years of age, and older trees in mixed stands, both pine and hardwoods, were blown down or severely damaged by the storm. About sixteen million board feet of merchantable timber was salvaged and sold to the Federal government; also, smaller amounts were sold to near-by wood-using industries. There is little merchantable sawtimber standing in the Petersham forests today. The remaining stands are, for the most part, young to middle-aged. A large percentage of the total acreage supports even-aged stands which have resulted from clear-cutting or pasture abandonment, but very largely the former. Table 5 shows the distribution of stands according to age classes in 1939, with 28 per cent of the acres in the 1-20 class, 44 per cent in the 21-40 class, and only 7 per cent in the 41-60 class. The remaining 21 per cent is in uneven-aged stands. Over half the volume is in the middle-age class.

Given these different types of commercially valuable species and the climate and soils of Petersham, which are well adapted to the growth of forests,

TABLE 5. Area and volume distribution by woodland-use classes and age classes for the Town of Petersham

Land-Use Class	Age class 1 — 20			Age class 21 — 40			Age class 41 — 60			Grand		
	Acres	Vol. per acre cu. ft. ^a	Total volume (000's)	Acres	Vol. per acre ^a	Total volume (000's)	Acres	Vol. per acre ^a	Total volume (000's)	Acres	Total volume (000's)	Total volume (000's)
Better Hardwoods	186	280	52	2860	860	2457	952	1260	1203	1652	1605	5317
Softwood-Better Hardwood	136	335	46	2056	1200	2463		1600				2509
Softwood	283	775	220	604	1470	887	243	3045	740			1846
Inferior Hardwoods	783	375	294	715	610	434		1190		549	312	1040
Softwood-Inferior Hardwoods	677	530	357	1521	845	1285		1400		1444	1220	2862
Indeterminate	2828											
TOTALS	4893	—	968	7756	—	7526	1195	—	1943	3645	3137	13574

GRAND TOTAL VOLUME = 13,574,000 cu. ft.

^a The volume per acre figures are based on the Mean Average Volume per acre values obtained from estimates on all the farms sampled in Worcester County.

the Harvard Forest staff proposed the following general plan of forest regeneration:

The application of good forestry practices in the Petersham area over a period of several decades will result in a high percentage of sawtimber materials and increased income. But with so many stands completely destroyed by the hurricane, the problem of rehabilitation is important. Fire protection is a primary consideration to prevent further destruction of the young reproduction and reduction in soil fertility which would result from a general conflagration in the hurricane area. Considerable fire hazard reduction work has already been done by the government. Improvement work, such as the cutting of blown-over but still rooted hardwood trees to prevent side sprouts from developing and thereby interfering with reproduction is recommended. The lopping and scattering of larger tops would be advisable to encourage the development of seedlings and seedling sprouts. It is recommended that no silvicultural treatments be undertaken for at least five years on the hurricane-destroyed areas, waiting to see what comes in naturally.

In stands up to thirty years of age that were not seriously damaged by the storm, *improvement cuttings* should be made to favor the better-formed trees of good species, such as the ash, maples, and paper birch. In some of the younger stands, *weedings* should be made to improve the composition and quality of the growing stock by the control of inferior elements, particularly the gypsy moth food species—oaks and gray birch. In five to ten years, *weedings* undoubtedly will be advisable in the young hardwood stands expected to become established on some of the hurricane areas.

Planting may be resorted to where the present stands are wholly inferior, or on abandoned areas such as old pastures and fields that have a heavy covering of sod. Underplanting of white pine beneath light-seeded weed species is good practice where the gypsy moth is not abundant, since damage from the white pine weevil is thereby greatly reduced. Planting should not be undertaken on the hurricane-destroyed areas except as a last resort. Furthermore, planting of conifers in pure stands should be avoided wherever possible because of the danger of insect pests and diseases which are associated with artificial conditions.

A conversion of the present even-aged stands to an all-aged or selection form of stand is recommended. In this form of stand, where trees of all ages and sizes are growing together, the periodic harvests are limited to the comparatively few trees which are mature and ready to cut, some part of the forest being cut in this way each year. With such harvests come yearly incomes rather than income once in a lifetime, which is the case with clear-cutting.

Considerable time will be required to build up the present depleted and devastated woodland growing stocks to the point where sustained yields of lumber products will be possible. In a very few cases, where past cuttings have been conservative and hurricane damage was slight, not more than a decade or two will be required to bring the oldest trees to an economic size for sawtimber. But for the most part, thirty and more years of added growth will be needed to produce sizable sawtimber trees. It is not a matter of waiting several decades after the initial treatments are made before any more trees can be removed and utilized.

On the contrary, further improvement cuttings will be needed periodically to keep the favored "crop trees" healthy and growing at a good rate. These cuttings will yield cordwood, posts, and ties.

The Harvard Forest staff then went on to estimate what the classification of forest lands in Petersham would be like after such a program of woodland management had been carried out long enough to make the change over to sustained-yield management, with the results appearing in Table 6. Three fourths of the forest of Petersham would be in the Better Hardwoods and the valuable pine and other valuable softwoods.

TABLE 6. Areal changes in land-use classes as a result of woodland improvement for the Town of Petersham

<i>Land-Use Class</i>	<i>P R E S E N T</i>		<i>F U T U R E</i>	
	<i>Upland</i>	<i>Wet</i> <i>(swales and swamps)</i>	<i>Upland</i>	<i>Wet</i> <i>(swales and swamps)</i>
Better Hardwoods	5650		7251	
Softwood-Better Hardwoods	2192		4394	
Softwood	986	144	2732	144
Inferior Hardwood	1857	190		140
Softwood-Inferior Hardwood	3642			
Indeterminate	2828		2828	
Total Acres	17,155	334	17,205	284

It needs to be emphasized that the management plans above outlined do not call for highly intensive treatment of stands. With wages and other cost-rates as high as they are in this country in relation to prices of lumber, nothing more intensive is warranted. More intensive methods can be introduced if lumber prices rise at a later date.

MARKETS

This leads to a discussion of market outlook and prices for timber products. Any discussion of such market outlets must distinguish between the near and more distant future. More timber can be cut any year in the United States, even more sawlog timber, from present stands, than can be marketed at reasonable prices. But the recent Reappraisal Report of the Forest Service indicates that the annual drain on the sawlog reserves of the United States is 53 per cent more than the annual growth. The comparable figures for New England are 22 per cent more. For timber of all descriptions, including the young pole timber stands, the annual drain and growth for the United States as a whole is about even at 13 billion cubic feet; in New England, the growth

exceeds the drain by 18 per cent, primarily because New England has a larger proportion than the nation of woodland in the pole-timber stage. But unless some way can be developed for making the inferior growth take the place of sawlog timber, the supply of the latter will begin to run low by 1970 or sooner, and the resulting high prices will induce lumbermen to cut sawlog trees at too early an age, which will further deplete the reserves. Hence there is no lack of markets in prospect for sawlog timber, except of some hardwood species not greatly in demand.

If this country is to be assured of a future supply of sawlogs, either of two things is necessary—reducing the rate of cutting, or speeding up the rate of growth of sawlog trees. The latter requires the kind of treatment of forests that has been outlined in the foregoing for Petersham, that is, cutting out the trees of inferior or “weed” species, and the poorly formed trees of good species, and giving the good trees that will become sawlogs a chance to grow more rapidly. But such improvement cuttings are costly unless a market can be found for the trees cut out. The market for the inferior materials produced by such cutting is far short of what the supply would be if all the needed improvement cuttings were made in the next ten or twenty years. Much of this wood is now useful only as fuel, and the consumption of this is dwindling. Much research has gone into developing other uses, but it has not yet found enough of them. Of woodworking plants that do use short lengths of wood, another principal product of such cuttings, few are within easy reach of Petersham. The woodworking plants in this part of New England mostly use shipped-in wood. Hence one has to conclude that the market for the kind of wood now most abundant in Petersham is not very good in the near view.

To test these conclusions, several groups of firms were approached with a view to discovering their possible or potential demand for New England low-grade timber products. One group makes furniture, veneered panel, and laminated plywood from low-grade materials. These said that the supplies of small-dimension stock—8'×6" for example—were not sufficient anywhere in southern New England at present to warrant setting up a plant to use it. Another group of manufacturers now operating in New England, and specializing in plywood from 12'-to-14' dimension hardwoods and 9' softwoods, indicated that its sources of supply were running out. The group engaged in production of building materials were of the opinion that the present and prospective forest production does not, and will not for many years, support any increase in the scale of their present operations. The pulp manufacturers in northern New England expect to hold their own so far as they depend on spruce and fir softwoods, but are somewhat cautious about

going into craft paper-making because of fear of strong competition from southern pine under new processes now developed. Nevertheless, one plant using peeled hardwood for pulpmaking has recently opened in southern New England, and plants using hardwoods in pulp are expanding their facilities in northern New England.

Probably, however, the marketing situation is not as difficult as the foregoing report indicates. Director Hugh Raup of the Harvard Forest states that a supply of red oak for flooring is available which may compete favorably in this area with flooring produced and shipped in from Arkansas. Experiments in the marketing of flooring are to be carried out in the near future. It is estimated that 200 workers could eventually be employed in a venture of this kind. Dr. Ernest Gould of the Harvard Forest staff considers that the cordwood market can be somewhat enlarged by aggressive salesmanship—there is almost no demand at the moment for cordwood stumpage. More important, continued technological advances in the pulp industry, together with an expanding demand for pulp and depletion of many of the present supply areas, make it almost certain that a pulpwood market will develop in southern New England within a few decades. Other industries using low grades of hardwood are also likely to expand, so that it seems reasonable to anticipate a market for cordwood and bolts.

In 1938, before the hurricane of that year, the Department of Conservation of Massachusetts compiled a list of over 200 wood-fabricating industries, exclusive of saw-mills, in Worcester County. In an average year, these employed 12,000 workers and used 90,000 MBF of timber products. Only 10, however, were using species native to Massachusetts, and only 3 of these were using wood other than white pine (2 oak and 1 ash). One of these three was a firm in Athol using 1,340 MBF a year of oak, maple, birch, and beech in the form of lumber, parts, small-dimension stock, and plywood in the making of toys and beach chairs. The other two were small firms using 10 MBF a year of small-dimension stock and lumber.

Much of the low-grade material on New England farm woodlots can be used on the farm where it is growing; but New England has 160,000 woodland holdings of less than 5000 acres which are not on farms.

MANAGEMENT

To test out the possibilities of operation of the forest lands of Petersham in different types of management units, several analyses have been made. The most significant one has been of a tract of 1,900 acres in three adjoining ownerships in the vicinity of Petersham.² Only 3 per cent of the timber in

² This analysis was made by Dr. Ernest Gould and Dr. Solon Barraclough for the Committee on Research in the Social Sciences of Harvard University.

this tract is of sawlog size, 48 per cent is pole timber, and the rest is seedling and sapling. About a third of the stands are softwood, mostly on one area of lighter soil. About 17 per cent of the tract contains stands of red maple swale and swamp types. Many of these are poorly suited to good sawlog production. The average volume of the present stands is only about 50 per cent of full stocking. This inadequate stocking will result in low yields and lower quality sawlogs. The average age of the pole-timber stands is from 35 to 40 years, while most of the seedling and sapling stands are less than 15 years of age. This tract of timber, therefore, offers less promise than many of the stands in Petersham.

The management plans worked out first assumed that this tract would be managed as one unit. It developed, however, that this would not be necessary under more extensive types of management. The plans made were for three levels of intensity of management as follows:

- A. Intensity A calls for the highest degree of management considered practical at this time. Harvesting will be done in a manner that promotes the prompt establishment of valuable reproduction. Partial-cuttings will also be made throughout the life of the stand to improve the growth of selected crop trees and to salvage stems that might otherwise die and be wasted. Weeding and pruning will be practiced in accordance with good silviculture. The net effect will be nearly complete utilization of cordwood, bolts, and sawlogs, and the concentration of the full capacity of the site to grow better trees. It is assumed that after twenty years of this management the average sawlog quality will be improved enough to command a 15 per cent price premium.
- B. No improvement cuttings, thinnings, or other cultural treatments will be made under Intensity B, but methods in the final harvest will be the same as for Intensity A. Normally, the final crop will be removed in two or three cuts, over a five- to fifteen-year period.
- C. Intensity C calls for none of the forest practices outlined above. Trees will be sold whenever a sufficient volume is available to attract a buyer; harvesting will be by customary clear-cutting or high-grading methods. Under most circumstances these practices will result in stands of increasingly inferior stocking and species.

Table 7 outlines more fully the three operating plans based on these three levels of intensity, plus a fourth one that assumes half the tract managed on the A level and half on the B level. The further assumption is made that all cordwood made available by improvement cutting will find a roadside market as fuel or pulpwood. These plans will be discussed in greater detail.

TABLE 7. Principal operating features of alternative management plans

Plan Number	Management Intensity ^a	Method of Sales	Operating Organization	Added Labor Requirements	Added Management	Added Investment
1	A	Roadside	Integrated unit	3-man permanent crew & day labor	Part-time manager	\$3,500 ^b
2	Half A and half B	Roadside	Integrated unit	2-man permanent crew & day labor	Part-time manager	\$1,500
3	B	Roadside	Integrated unit or independently	Day labor	Public forestry assistance	None
4	C	Roadside	Independently	Day labor	None	None

^a Intensity C—Customary practice—clear-cutting and high-grading

Intensity B—Harvest cuttings made so as to promote desirable reproduction

Intensity A—Intensity B plus improvement cuttings, thinnings, and other cultural operations

^b After the first 40 years this added investment will be \$7,000.

Plan 1. This plan requires hiring a skilled forester³ at least half time to lay out operations, find the most advantageous markets, and direct sales. A permanent crew of at least three men will be needed, including a capable foreman. Considerable temporary labor will be required from time to time. Besides standard logging tools, consisting of saws, axes, chains, peaveys, scoots, and so on, a power chain-saw, cut-off saw, and truck will be needed. Horses must be available for skidding until the volume of operations reaches a point that will repay the investment in a small crawler-type tractor. Despite good management it is probable that this equipment will not always be employed at full capacity. The need for outside management and a capable woods crew indicate that the owners must operate their holdings as a unit, since no one of them has land enough to keep such a crew profitably employed.

Plan 2. The plan calls for managing about half of the area in accordance with Intensity B, while the remaining area, *including the most promising stands*, will be managed under Intensity A. Naturally, any time that conditions make it desirable to do so, the proportion of stands managed under Intensity A or B can be altered. The operating skill required for carrying out this plan and the volume of work to be done make necessary a permanent two-man crew, including a foreman with considerable judgment and capacity. Additional labor will also be required to meet peak work-loads. Minimum investment in equipment for such a crew will include a light truck or jeep, a power chain-saw, cut-off saw, and various woodsman's tools. A team and scoot will also be needed at least part of the time. A consulting forester is more likely to be sufficient than under Plan 1.

Plan 3. This plan assumes that harvest cuts will be made in accordance with management Intensity B and that this will promote adequate, valuable reproduction. It is assumed that enough public forestry aid will be available to lay out cutting plans at no added cost to the owner. There is ample reason to believe that if good cutting practices are followed, the entire area eventually will be adequately stocked with desirable reproduction. While this plan requires a slightly greater investment than Plan 4 following, because it defers final cuts, this may be more than compensated for by the value of the added growth during the period of postponement. The full value of this plan can be only partly reflected in added net cash income during the planning period, since a chief result will be the increased values of the residual growing stock.

Plan 4. This plan calls for a continuation of the prevalent practices of

³ Skilled in the sense that a good dairy farmer is skilled. Most farmers do not have such skills in woodland management.

selling all merchantable sawlogs whenever there is sufficient volume to attract a buyer. These cutting practices provide no measure to encourage desirable reproduction and require a minimum of investment in either labor, management, or deferred harvests. Silviculturally, this plan will presently result in poor-stocking of most of the tract, and succeeding stands will tend to be of increasingly inferior quality and species. It will be necessary either to hire a crew by the day to get out the logs and cordwood or to hire a contractor to do the same thing. It has been assumed that the cost will be substantially the same, however the job is done. There is no inherent reason why this plan cannot be followed by the owners either singly or together.

The next step was to estimate the timber stands at the beginning and at the end of the 90-year period that was assumed for purposes of this analysis, and the amounts of saw-timber and of cordwood harvested, according to each of these four plans. The results appear in Table 8. Plan 1 yields clearly larger cuttings than Plan 2, but leaves a somewhat smaller, though more valuable, residual stand at the end. With Plan 4, both are low.

TABLE 8. Present timber stands, harvestings, sawlogs and cordwood separately, and stands at the end of 90 years, for Management Plans 1 to 4; also man-labor inputs

Plan No.	Timber stand in 1950 (cu. ft. per acre)	Harvestings per acre per year		Man-days per acre per year ^a	Timber stand in 2040 (cu. ft. per acre)
		Saw timber (bd. ft.)	Cordwood (cfs.)		
1	1,067	273	0.52	1.1	1,678
2	1,067	226	0.30	0.7	2,069
3	1,067	177	0.20	0.5	2,001
4	1,067	171	0.21	0.5	1,248

^a Power and equipment costs converted to man-day equivalents are included.

The next step was to estimate costs and returns from these management plans. This was done on two bases, the first, that prices of timber products will remain the same (relative to the general price level of the country) over the 90 years; the second, that sawlog prices will average one third higher in the 30-60 year period, and still another third higher in the 60-90 year period. Wages and cordwood prices were kept the same throughout. The net returns were then figured, leaving out taxes and interest, then including taxes and 3 per cent interest on the deficits incurred during the early years. Table 9 presents the results of this figuring on the four plans outlined and three more. The constant cost-rates assumed were equal to the 1943-1945

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average, and the prices assumed were comparable with 90 per cent of parity for agricultural prices, both being intended to be on the conservative side. Specifically, the costs and prices used in the figuring were as follows:

Assuming constant rates:

Sawlogs delivered roadside	\$18 to \$21	per M.B.F.
Sawlogs sold on-the-stump	\$6	per M.B.F.
Cordwood delivered roadside	\$9	per cord
Labor	\$6	per day

Assuming rising rates:

	<i>Years in the future</i>		
	<i>0-30</i>	<i>30-60</i>	<i>60-90</i>
Sawlogs delivered roadside	\$18-\$21	\$24-\$27	\$30-\$34
Sawlogs sold on-the-stump	\$6	\$12	\$18
Cordwood delivered roadside	\$9	\$9	\$9
Labor	\$6	\$6	\$6

Plans 6 and 7 further assume that there is no cordwood market and that sawlog sales will be on a stumpage basis in place of the operator's doing the harvesting. (Plans 3 and 4 could be followed with no cordwood market.) Under Plan 5, the stands are managed according to the methods outlined for Plan 2, except that no cordwood is cut from the poorest stands handled under Intensity B and the sawlogs from these stands are sold on the stump. Practicing Intensity A on the best stands will provide roadside cordwood and sawlogs and will require a permanent 2-man crew, equipment, and part-time hired management. Further than this, in the estimates for Plan 5 in Table 9, the roadside cordwood market is assumed to be limited to less than 500 cords per year.

First to be noted is that Plans 1 to 4 all return a net income per acre, even assuming no rise in prices of sawlogs if interest on deficits in the early years is figured at 3 per cent interest. Also to be noted is that at the 3 per cent rate, the more intensive the management the larger the returns, but the margin of difference is small. This 3 per cent assumed as a possible minimum may seem a low rate to some, but it is in line with the rates on many other long-term investments. At 6 per cent interest, not shown in the table, only the less intensive plans, with a small early investment in growing stock, would yield a net return assuming no rise in prices. At the rise in sawlog prices assumed in the other columns of Table 10, the more intensive systems of management pay best by wide margins. At 6 per cent interest and the higher

prices, all seven plans would yield a net return, and the more intensive ones the highest return, but by relatively narrow margins. With rising sawlog prices, Plan No. 5 yields a higher net return than Plans 3 or 4, but not otherwise.

TABLE 9. Estimated average net returns per acre per year from a 1900-acre timber tract in Worcester County, Massachusetts, for the period 1950 to 2040, before and after taxes, and before and after taxes plus interest charges on deficits at 3 per cent, with constant prices and with rising prices according to 7 Management Plans^a

Plans	<i>No tax and interest deductions</i>		<i>Taxes alone deducted</i>		<i>Taxes and interest deducted</i>	
	<i>Constant prices</i>	<i>Rising prices</i>	<i>Constant prices</i>	<i>Rising prices</i>	<i>Constant prices</i>	<i>Rising prices</i>
1	\$2.70	\$5.70	\$2.20	\$5.20	\$1.90	\$5.00
2	2.60	4.90	2.20	4.50	1.80	4.20
3	2.30	4.10	1.80	3.70	1.80	3.60
4	2.10	3.50	1.60	3.10	1.60	3.00
5	2.20	4.50	1.80	4.10	1.40	3.80
6	1.20	3.10	.80	2.60	.60	2.50
7	1.00	2.50	.60	2.00	.50	1.90

^a Early deficits and compound interest were assumed to be repaid from the positive net incomes of subsequent years. Net return includes the increased value of residual stand and operating equipment plus net incomes.

We must conclude that, if we accept the assumptions on which this analysis of the 1,900 acres is based, a relatively high intensity of management will more than pay for itself on the Petersham woodlands and others like them. To obtain the higher returns, however, they need to be handled in units large enough to afford skilled management and the maintenance of skilled crews and woods equipment.

Important also is it to know what the net deficits and net incomes are in the earlier years while the stands are being improved. Table 10 gives the estimated net figures by 10-year periods for the tract as a whole, assuming integrated management for Plans 1, 2, and 5, and independent management for the others, as explained in Table 7. Not until after 30 years will any of the plans except 3 and 7 yield a net return, but the deficits after 20 years will be small with most of them. The deficits in some of the later periods arise from the fact that the bulk of the trees are now in the 20-40 year age group.

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TABLE 10. Estimated average annual net incomes from the 1900-acre tract by 10-year periods for the 7 plans, assuming constant and rising prices; with taxes and interest at 3 per cent; also totals over the 90 years

<i>A. Assuming constant prices and wages</i>							
	<i>Plan 1</i>	<i>Plan 2</i>	<i>Plan 3</i>	<i>Plan 4</i>	<i>Plan 5</i>	<i>Plan 6</i>	<i>Plan 7</i>
0-10 years	-\$2874	-\$2086	-\$932	-\$389	-\$2121	-\$966	-\$695
11-20 years	-2834	-3184	-987	-931	-3466	-1269	-1241
21-30 years	-297	-819	-419	2322	-1257	-686	215
31-40 years	3214	2493	2859	-72	1264	231	-1161
41-50 years	9943	6758	8593	12361	4539	3749	5980
51-60 years	9189	7163	2748	-846	4709	1028	-874
61-70 years	-1622	3033	3944	5316	2855	1240	1883
71-80 years	6024	9732	8346	5782	9597	3272	2358
81-90 years	6231	3709	2235	3688	3484	1204	1307
90 years net							
cash income	269,790	267,960	272,250	272,310	196,040	78,030	77,720
Increase in							
residual value	55,285	37,315	29,655	3,041	37,315	29,655	3,041
Total	325,025	305,275	301,905	275,351	233,355	107,685	80,761
<i>B. Assuming rising sawlog prices</i>							
	<i>Plan 1</i>	<i>Plan 2</i>	<i>Plan 3</i>	<i>Plan 4</i>	<i>Plan 5</i>	<i>Plan 6</i>	<i>Plan 7</i>
0-10 years							
11-20 years	Same as A for first 30 years						
21-30 years	Same as A for first 30 years						
31-40 years	\$6296	\$5788	\$4864	\$ 31	\$4558	\$2470	-\$721
41-50 years	17670	13737	13569	19483	10485	9062	13259
51-60 years	14925	9177	4650	-846	7518	2929	-874
61-70 years	4106	8771	8174	10831	8592	5492	7398
71-80 years	17752	20452	16640	12247	20318	11567	8824
81-90 years	14861	9020	6391	8050	8798	5359	5668
90 years net							
cash income	695,600	608,560	527,880	507,980	534,250	339,360	318,270
Increase in							
residual value	151,855	108,945	88,965	9,123	108,945	88,965	9,123
Total	847,455	717,505	616,845	517,103	643,195	428,325	327,393

It will be of interest to note at this point that if all the woodlands in Petersham classified in Table 5 as Better Hardwoods, Softwood-Better Hardwoods, etc., were managed as recommended by the Harvard Forest staff, the gross annual incomes would be as indicated in the right-hand section of Table 11, contrasted with the incomes shown in the left-hand section if handled as at present, assuming no rise in prices. The \$9.30 per acre average for the 14,660 acres (omitting the Indeterminate) may be compared with the \$2.30 to \$2.70 net before taxes and interest in the first column of Table 9. This leaves room for ample labor and equipment costs.

TABLE 11. Estimated average gross annual income from all timberland in Petersham if handled as at present, and if managed as recommended by the staff of the Harvard Forest

Land-Use Classes	Present Management			Proposed Management				
	Acres	Value per acre assuming full stocking	Per cent of full stocking	Total value	Land-Use Classes	Acres	Value per acre	Total value
Better Hardwood	5650	\$4.00	64	\$14,000	Better Hardwood	7251	\$7.80	\$36,500
Softwood-Better Hardwood	2192	5.20	57	6,500	Softwood-Better Hardwood	4394	9.40	41,200
Softwood	1130	9.30	52	5,500	Softwood	2876	13.50	38,900
Inferior Hardwood	2047	3.20	44	2,900	Inferior Hardwood	140	2.30	300
Softwood-Inferior Hardwood	3642	4.70	45	7,700	Indeterminate	2828	— ^a	— ^a
Indeterminate	2828	— ^a	— ^a	— ^a				
GRAND TOTALS	17,489	—	—	\$36,600	GRAND TOTALS	17,489	—	\$136,900

^a No estimates made for Indeterminate.

Such calculations as the foregoing of course assume that all the forest lands in Petersham get into some kind of management units that will make possible the different kinds of management considered. This is a very large assumption. As our next step we need to consider the different types of management units in which this woodland is likely to find itself.

A. The largest ownership in the town, namely the lands now under control of the *Metropolitan District Water Commission*, can be managed with an intensity equal to that of Plan 1 for the 1,900 acres with great advantage to the community of Greater Boston over the next 100 years, as well as to the people of Petersham, entirely aside from the important function of protection of the sources of supply of the water in the reservoir itself. A management organization can be set up for the woodlands in the District that would be highly efficient and that would improve the stands of timber at a rate fully equal to that which has been estimated in the analysis of the 1,900-acre tract. The timber on this tract alone would furnish a good part of the base for a woodworking industry in the town.

B. *Management units* of perhaps 1,200 to 4,000 acres can be created by consolidation of small adjoining or near-by tracts that will yield a reasonable average return on the investment over 90 years, or less than 90 years if enough of the timber is over 40 years of age and the stocking is heavier than on the 1,900 acres analyzed. Such consolidations are likely to come about as a result of purchases of additional land by someone who already owns several hundred acres. Such an ownership, for example, may grow out of an interest in a continuing family estate by a summer resident or other resident in the region.

C. *Integrated group management of smaller tracts.* The proposed group management for the 1,900 acres is only one example of what is possible along these lines. Most of the nonfarm woodland ownerships, as indicated earlier, are smaller than the three 600-to-700-acre tracts combined in the 1,900-acre tract. As many as 10 to 20 tracts of 100 to 200 acres each can also be organized into a unit for group management, if they are not too widely scattered. Otherwise too much time would be spent in travel and moving of equipment from one tract to another. There are several ways in which joint management can be arranged. The simplest is a coöperatively organized unit to engage the services of a professional forest management firm, or an agency such as the New England Forestry Foundation. Another is for the group to organize according to a more formal plan and employ a skilled forester to manage the group unit. Public assistance in connection with the latter can be obtained through the local Soil Conservation District.

D. *Summer residents* or near-by residents can hire labor to perform the

necessary improvement cutting, weeding, harvesting, and other operations, giving such direction as is needed during the summer months or on occasional trips to their holdings. This will not ordinarily be feasible for tracts of more than 200 to 300 acres.

E. There is no reason why there cannot be *part-time forest farms* as well as part-time farms. On a family holding with only an acre or so cleared for a garden and perhaps a cow, and with woodland attached, perhaps anywhere from 50 to 150 acres, the family head and other members of the family, when not otherwise employed, can do much of the woods work needed for reasonably good management of the woodland. The income which they can expect from this woods work will be like that indicated for tracts of similar sizes on dairy-woodland combination farms discussed below. Combining woods work with an off-the-farm job has the distinct advantage that the woods work does not need to be done at any regular time, whereas either crop or livestock production has a fairly definite schedule.

F. *Farm woodlands usually on dairy farms.* This is a very common combination all over New England, but ordinarily the woodland is not well managed. It seems worthwhile to study more closely the possibilities of such combinations under good woodland management. Five of such dairy-woodland combination farms in towns in the immediate vicinity of Petersham were analyzed carefully from this point of view in 1938.⁴ Figure 8 presents a field map of one of these farms. This particular 260-acre farm has somewhat more woodland than the usual dairy-woodland farm in this locality because its land runs up onto a steep stony hill on the west side of the farm.⁵ The soils on the farm are all Gloucester, except a little Whitman in several alder swamps. Its 39 acres of cropland are distributed in six small patches scattered all over the farm. Some of this is still rather stony and other pieces of it must be used for wild hay unless they are drained. The farm has 66 acres in pasture, but two thirds of this is brushy or covered with a thin growth of trees. The cattle actually are free to range over the whole 142 acres of woodland on the farm, but there is so much of it that they have done little damage. The married farm laborer employed on this farm occupies the farm buildings in Field C₅. The net cash income of the farm at 1943-1945 prices was \$1,980, derived from receipts of \$5,880 and expenditures of \$4,200, including \$750 for hired labor, \$990 for concentrates, \$600 for replacement cows, \$345 for milk hauling, and \$210 for fertilizers and seed. The receipts were all for milk, except \$463 from cull cows and calves and \$42 from cord-

⁴ By Gordon Chute under direction of the Harvard Forest and J. D. Black.

⁵ This map omits most of the stone fences or "walls" on this farm. Field C₅ and Field C₆, for example, are each split into 8 separate fields by stone walls. The pasture tracts, P₃ and P₅, are split into 5 and 4 fields. This indicates that they are cropped at one time.

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wood. Receipts from timber products would have been somewhat larger if the hurricane of 1938 had not forced premature harvesting of some of the stands. This \$1980 is not an adequate return to this family for the management and labor of the elderly farmer and his son.

The changes proposed in the crop-and-livestock part of the organization are as follows:

- a. Convert Field C_3 to fertilized permanent pasture; it is too stony and too drouthy to warrant stone removal.
- b. Improve 18.8 acres of pasture in Fields P_2 , P_3 , P_5 , and P_6 , to provide 60 per cent more pasture feed, by liming, fertilizing, and seeding to a ladino clover mixture and cutting the brush on some of it.
- c. For all the cropland, except part of Field C_6 , a rotation with no tilled crop is proposed, consisting of millet and oats, and then hay for 5 years. A low-alfalfa mixture is proposed for most of the hay, and a clover mixture for the rest. For the level part of Field C_6 , a rotation is proposed of potatoes, then oats, then mixed clover-hay for three years.
- d. The additional pasture feed and roughage thus provided will enable this farmer to raise all his replacements and feed his 21 milk cows better enough to obtain 500 more pounds of milk per cow per year while reducing his feed bills by \$75 a year.

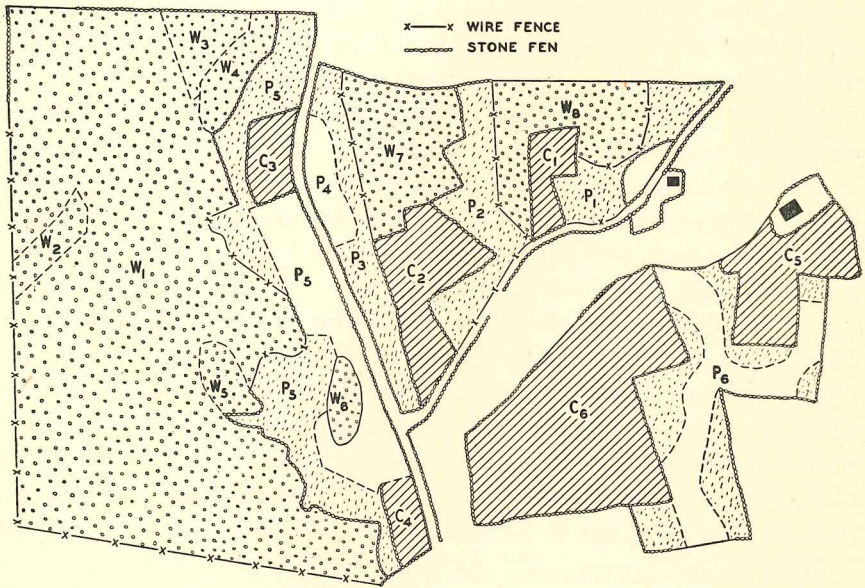


Figure 8. The Field Map of a 260-acre Dairy Farm in Worcester County, Massachusetts

Only one small timber stand is more than 35 years old, and most of it is 25 years or less. In spite of the clear-cutting and the grazing, enough sound straight hardwood trees are left on the better-hardwood stands to make a final harvest of good volume and quality. The softwood stands have seeded in on run-down pastures. For the better-hardwood stands, improvement cuttings spread over the years are proposed. These should reduce the red maple, which is a less valuable species, and also the red oak, because it is a favored food of the gypsy moth, which causes much damage in this area. For W_4 , the gray birch is to be gradually removed to release the white pine seedlings that are coming along under it. The softwood tract W_6 is to be converted to pasture. Fences are to be built to supplement the existing stone walls as indicated in Figure 8. The cash outlays for this fence will be \$150, the farm furnishing the posts and labor.

The improvement cuttings will require about 160 man-days of labor a year over the next ten years, which is more than the regular labor force can provide. They will, however, yield 1,060 cords of fuel wood, and 3 MBF of sawlogs, which at 1943-1945 prices, if they can be sold, would sell for \$5,325. This would pay for the extra labor hired and leave an additional net return of \$353 per year.

The analysis of the receipts and expenses of this farm by five-year periods for 70 years indicates that from the tenth year through the fiftieth, the woodland will yield, from thinnings, fuel for the farm family, estimated at 18 cords a year, and fence posts and other timber for the farm, and from \$214 to \$383 of net income per year. The regular farm labor force will be able to do all the work. From then on, the cuttings will increase as the stands need to be opened up further by removing trees already of sawlog size to give the final crop trees a chance to expand. Extra labor will need to be hired, but sales will be heavy for several decades. Then they will decline gradually to the sustained-yield normal of \$1167 a year, which the farm labor force can handle, except for \$171 a year of hired labor. The net farm income at this stage will be \$3,621, which is almost double the present income. Most of the increase will have come from improving the woodland. At the end of 70 years a third of the cash receipts of the farm will be from the woodlands, as compared with less than one tenth during the first 20 years. When the woodland is fully productive and on a sustained-yield basis, the cash receipts from the woodland will be fully as large as those from the dairy enterprise. If prices of forest products rise as assumed in B of Table 10, the woodland part of the income will be clearly the larger.

Before this particular reorganization was chosen, several alternatives were analyzed. Those for the dairy part of the farm involved, for example, addi-

tional capital investments in clearing stones from land to increase the cropland, and at the same time improving more pasture. The woodland alternatives analyzed included a cordwood cutting program on the hardwood stands, with sawlogs only in the softwood stands and selling 62 acres of the timberland so that the regular farm labor force could handle the rest, but managing 80 acres about as outlined. The first of these would return \$645 less than the one chosen; and the second, \$450 less.

This farm has more woodland than most of the dairy farms of New England, but apparently not more than can be handled to advantage. Four other farms analyzed in the same town had, respectively, only 18, 31, 43, and 46 acres of woodland. These acreages were less than three of them could handle to good advantage. The reorganization plans for these called for converting, respectively, 29, 27, 5, and 18 acres of brushy pasture to timber by fencing out the cattle and letting natural reproduction have its way, and if this did not suffice, doing whatever planting was needed. The plan for the third of these called in addition for the buying of 25 acres of young hardwood stand.

The resulting 47 acres on the first of these farms would return the farm a net \$330 a year and call for only 44 days of labor a year. Pasture improvements and adjustments in cropping and livestock systems would increase the farm income by \$1,700. The second farm in the list would have 58 acres of woodland after reorganization, with \$400 added to its income thereby, plus \$525 from other adjustments, with 41 days extra labor; the third, 73 acres, and \$430 added income; and the fourth, 64 acres and \$410 more income. The third of these is a farm with 74 acres of cropland that can handle the 25 more acres of woodland to advantage, hiring only \$90 worth of extra labor.

None of the proposed reorganizations of these farms is drastic. They mostly leave the field boundaries where they are, and propose scarcely any removals of stone walls, or drainage of lowlands. The dairy herds are enlarged very little, and the pasture improvements are modest. Most of these farms could be made to increase their output of milk by a half. If timber products were to rise in price strongly in the next few decades, a large expansion of timber output could be projected into the future by converting more brush pasture into woodland. The five farms all have a sizable acreage of land more or less idle in the twilight zone between improved pasture and improved woodland. Thus the reorganized farm plan of the 260-acre farm outlined still has 16 acres of unimproved pasture and 36 acres of brushy pasture.

Forest farms. This is the term that has come to be applied to enterprises that get most of their income from the woodlands, but carry on a little farm-

ing along with it. Congress in passing the Norris-Doxey Act in 1938 provided for assistance in developing enterprises of this type as well as regular farm woodlands. Three such forest farms were analyzed in connection with the Worcester County Study on land of exactly the same type as that in Petersham.⁶ These averaged around 350 acres. As planned, each included a set of farm buildings and a small acreage of hay land and pasture that could be contracted or expanded. Incomes were estimated, as on the dairy-woodland farms, by five-year periods up to eighty years, for two scales of farming operation, and five different intensities of forest management. One scale of farming operation involved keeping four milk cows and providing pasture, hay, and forage for these and three horses used on the farm and in woodland work, as well as providing other food for the farm family. The other involved producing food only for the farm family (with one cow) and hay for the horses.

The most promising combination on these three farms over the whole period included keeping the four cows, "full" treatment on fourteen of the stands, and "partial" treatment on ten. The full treatment involved doing all the thinning and improvement cutting required for good silviculture at any period, and handling the cutting in such a way as to come out in the end with all age classes represented by even-aged stands. The partial treatment called for one weeding when a stand was about 15 years old, a combined thinning and improvement cutting around 30 to 40 years, a thinning around 55 to 65 years, and a final cutting in about 80 years.

Full treatment did not promise to pay on the ten poorer sites. On the other hand, applying only partial treatment to the fourteen better stands would reduce the net income greatly and leave the operators with some spare time. With either no treatment at all or a cordwood system of cropping, these forest farms would not be able to support the operators and their families. The combination with the four cows promised to pay better than that with only one because, first, some of the land on these holdings grows good pasture, hay, and other forage, and returns considerably more per acre so used than in timber; and second, the operators can fit in the labor needed for this much farming without its interfering with their work in the woods.

All three of these are what may be classed as small-scale enterprises. The work would be done by the farmer himself and his immediate family, except for necessary help in operations requiring more than one man. The incomes would be about the same as obtained from small family farms in the Northeast. Some of the operations would not be performed very efficiently because

⁶ By Dr. Ernest Gould for the Committee on Research in the Social Sciences of Harvard University.

the operator would not be able to use some of the more expensive power equipment used on much larger tracts. Forest farms are likely to need enough land to be able to employ fully the two men needed for some of the operations, if they are to yield returns comparable to those of dairy-woodland farmers. These three farms are therefore too small for a really adequate income.

At the end of the discussion of agricultural possibilities there was included a brief statement of the difference between these possibilities and what can be expected. If the gap appeared to be wide in the case of agriculture, it is still wider in the case of forestry. The woodlands are the poorest managed part of the farms, not only of New England but of the whole United States. The small nonfarm holdings are even more neglected, although they are less likely to be pastured.

As with agriculture, the largest factor in the gap between possibilities and realities is the attitude of the people. All the years since any part of this large domain of ours was first occupied, its people have been obtaining all their supplies of lumber and other timber products from virgin stands or from second-growth stands which followed naturally after the cutting of the virgin stands, with scarcely any attention whatever to management. The supplies available from these two sources have been large enough to keep lumber prices at relatively low levels, thus discouraging any interest in good management. As a matter of fact, they are still doing so. It will not be until actual shortages appear in the market that the prices will rise. There will intervene a period when supplies will be maintained by the wasteful overcutting of immature stands. We may have already reached this stage. Then will follow a period of short supply and abnormally high prices during which great enthusiasm for forestry will arise. In this span of years, which may last half a century or longer, this country may indeed overdevelop its forest resources. It is in the public interest to prevent as much as possible the overcutting of immature stands and to get young stands of sawlogs established over the country. This will make prices higher in the near future and keep them from rising so high in the period following. In this matter at least, private and public interests are identical. Those who start developing crops of sawlogs at this time will get very good prices for them when they are matured. There is no likelihood that too many will do this.

A decision to manage present woodlands so as to get a crop of sawlogs ready for market 30 to 70 years hence or a stand of timber that will increase the value of his farm in the meantime is one which each individual woodland owner must make for himself. All this report can do is to attempt to

give the owners a realization of the possibilities of such woodland management. It is highly important that everything be done to make as many woodland owners as possible see these possibilities. This calls for a program of public education.

Other factors in converting forestry possibilities into realities will be the kind of marketing and processing facilities that are developed. Another will be the availability of credit. At present the private and public agencies providing credit for private enterprise have very little interest in loans to develop forestry. For this reason there will need to be an expansion of public services of various sorts, including both marketing and credit.

Strong local community leadership will be needed to develop a forestry program even more than to develop an agricultural program. The Extension Service can make an important contribution to this as well as in forestry education itself.

CHAPTER 4 INDUSTRIAL, RECREATIONAL, AND RESIDENTIAL POSSIBILITIES

The industrial aspects of the future of the Town of Petersham need to be considered under two heads; first, that of industry within the Town of Petersham itself; and second, that of industry in surrounding towns.

As for industry within the town itself, it should be obvious that Petersham offers few possibilities. Any processing of its agricultural or woodland products, except simple sawmilling, is likely to be more economically performed in cities and in surrounding towns located on railroads, and transporting other raw materials for manufacturing from railroad towns to Petersham certainly offers no advantage. The only exception to the foregoing statement is that some worker or small group of workers with particular skills in wood-working or the like might choose to locate their operations in Petersham because they preferred it as a place in which to live. Or they might even develop some industry largely using hand labor and raw materials very easy to transport. Small industries of this latter sort can locate almost anywhere.

The interrelations within a combined agriculture-forestry and urban economy such as in southern New England are very close. Southern New England is highly urbanized. The populations per square mile in 1940 of Massachusetts, Connecticut, and Rhode Island were 546, 349, and 674 respectively. These compare with the most highly urbanized countries of Western Europe. In such an economy the city populations furnish a market equal to their entire consumption for fresh milk and local fruits and vegetables in season, and to a large part, if not all, of their consumption of fresh cream, fresh eggs, and fresh-killed poultry. The amount of agriculture in such a region may be very largely determined by the size of the home market for these products.

Only secondary in importance to the foregoing are the jobs which the cities provide for the sons and daughters of farm and other rural families, jobs often near enough at hand so that they can live at home and travel back and forth to work. This interrelation is mutual in effect because it supplies

the cities with needed labor. The rural areas may also provide homes for families of industrial and other urban workers. The cities in turn offer a large number of services and other opportunities that make residence in such an area particularly desirable. Included under this head are the major highways threading through the adjoining towns and connecting them with the cities. As an unavoidable result of these interrelations, the support of the public services of the rural towns and of the cities becomes closely interwoven. It may well be that the cities contribute more proportionately toward these public services than do the adjoining towns.

The foregoing statement is in terms of cities rather than in terms of industry. The gainfully employed workers in a city such as Worcester, Massachusetts, were only 42 per cent employed in manufacturing in 1940. Another 19 per cent were employed in trade. In what is called the Worcester industrial area in the Census of Manufactures, which consists of Worcester and nine other surrounding towns with a total population of a half million in 1940, only 47 per cent of the business establishments were classified as industrial. For our purpose there is no particular object in distinguishing between industrial and other establishments, and we shall in the main consider them as one group.

The Census of Manufactures of 1947 shows the changes indicated in Table 12 in the numbers of workers employed in industry in the cities shown on

TABLE 12. Census data on changes in manufacturing between 1937 and 1947 in central Massachusetts cities (See Figure 2 for location of these cities)

<i>Cities</i>	<i>Number of productive workers</i>		<i>Percentage increase</i>	<i>Number of establishments</i>	
	<i>1937</i>	<i>1947</i>		<i>1937</i>	<i>1947</i>
Athol	2,175	3,369	57	20	33
Chicopee	6,938	14,266	105	57	71
Clinton	2,177	2,794	19	25	43
Fitchburg	6,836	10,720	57	94	109
Gardner	4,820	5,416	12	65	93
Greenfield	1,278	3,317	40	28	47
Holyoke	24,471	27,159	11	146	159
Leominster	4,354	4,720	8	63	95
North Adams	5,114	4,688	-5	37	33
Northampton	1,227	2,648	113	38	44
Southbridge	4,971	6,712	35	34	33
Springfield	13,774	22,426	63	290	364
Webster	3,081	3,292	7	18	30
Westfield	1,858	2,843	53	40	52
Worcester	26,470	37,834	43	487	574

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the map in Figure 2 for which Census data are reported separately, and also the accompanying changes in numbers of manufacturing establishments. This was a period of general increase because of the shift from large unemployment prewar to almost overemployment in 1947. But the gains were very uneven. A few cities made little or no gain while two more than doubled their employment. Worcester and Athol made large gains.

The 1947 Census of Manufactures gives no breakdown for these establishments by industries for individual towns. For the group of thirteen cities and towns making up the Worcester Industrial Area, the numbers employed in 1947 were as indicated in Table 13 for a list of industries most significant from the point of view of Petersham. The other columns in the table give the comparable figures for the other three Massachusetts industrial areas in the Census classification. The Worcester Area is notable for its small amount of food and apparel manufacturing as compared with Boston. It is low in textiles as compared with the Fall River-New Bedford and Springfield-Holyoke Areas. Its manufacturing runs strongly to metals and machinery.

Of considerable importance from the standpoint of industrial background for rural towns like Petersham is the relative growth of industry in different sections of New England. Following is a comparison of the rates of change for the Worcester industrial area and the other three Massachusetts areas:

	1939	1947	Percentage
	<i>Number of workers</i>	<i>Number of workers</i>	<i>increase</i>
Worcester	32,033	43,525	35
Boston	157,230	215,354	37
Fall River-New Bedford	48,127	57,379	19
Springfield-Holyoke	38,504	67,366	75

The Worcester area did not make the large gains of the Connecticut Valley cities, but kept up pretty well with Boston.

The most important recreation furnished within the Town of Petersham has been summer living for its summer residents, and this is likely to continue to be the case, even though the number of these is declining. With the increase in the number of worker families, however, attention needs to be given to providing some additional recreation for the general population. One suggestion is that Brown's Pond near the village be purchased by the town for this purpose.

As for recreation for tourists, and in particular for families driving out from the cities near by in the evening or from the larger cities for overnight or over the weekend, the forest tract near the Quabbin Reservoir maintained by the Federation of Women's Clubs is very attractive and fairly well developed for picnicking, but almost impossible to find. This could be remedied

TABLE 13. Manufacturing industries classified by products in the 1947 Census of Manufactures, the Worcester and three other Massachusetts industrial areas compared

	Worcester		Boston		Fall River- New Bedford		Springfield- Holyoke	
	Establishments	Workers	Establishments	Workers	Establishments	Workers	Establishments	Workers
Food and kindred products	71	912	629	21,915	93	1,153	108	1,976
Textile mill products	66	5,412	155	9,161	105	30,022	45	10,486
Apparel and related products	63	1,562	903	21,436	163	10,631	55	2,755
Lumber and products, excluding furniture	20	307	115	1,780	18	401	27	821
Furniture and fixtures	24	202	243	3,754	12	318	25	443
Paper and allied products	19	1,205	125	9,417	12	516	66	6,456
Printing and publishing industries	65	885	734	15,292	33	684	118	3,143
Leather and leather products	44	4,229	512	25,326	13	854	12	929
Primary metal industries	30	6,481	89	3,395	9	1,061	32	2,211
Fabricated metal products	88	4,399	416	13,982	20	1,249	85	3,594
Machinery, excluding electrical	109	8,543	414	19,177	38	2,230	110	15,614
Electrical machinery	8	1,203	112	23,338	7	3,879	16	3,148

Worcester includes: Auburn, East Brookfield, Grafton, Holden, Leicester, Millbury, Northborough, North Brookfield, Shrewsbury, Spencer, Westborough, West Boylston Town, and Worcester.

Fall River-New Bedford includes: Acushnet, Dartmouth, Fairhaven, Somerset, Swansea, Westport, Tiverton, R. I., Fall River, New Bedford.

Springfield-Holyoke includes: Chicopee, Holyoke, Springfield, Westfield, Westfield, Agawam, East Longmeadow, Longmeadow, Ludlow, West Springfield, Northampton, Easthampton, South Hadley, Enfield.

Boston includes: The cities of Cambridge, Everett, Malden, Medford, Melrose, Newton, Somerville, Waltham, Woburn; the towns of Arlington, Ashland, Bedford, Belmont, Burlington, Concord, Framingham, Lexington, Lincoln, Natick, North Reading, Reading, Stoneham, Wakefield, Watertown, Wayland, Weston, Wilmington, Winchester, Beverly, Lynn, Peabody, Salem, Danvers, Hamilton, Lynnfield, Manchester, Marblehead, Middleton, Nahant, Saugus, Swampscott, Wrentham, Quincy, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Medfield, Milton, Needham, Norwood, Randolph, Sharon, Walpole, Wellesley, Westwood, Weymouth, Hingham, Hull.

by posting readable direction signs on the highways. A camp site would make these grounds more useful. Another suggestion is that Connor's Pond on Route 32 be developed as a cabin enterprise. Also one of the farms with a pond and several hundred acres of woodland off from the main highway might be stocked with fish and equipped with camping and overnight accommodations. In general, the attractiveness of the area and its accessibility and nearness to large cities offers advantages that can be made the basis for a significant but not large volume of recreational activity.

Residence on the full- and part-time farms in the town calls for little discussion. Such living can be made more attractive by home improvements and more ample small fruit and vegetable gardens. A survey of the housing in Petersham made by the Country Life Commission in 1938 classified and ranked the farm dwellings from Excellent to Very Poor, in terms of percentage of each, as follows:

<i>Condition</i>	<i>Full-scale farms</i>	<i>Part-time farms</i>	<i>Residential</i>
Excellent	0	0	9
Good	45	56	46
Fair	55	22	36
Poor	0	22	3
Very Poor	0	0	6

The 22 per cent of poor dwellings on part-time farms includes a good many on abandoned farms that have not been kept in good repair. The substandard dwellings are mostly in the residential column.

From the standpoint of the future of the town, three other opportunities are important. The first of these is maintaining the attractiveness of the present Village of Petersham and immediate environment so that an important group of families with adequate but not necessarily large incomes will want to spend their summers in the village, and part of them to live in the village the year round. The second is to provide a good location with necessary facilities for an increasing number of families from Athol, Gardner, and other near-by cities. Objections to making parts of the Town of Petersham into a "bedroom" location for workers' families need to be weighed very carefully before they are accepted as conclusive. The major consideration is to see that they are properly located, adequately supplied with needed facilities, and laid out in such a way as to assure plenty of living space. The third opportunity is to provide location and facilities in fairly concentrated blocks for families desiring the part-time farming and residential farming mode of living. This will be discussed further in the section on Zoning in Chapter 5.

CHAPTER 5 GOVERNMENTAL ASPECTS

In outlining the problems of the Town of Petersham at the beginning of this report, two lines of action were suggested for bringing public income and public expenditure into balance. One of these was to increase the volume of private enterprise in the town and thus increase the assessed valuation and income from taxation. The other was to reduce the amount or cost of public services provided. It was suggested that probably the full answer would combine both approaches. The analysis thus far has indicated clear possibilities of increasing the volume of business enterprise in the town and also its residential values, and in these ways enlarging the tax base. This enlargement, however, is likely to proceed rather slowly and to make only minor progress in the next five years. The major portion of it lies ten years or more in the future. Hence it becomes necessary to take very seriously the other approach to achieving the necessary balance. As already indicated, the expenditures on public services can be cut either by reducing the amount of them or by making them more efficient. Both of these possibilities will be considered in what follows.

First of all, three major alternatives in governmental organization for what is now the Town of Petersham need to be considered. The most drastic of these is to abolish the Town of Petersham as a separate governmental unit and combine it with a group of surrounding towns, a solution that is frequently proposed these days, but seldom approved. Continuing the town organization as it is with the historical type of town public services continuing to be provided by the town government represents the other extreme and is most commonly favored. But between these extremes is the alternative of having some of the services organized as a unit for a group of adjoining towns, or even transferred to the county government. Some beginnings of this are under way in various parts of New England. Thus groups of Massachusetts towns are now employing one school superintendent in many situations. We shall consider these three alternatives separately.

A. Abolish the Town as a Political Unit

This is not an attempt to decide whether or not Petersham should be continued as a separate political unit of government. It will be the people of Petersham who make such a decision, if it is to be made. This analysis is designed to help the people of Petersham anticipate any changes which ultimately they may have to make and not postpone the right decision too long.

The alternative of abolishing the town government of Petersham of course raises some very broad questions concerning the future of rural town governments in general, and particularly of rural towns whose population and economic base have been declining. On one side of this question is the simple matter of cost. The statistics of municipal finances by the Massachusetts Department of Corporations and Taxation indicate that the towns of Massachusetts with a population around 25,000 had the lowest per capita costs of government around 1940. The highest costs were for the large city of Boston. The next highest costs were for a group of small towns averaging a population of 1,000. The per-capita school and library expenditures of this latter group of towns were a third higher than those of towns in the 25,000 group, and roads and highway expenditures were twice as high. The welfare and relief and general government expenditures were nearly a half higher. The only expenditures which were lower in the small towns were those for public safety and health and sanitation. A comparison of the per-capita expenditures of community services of Petersham and seven surrounding towns in 1943 places Petersham at the top at \$93, Phillipston close to it at \$86, Athol at \$45, and Hardwick at \$51.

The expenditures are far from proportionate to the size of the towns. No doubt there is a wide difference in the amount and quality of the services provided in these towns. In general, the quality of public services is poorer in the smaller towns. The situation is somewhat parallel with one which the senior author discovered long ago in analyzing the economics of creamery operation in Minnesota. Only the fairly large creameries were able to hire the services of a first-class buttermaker and make 93-score butter. The small creameries with low-salaried buttermakers commonly made 90- to 91-score butter. It does not necessarily follow that the public health officers and public school teachers are less competent than those in towns with larger resources, but the chances are that this will be the case.

On the other side of the question, the public employees of a town are likely to be nearer at hand and able to give more immediate attention to local problems than would the employees of a larger unit of government including several towns.

The strong present interest of the citizens of the Town of Petersham in

keeping Petersham the kind of a town that they want it to be operates, of course, in favor of trying to meet the higher costs and accepting the limitations in service. The essence of the town type of government is that the people in the town are in a position to determine for themselves what they want more immediately and more directly than in a city type of government. A Supreme Court opinion of 1918 made the distinction between the town and city organization that "in the former all the qualified inhabitants meet together to deliberate and vote as individuals, each in his own right, while in the latter all municipal functions are performed by deputies. The one is direct, the other is representative."

Evidence that towns are making decisions as to what they want appears very clearly in the statistics of population growth in the towns surrounding Greater Boston in the last decade. Some of those that have used zoning ordinances to keep out low-cost dwellings, and thus preserve their towns as dwelling places for the more well-to-do, show increases in population of 5 per cent or less during the decade, whereas others that have permitted and encouraged the building of lower-cost homes have had increases of from 20 to 70 per cent in population during the decade. The people of Petersham with their town system of government are in a position to make a decision of this sort.

It does not necessarily follow, of course, that if Petersham became part of a section of the County of Worcester, including Petersham and a half dozen surrounding towns, it would change in character in ways that would be unwelcome to the present population of Petersham. The combined interest of the people in the whole group of towns might very well be in the direction of making the Town of Petersham into a better community than it is now. Still, the cities in this larger unit would probably poll the largest vote and might have some preferences as to the development of Petersham which would run contrary to those of its present citizens.

Another aspect of the matter, of course, is that, as was pointed out at the beginning of this report, the people of Petersham are now doing most of their trading and getting their commercial recreation and other facilities of like nature in places like Athol and Barre. Their young folk go to these places for their social life and increasingly for their jobs. It may be well worth while to give the people of Petersham a voice in the affairs of these cities which now serve them.

B. Continue the Present Town Organization

To continue with the present town organization for the next five or ten years at least will probably require, as indicated above, either reducing the

public services to the people of Petersham or performing them more efficiently in order to reduce their cost. In this connection, it will be interesting to consider the structure of tax rates per dollar of assessed valuation in this part of Massachusetts. Petersham's tax rate in 1948 was only \$35 per \$1,000 of assessed valuation as compared with \$43 in Athol and \$48 in Barre. However, account must be taken of the assessment rate as well as the tax rate, and Petersham's assessed valuations appear to have been held at their former level, in spite of the decline in real estate values of the summer colony property. An analysis of the finances of the town shows that between 1930 and 1948, the amount raised by taxation increased 67 per cent and the assessed valuation of personal and real estate property remained practically stationary, with the result that the tax rate rose by 63 per cent. The actual appropriations by the town rose 100 per cent, the difference between this and the taxes raised having been covered by state aid, which doubled between 1930 and 1939 and remained about the same thereafter. Schools costs rose 20 per cent from 1939 to 1948. General administration expenses of government increased during the 1930's because of the increase in state and federal aid and the matching of local funds.

Let us now consider some of the services. Petersham has a high school and a grade school in Petersham Center. The children are brought to the Center grade and high school by eight different school buses. The school is equipped for sewing and cooking classes, but has no vocational equipment for boys. The high school enrollment was reported as 60 pupils at the time of the Country Life Survey in 1938, the grade school enrollment as 100, and the rural school enrollment as 17.¹ The total enrollment reported in 1949-1950 for the Center school was 146, of which 120 were in the grade school. Six teachers handle the 8 elementary grades, and four the 26 high school pupils. School expenses made up 52 per cent of the Petersham town budget in 1949.

The Petersham library is practically self-supporting. New books are added each year. The annual circulation is approximately 9000 books.

A health service consisting of a school doctor and a school nurse is furnished as part of the educational service. The school nurse conducts clinics of various kinds and gives physical examinations at the beginning and end of the year. She also teaches first-aid courses in the seventh and eighth grades and teaches home nursing to the girls in high school. She also visits the homes and gives advice to parents concerning the condition of their children.

The high school building serves more or less as a social center for the

¹ The rural school has since been discontinued.

young people of the village and to a lesser extent of the town. Meeting space is also available in the Town Hall and in the Library.

One of the ways that is frequently suggested to keep the school budget within bounds is to see to it that no cheap houses are built anywhere in the town, since the families living in these cheap houses are likely to have three or more children and not to contribute enough in the way of taxes to finance the cost of their education. Reasoning in these terms can very easily be fallacious. The principal cause of the high cost of education per pupil in Petersham is the small number of children. If the enrollment in the Petersham Center high school were 52 in place of 26, the cost per pupil would be almost cut in two. In the situation in which the Town of Petersham now finds itself, one has to think in terms of the *additional* cost of the additional pupils balanced against the additional tax income from the low-cost homes.

The simplest solution of the high cost of high school education would appear to be to close the high school and transport the boys and girls to Athol. But the cost of the bus service plus tuition would go far toward paying the salaries of the four teachers. In addition, some of the boys and girls might not go to high school if they had to go to Athol. Still, if the enrollment in the high school continues to decline at the rate it has since 1938, some arrangement of this sort is due anyway.

The next highest expense is, of course, the roads. In 1938, at the time of the Country Life Survey, the town had 23 miles of hard-surfaced roads. The town still has a considerable mileage of poorly kept dirt roads in parts of the town where there is very little travel. No doubt road costs are increased somewhat by the maintenance of equipment and operators who have the capacity for taking care of a larger mileage than is available in the Town of Petersham; the same is true of fire equipment. The town public property of Petersham had an estimated value in 1948 of \$107,000.

The foregoing statement of the Town's finances does not appear to offer much promise of large savings by any other means than simply cutting out some of the services—such, for example, as the high school and the services of the school nurse. No doubt, however, some reduction in the number of public officials, other simplifications of the town government, and adjustment to changed conditions can reduce expenditures somewhat. Towns with 800 population do not need as elaborate governmental organizations as those with 9000. But how to bring about this simplification is not easy to decide.

One type of reorganization frequently offered nowadays for consideration, and permissible under the laws of Massachusetts, is that of having the selectmen employ a "town manager" who undertakes to organize the various departments of government on an efficient basis and keep the activities of

these departments well integrated. This town manager attends the regular meetings of the selectmen to answer questions, make recommendations, and submit appropriation estimates. He acts as an intermediary between the selectmen and those in charge of the departments, and in the smaller towns may go far in the actual conduct of the affairs of these departments. The Town of Norwood, Massachusetts, needing better handling of its revenue collection and more adequate supervision of expenditures, adopted what is essentially a town manager system as early as 1915. The town manager held office at the will of the selectmen, organized all the departments, appointed and removed department heads and their subordinates, and fixed salaries. By 1930, fourteen communities in New England had adopted the town manager system, five within the State of Massachusetts, namely Mansfield, Middleboro, Norwood, Orange, and Stoughton. The average term of the manager employed has been four years. His salary has ranged from \$3000 to \$5000 per year, and none have been residents of the community employing them.

The experience of these towns points to some of the objections offered to this form of administration. One, the Town Meeting leaves the manager in an uncertain position, since he holds office at the will of this assembly. Two, friction is likely to develop between him and the selectmen over subordinate appointments. On the whole, however, the town manager system has worked out pretty well. The town manager has maintained the role assigned him as an administrative official without becoming too much involved in town politics or factionalism. Operation of the town manager system has usually achieved some important economies and has been approved by the citizens of the communities which have tried it.

Other types of organization are clearly possible under the state law. All that is necessary is for the citizens of a town to work out a type of organization that is suited to its particular situation. An alternative sometimes employed is to set up a board of public works responsible to the selectmen and at the same time assigned important authority in street and highway planning and other coördinating activities.

The organization in Petersham, like many others, suffers from the fact that it has not been revised to meet changing conditions. Reorganization of town governments such as Petersham generally needs to keep in mind the following general weaknesses in the present governmental operations. One, a full town meeting has to be held to decide on too many details of operation, and a town meeting is not well suited to making decisions of this kind. Two, the petty officers carrying on the town's business are so numerous, their duties are so scattered, and their authority is so decentralized that

neither they nor the community as a whole which they are supposed to serve can implement the types of changes which have been indicated. Three, boards independent of each other and responsible only to the town makes coördinated effort difficult. Government under such circumstances tends to be government by cliques and not according to the will of the people of the town.

One possible way of achieving more effective administration of town finances would be the election of a town finance committee of three or five members. Many New England towns have such committees, and in most cases they have helped to make the spending of town funds more efficient. Usually the committee receives a list of proposed expenditures some time in advance of the town meeting. These expenses are considered and compared with the town income. Heads of the various town departments can be asked to appear before the finance committee to explain the basis of their requests for funds. When one group considers all the expenses, it can often suggest ways of avoiding duplication of costs and getting a greater return for the amount spent.

The finance committee presents at the town meeting its recommendations on town appropriations. The town meeting may accept or reject the advice of the finance committee. The primary function of the finance committee is to make clear the relation of town costs to income and help the voters to decide on the contribution of the various proposed appropriations to the welfare of the community. The finance committee does not decide on appropriations; it merely helps the voters make that decision more wisely.

C. Organize Some of the Services on an Intertown Basis

Almost any one of the services rendered publicly in a town is capable of being organized for a group of towns together. Thus fire protection, public health, public hospitals, highways, and even education can be organized for a group of towns as a unit.

To show in clear outline what organization on this basis may be like, this report takes one conspicuous possible example of it, namely, regional organization of the schools, and works out the main outlines. It must be understood clearly that this report does not propose or recommend an intertown organization of the schools for Petersham and surrounding towns. Neither does it do the opposite. Instead, it wants the people of Petersham and surrounding towns to get a clear idea as to what such an intertown organization would be like so that they will be in a better position to decide whether or not they want it. Intertown organizations of fire protection, health protection, or the like would not be patterned too closely after what

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is here outlined for education. Nevertheless, the reader can get a pretty fair idea of what they would be like.

It is worth noting at this point that the State of Massachusetts is encouraging amalgamation of small towns into "regional" school districts. The State Board of Education recommends that adjoining towns organize a "joint regional school board" to build and administer the elementary and/or high schools in such a region. Not only this, but it gives larger state aid for new regional buildings than for the construction of local schools. The state also bears the cost of transportation above \$5 per pupil per year so that higher transportation costs will not be a deterrent to such regional organization.

A plan for a so-called regional school system could be worked out, it is obvious, for the high schools alone or for the whole school system. There is more purpose in it for the high schools than for the elementary schools in a rural territory such as that which surrounds Petersham because, as will appear presently, the saving in costs and improvement in quality of instruction resulting are greater. With the elementary schools, the gains would come from a fuller use of present or new educational facilities because with joint administration pupils can be shifted from one school system to another along the borders, and thus relieve the pressure on those that are overcrowded. This is likely to become very important in the next ten years because of the large increase in the birthrate during and since the war.

The following outline describes a so-called regional high school for the towns of Barre, Hardwick, Hubbardston, Petersham, Phillipston, and Templeton. Under this plan, one new high school is to be built immediately to serve all the high school students in these six towns. The pertinent data concerning these towns are as follows:

<i>Town</i>	<i>Population 1945</i>	<i>Total school enrollment 1948</i>	<i>High-school enrollment 1948</i>
Barre	3,485	612	260 ^a
Hardwick	2,115	302	77
Hubbardston	1,019	140	66 ^a
Petersham	735	149	29
Phillipston	475	107	19 ^a
Templeton	4,435	748	296
Total		2,058	747

^a Grades 7-12. Other high schools 9-12.

These six towns now have four high schools. Hubbardston sends its high-school students to Gardner, and the Phillipston students go to Athol. The

Barre high school in turn admits students from Oakham; and the Hardwick high school receives students from New Braintree and West Brookfield. The actual enrollment in the present high schools is higher than need be for the six towns alone because the Barre high school includes the junior high school seventh and eighth grades, and Hubbardston and Phillipston are sending seventh and eighth grade students to Gardner and Athol. The forecasted enrollment in the ninth to twelfth grades for the proposed regional high school is 840 in 1955 and 770 in 1960, the decrease after 1955 reflecting the fact that the war and postwar population bulge is likely to be over by that time. Analysis made by the Massachusetts School Building Assistance Commission indicates that 800 is the optimum number of students for a high school in terms of costs and quality of instruction, and that 500 pupils is the minimum size for adequate services at reasonable cost.

The expenditures per high-school pupil of these six towns in a recent year were as follows: Barre, \$208; Hardwick, \$324; Hubbardston, \$285; Petersham, \$533; Phillipston, \$237; Templeton, \$175. The expenditures of Athol are \$175 per pupil.

The range in costs per pupil in elementary school is much narrower, from \$130 to \$180, but Petersham is still at the top.

Of the four high-school buildings in the six towns, three of them, in Barre, Petersham, and Hardwick, are over forty years old, and the Templeton building is twenty-seven years old. The present Barre high-school building is altogether too small and is also inadequate in other ways.

The choice of location suggested for the new building is near the center of the towns on a main highway north of Barre. A building designed for 800 pupils, according to the building standards of the New York State Department of Education, would cost \$1,590,000. Of this, \$825,000 or 65 per cent, would be paid by the State. The distribution of the remaining \$765,000 on the basis of assessed property valuation per pupil in the towns would be as follows:

Barre	\$266,500
Hardwick	79,000
Hubbardston	67,000
Petersham	29,600
Phillipston	19,400
Templeton	303,000

Even though the \$825,000 is a higher percentage of state aid than is now given to the local schools, the cost to the state per pupil would be only \$1,100 as compared with \$1,300 now. The building cost to be charged to Barre and Templeton would be reduced about 20 per cent below what it would cost

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to reproduce their present buildings. The facilities in the regional high school would be much more adequate, including an over-all allowance of 1,500 cubic feet per pupil and a gymnasium and auditorium. What it would cost per pupil to build adequate high schools for the two towns now without high schools need not be calculated.

The annual operating expenses are, of course, much more important than the construction costs. Following is a suggested budget of these expenditures, based on careful study of the operating expenses of the Bridgewater Regional School as reported in the *Bridgewater Independent* on May 5, 1949. This budget does not include the cost of transportation of pupils, toward which the state will contribute all costs above \$5 per pupil.

General control			\$ 1,700
Instruction:	41 salaries	\$132,700	
	books	1,600	
	supplies	4,500	
	other	800	139,600
Operation:	wages	7,200	
	utilities and other	8,800	16,000
Maintenance			2,500
Auxiliary:	nurse	2,800	
	dental	2,200	
	cafeteria	2,500	
	other	2,500	9,000
Fixed charges			2,700
TOTAL annual operating expenditure			<hr/> \$171,500

The \$171,500 total would be distributed between state aid and local expenditures as \$27,200 and \$144,300 respectively. The distribution of the local operating expenditures by towns and per pupil would be as follows.

Towns	Total local expenditures	Expenditures per pupil in 1948	Regional school expenditures per pupil	Difference
Barre	\$49,800	\$208	\$226	+\$18
Hardwick	15,125	324	226	-98
Hubbardston	8,730	285	226	-59
Petersham	4,425	533	226	-307
Phillipston	2,485	237	226	-11
Templeton	63,750	175	226	+51

The saving per pupil for the Town of Petersham would be \$307 per year, or a total of \$8900 annually, not including transportation. This saving alone will pay Petersham's share of the cost of the new building, \$29,600, in four years. Petersham recently spent \$21,000 on the renovation and enlargement of a gymnasium which still is not large enough for its high-school activities. Removing the high-school students from the present Petersham school

building would increase the cost of elementary schooling per pupil, since the whole building would need to be maintained, but this additional cost would be small in comparison with the saving in high-school education and the higher standards of education. The savings in Hardwick and Hubbardston would be considerably smaller, but still worth while when combined with the improvement in quality of instruction.

As for Barre and Templeton, the costs would be increased, but these towns now maintain an underpaid and overworked teaching staff in an overcrowded building and do not provide the comprehensive facilities of the suggested regional school. The Templeton school building could continue to be used by the elementary grades as it is at present and the extra space could be used in part to relieve overcrowding.

The foregoing analysis is in terms of consolidating the high-school instruction in a particular group of six towns. These six were chosen to serve as an illustration. Some other grouping might work out better, perhaps four, five, or seven towns in place of six. It could well be that some one of these towns is in a position to work out a better combination for itself. The simplest arrangement, of course, would be to enroll the high-school pupils in another high school and pay transportation and tuition.

All the foregoing discussion has been in terms of a consolidated high school. No estimates are being made as to savings from integrating the elementary school system. These need to be considered more or less independently and this will not be attempted here. A choice would need to be made between having one regional school board to administer both the elementary and the high schools or leaving the present school boards to handle the elementary schools and setting up some overhead group representing these boards to look after the regional high school.

A change as drastic as would be involved in this high-school plan is, of course, not going to be made except after prolonged discussion. The small town school boards are likely to be very jealous of their present autonomy and control over their own local school systems and budgets. The towns which like Barre are faced by pressing school problems will take the most interest in the possibilities of a regional high school.

Of interest in this connection is the fact that three of the towns are now voluntarily organized in one school superintendency. Hubbardston, Phillipston, and Templeton are part of another school superintendency. School superintendents sometimes oppose the formation of regional school units, probably because it may terminate some of their positions. One superintendent under such circumstances wrote as follows: "Such efforts should be resisted because I do not believe them to be in the interests of the town," and

because the families in his superintendency "know one another and trust one another," and this would no longer be true if new towns were brought in.

An analysis of the resources of a community and the probable results that can be expected from alternative uses of these resources offers nothing more than a set of alternative blueprints for the future. If concrete results are to grow out of a plan, choices among these alternatives must be made and someone must be in a position to act on these choices. This means that the possibilities suggested in the blueprints must be translated into public issues upon which the people of the town can express their opinions and eventually reach a decision. Once the decision has been made, there must be some agency, person, committee, or board capable of carrying out the decision. Finally, in setting up a program to carry out plans that have been chosen, some provision needs to be made to reconsider from time to time the plans adopted so that they can be modified to meet changing conditions and correct unforeseen mistakes. Of these four steps, this report represents only the first.

As for the next step, that of education and full discussion of these alternatives, there are several organizations in Petersham which could assume the responsibility for it coöperatively. Among these are the Town Planning Board, the Petersham Agricultural Association, and the Village Improvement Society, all of which are directly concerned with community development. Other organizations, such as the American Legion, the Grange, and the church groups can also assist. The role of education at this stage is not to promote or oppose proposals, but rather to see that people are fully informed as to the pertinent facts and alternatives.

The body of this report is intended to be the raw material for such an educational program. It is designed to bring together the facts about the present situation of the Town of Petersham and suggest possible developments. With this report in the hands of all the voters, and discussion among organized groups, the alternative plans for development presented in it and others that may be suggested by it can be thoroughly examined, and the people of the town will be in position to come to a decision as to the future course the town should take. The key to effectiveness in this process is coöperation among the various groups to get all the facts out into the open.

Toward the end of this discussion, however, it should begin to crystallize into definite proposals as to the course of action to be followed. At this stage the Town Planning Board needs to be called into service. Once the issues about future development have been brought out and the voters have the facts of the situation, the next step is to draft articles for the town warrant or formulate other necessary formal statements for consideration at the town

meeting or other appropriate places at which decisions to act can be made. The Town Planning Board is particularly suited to sponsor the preparation of such documents.

The Town Planning Board is also the obvious agency to be charged with carrying out the proposals when and if they are formally adopted. This will have to be done in cooperation with other town officials such as the Board of Selectmen. But some agency like a town planning board must have specific responsibility for carrying out programs for community development. Without such an agency and such responsibility, the best civic intentions frequently evaporate into wishful thinking.

The final task of keeping a critical eye on the program as it progresses and of suggesting necessary changes to meet new situations is a responsibility of all civic groups and individuals. But such suggestions should be channeled through the agency with executive responsibility for the program, the Town Planning Board. Thus handled, the suggestions for additions or changes can be coordinated with the program being followed and built upon it as a base. This again points up the fact that the essential element in successful community development is the will of the people of the town to cooperate to achieve a better community. A plan is never more than the raw material to be used by the electorate to help them create the kind of town they want.

In conclusion, let it be said again that this study of the Town of Petersham is presented with the single idea of providing its citizens with the raw material out of which to fashion a development program. It is in no sense intended to suggest what the town should do. It is rather an attempt to outline what could be done, what such developments would cost, and what the probable results would be. Nor does it pretend to cover all the possibilities, but hopes only to help the townspeople of Petersham to build the community they desire.