A black and white photograph of a dense forest. The trees are tall and thin, with a thick canopy of leaves. The ground is covered in a layer of fallen leaves and forest floor vegetation. The overall scene is a lush, green forest.

**FORESTRY
IN VERMONT**

Forestry in Vermont

1947



ERNEST W. GIBSON
GOVERNOR

WILLSIE E. BRISBIN
SECRETARY OF CIVIL AND MILITARY AFFAIRS



STATE OF VERMONT
EXECUTIVE DEPARTMENT
MONTPELIER

October 6, 1947

To the Citizens of Vermont:

My first concern, as governor, is to do everything possible to make Vermont a better state in which to live. I am convinced that our forest lands, properly managed, will play an even more important part in the economy of our state. However, before we can bring this about, thousands of Vermonters must know more about this problem.

Much can be learned about this problem by a visit to our forests. Therefore, for this year, I am designating October 6th to 12th as forest festival week and urge every organization to take an active part to promote interest in and the development of our forests at this time.

I have designated county chairmen and in the towns, town chairmen to bring this important matter to the attention of everyone through the radio, press, lecture and exhibits. Our county foresters are available to show examples of good forestry practice in your locality.

Further, the information in this little booklet should be of educational value not only for our schools but for every citizen.

Let's work together to develop a thorough appreciation of the economical and recreational value of our forests.

Very sincerely yours,

A handwritten signature in cursive script that reads "Ernest W. Gibson".

GOVERNOR.

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Foreword

The object of this little publication is to furnish information chiefly for Forest Festival Week, though the material herein should be of interest at any time to the schools and individuals who are continually asking questions about our forests.

There has been much discussion, legislation and investigation of the subject of forestry. In 1928 and 1929 a study and publication of land utilization as a basis of rural economic organization was made in thirteen hill towns by the Vermont Agricultural Experiment Station in cooperation with the U. S. Bureau of Agriculture Economics and the Vermont Forest Service. The legislature of 1927 passed a joint resolution No. 226 which set up a committee to report on forest conditions in Vermont. They published a short report with recommendations in 1928. In 1946 a legislative committee made an extensive report on forest taxation.

Due to the shortness of time it is impossible to put into this publication much material that would be of interest and value.

PERRY H. MERRILL
State Forester

A Program for the Development of Forest Resources in Vermont

Objective

The ultimate purpose of forestry is to so manage the forest lands of this state as to insure an adequate timber supply for our wood-using industries and to obtain and conserve for the owners and the public the maximum subsidiary benefits such as watershed protection and recreational and scenic values, to be derived from such lands. More specifically stated the objectives are as follows:

1. To grow timber of good quality indefinitely, with certainty and at reasonable cost to be used as raw material for existing wood-using industries.
2. To assist our wood-using industries and to attract to the state and to develop new wood-using industries as needed to provide a degree of utilization of forest products consistent with the production of forest products in terms of volume, species and quality.
3. To maintain, and where necessary create, an environment suitable for the needs of wildlife.
4. To make adequate provision for recreation, aesthetic and inspirational values.
5. To make proper use of forest cover as a means of preventing soil erosion and deterioration on lands poorly suited to intensive forms of agriculture.
6. To make full use of forest influences in the protection of water supplies and in the amelioration of flood conditions.

Means

A. The creation of more favorable conditions for the private owner of forest land, which will encourage him to preserve and improve existing forest, and to reforest additional land.

1. The improvement of fire prevention and suppression methods until the average area burned annually becomes negligible and the forest property becomes an insurable risk at reasonable rates.
2. The modification of tax laws and the tax system so as to secure equality of tax burdens on forest land owners as compared with other types of ownership, so that forest lands will not be assessed beyond their value to produce and thus cause destructive logging.
3. Advice and assistance to the landowners in marking and marketing their timber.

Funds, both federal and state, to increase the number of county foresters of the Vermont Forest Service should be ap-

propriated so that all of the forest landowners in each county may receive equal benefits in forest management and protection of their woodlands from fire.

4. The continuation and improvement of protective measures against forest insects and diseases.

5. The study of markets for forest products and of possibilities of increasing the income from timberlands. Assistance to small millowners in the manufacture and grading of their timber, to conserve much timber now lost through improper manufacture.

6. The continuation of the state policy of supplying nursery stock for forest planting at the lowest possible cost.

7. Forest Cooperatives. The formation of forest cooperatives for the orderly marketing of forest products. The members of such cooperatives should plan to insure continuous yields from their forest lands.

8. Land Management. When it is in the public good, local groups should have authority to associate themselves together to prevent any individual from misusing his lands to the public detriment and welfare.

B. The extension of state ownership of forest land to include at least 300,000 acres, which is about 9% of the forest area of Vermont, in order

1. To build up in regions of small scattered ownership, large state holdings which will produce dependable amounts of wood to support local industries.

2. To better protect areas affecting stream flow and thus reduce the flood hazard and erosion.

3. To serve as public hunting and fishing areas, as sanctuaries for propagation of game birds and animals and as recreational areas.

4. To serve as demonstrations of forestry practice, and of forest management for the instruction and education of private owners.

5. Ultimately to produce net revenue for the State.

C. The extension of town forests until every town containing suitable forest land shall own a forest (to include approximately 10% of its forested area) to be used as:

1. For demonstration of forestry practice.

2. Ultimately for town revenue from wood crops.

3. Public recreational areas and for bird and game sanctuaries.

D. The protection of the public health, promotion of happiness and the increase of the attractiveness of Vermont to residents and visitors, through recognition of the necessity of public ownership and control of small areas of high scenic and recreational value, by the creation of State Forest Parks embracing mountain scenery, roadside

areas, remnants of primeval forests, lake shores, waterfalls and sites of historic interest.

E. An organized effort to educate all elements of Vermont business, professional, civic and social life, to a true recognition of the overwhelming importance of the forests of Vermont in plans for its future stable prosperity and development, by

1. Conservation education course in normal schools and colleges.
2. Integration of conservation in the subjects now taught in the schools.
3. A conservation manual for use in the schools and by boy scouts, 4-H Clubs and others.

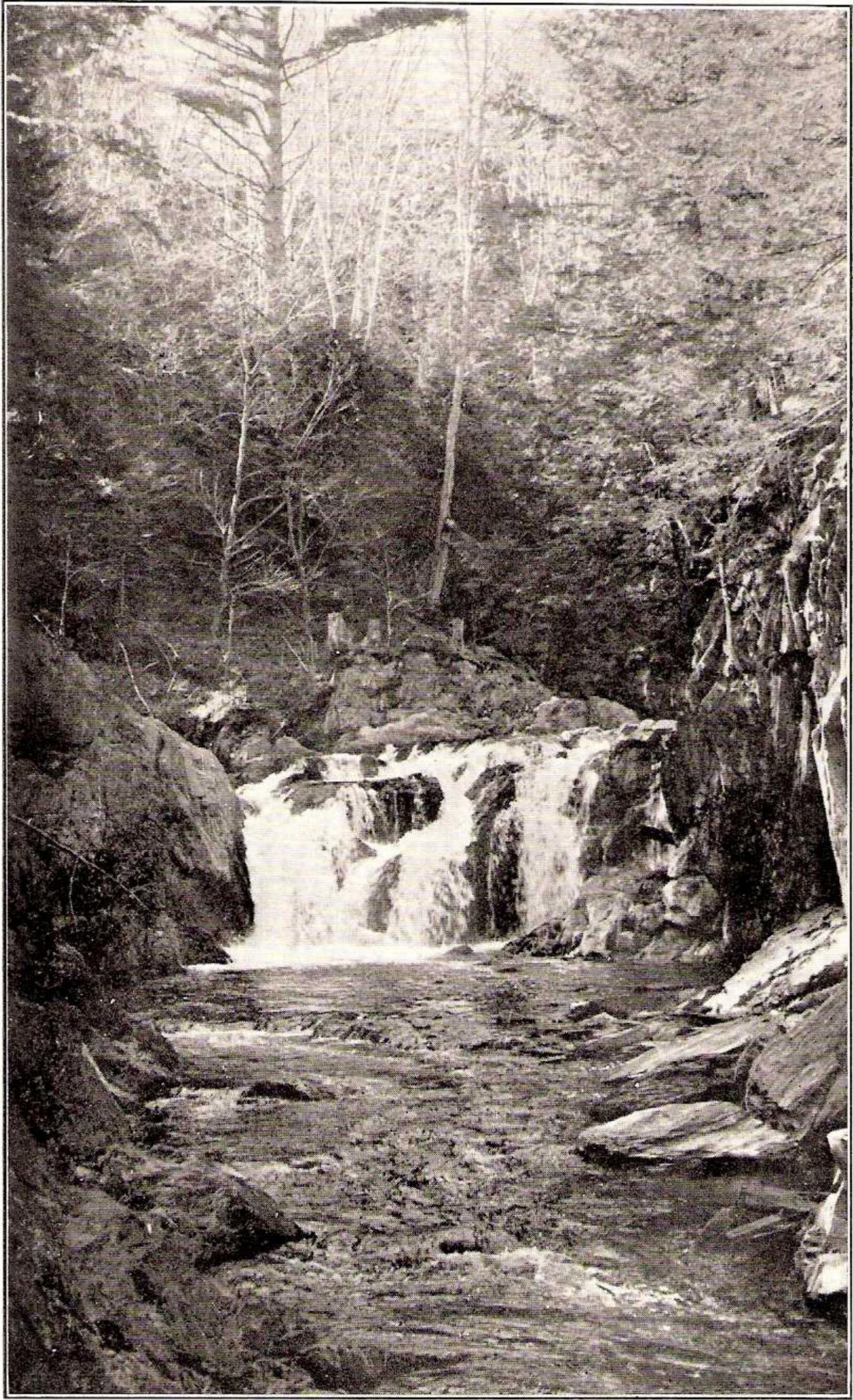
Problems Confronting the Practice of Forestry

1. The major problem confronting the practice of forestry is the fact that it has not been considered from a practical business standpoint. Forests have been considered as mines of wealth to be exploited at the whims of the owner; as an appendage to the farm to be ruined or saved according to personal desire or needs; or as a product to be removed from the land to make way, in many instances, for a dubious agriculture. Until such time as forests are organized into units capable of being handled as a going business or as an integrated part of a going agricultural business, they will continue to be treated more or less on personal ideas and notions rather than on sound scientific facts, with the subsequent patchwork of good, bad and indifferent treatment.

2. Personal ideas, whims and necessities-of-the-moment greatly influence the practice of forestry. The average owner desires to get an immediate cash income regardless of whether the trees would give a much greater income if left to grow. Many owners may be willing to have their forests cut selectively and the mill owners prefer to buy logs from such an operation. However, the logger or jobber still insists on cutting every tree in sight.

3. Taxation, whether it is a problem or not, is much discussed. The uncertainty of what the listers may do in taxation of forest properties ten, fifteen or twenty years hence acts as a deterrent to the purchase of young timberland or the reforestation of open land. Excessive taxation means premature cutting and loss of taxes to the towns.

4. "Our land-holding system tends towards depletion of our soil and timber resources. A farmer is frequently influenced, or perhaps forced, to sacrifice soil fertility, immature timber, and even his maple sugar orchard to pay a heavy mortgage and reduce high interest payments. The fact that a farm has to pay for itself each time it passes to a new



OUR FORESTS EQUALIZE STREAM FLOW

owner keeps adding to the burden on the land. A farm may be free of mortgage today, with the owner able to meet his obligations with relative ease, while tomorrow it may have changed ownership and be mortgaged "to the hilt." This means that several hundred dollars extra must be found each year to pay the principal and interest. This extra money frequently has to come from the soil or the timber, and so depletion takes place. Other burdens on the land resources are heavy property taxes—a relic of our early history when property constituted the only substantial tax source—and the cost of rearing and educating our farm boys and girls who later, when ready to begin productive work, migrate to the non-agricultural industrial centers, which do not raise their own human replacements. These are all burdens on the land which must be lightened or compensated if we are to expect those holding the land to carry on an effective conservation program with respect to our soil and our forests."

5. The long time investment which one must make if he acquires cut over or young sprout land often deters people from buying. This is accentuated by the lack of interest of bankers to furnish long-term capital at low rates of interest.

6. The cutting of maple sugar orchards is also a serious detriment to the practice of forestry. Many sugar orchards are clean cut for lumber, whereas in five years or so they will produce for the owner as great a cash labor-income from maple products. Sugar orchards can be cut selectively as they become mature. The ideal sugar orchard is ungrazed and has trees of all ages from young seedlings and saplings to trees over a hundred years old.

7. As discussed under another heading, past land use has left much of our land unproductive at present and for some time in the immediate future, thus leaving it a burden and problem for present-day owners and tax payers.

8. Another factor influencing the practice of forestry is the fluctuating normal demands for forest products, i.e., the market. Periodically, exceptionally heavy demands, caused by wars or general economic conditions, occur causing exploitation and denudation of many timber lots. A forest under management will have plans made for exceptionally heavy cuts when markets are good but will follow this by light cuttings during poor markets, never cutting to such an extent that the timber production capacity is impaired. Under present conditions the cut is so heavy as to impair timber production a full generation or for several cutting periods. Thus, the people who cut for money and because they believe it is patriotic to put their timber on the market during a national emergency, are in the long run impairing their country's wealth and chances for future economic supremacy.

9. Risk of loss through fire, disease and insects, grazing, erosion or floods.

Suggested Solutions to Problems Confronting the Practice of Forestry

1. Education of our youth through subject matter on conservation integrated in all courses taught in our schools.
2. Education of groups, such as 4-H Clubs and older Youth organizations, through demonstrations and meetings.
3. Public assistance to landowners in marking and marketing their timber.
4. Control of cutting by the state or federal government either by licensing the timber operators or regulating the method of the cutting of the owners in accordance with rules and regulations which have the authority of law.
5. Public ownership by the municipal, state and federal governments.
6. Credits—Long-term loan of funds by bankers or the government on a timber crop at a low rate of interest.
7. Equitable taxation.

Probably the most important method of attaining good forest practice can be attained through education and assistance to forest owners now given through the county foresters in marking and marketing.

It is recommended that each landowner use a timber sales contract in each sale of stumpage. It will be of much protection to both the buyer and seller. Ask your county forester for a sample timber sales contract applicable to your situation.

However, there are many people who get hard pressed for money so, a means or method of furnishing long time credits either from local banks or the state or federal government should be authorized. In addition there should be some ceiling placed on the appraised value of forest land so that the timber during its growing period will pay only a reasonable equitable tax.

With everyone educated to the value of conserving our forests and how it should be done, sufficient credits and equitable taxation, there is still need of some legislation to prevent destructive cutting of our forests. Further, there are many areas of forest land which will never produce a commercial crop of timber. Too, there are areas more valuable for watershed protection. All these areas plus areas which are needed for demonstration purposes should be in public ownership.

Early History

Vermont was originally almost entirely wooded. Of the 9,114 square miles 9,000 square miles were covered with forests. By 1905 there were approximately 3,500 square miles or 38.4% of wooded area. The census of 1900 gave 3,900 square miles.

Today there are nearly 4,000,000 acres, about $\frac{2}{3}$ of the land area of the state, which support forest growth, brush or abandoned farm lands reverting to forests.

The census of 1820 gave statistics for Windsor County as follows:—

“Value of articles manufactured from white pine and hemlock, \$3,200.00.

“The quantity of sawn material consumed was 1200 logs and 500,000 board feet valued at \$3,300.00.”

From Twelfth Vermont Agricultural Report by the State Board of Agriculture for the Years 1891-92:

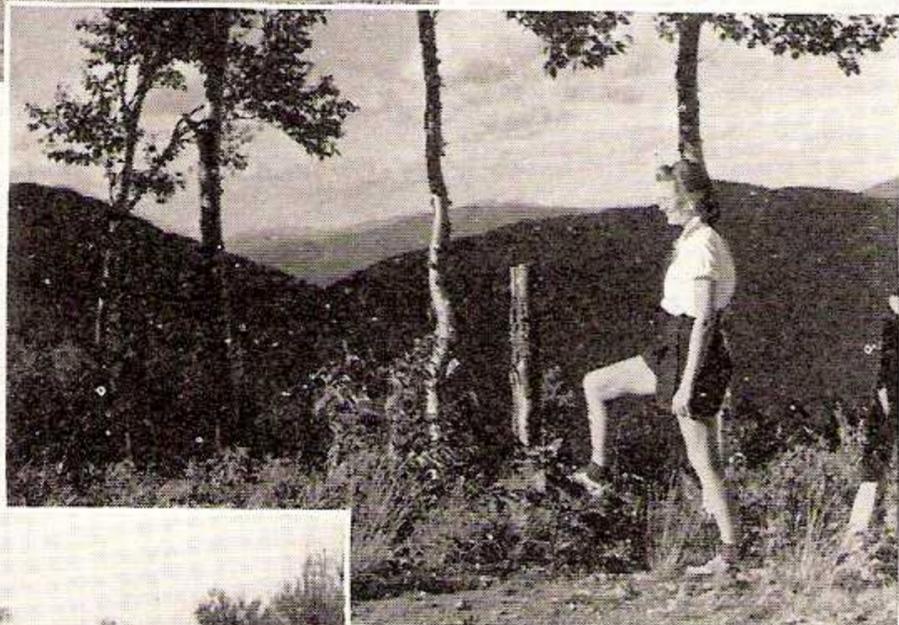
“Northern Essex county has very few abandoned farms, because she has few to abandon. If the forests of this country had been properly handled in the last forty years, that is, only mature timber cut, the small growth saved, and the fire kept out, there would have been nearly as much timber here now as then, and the land instead of being worth from one to three dollars per acre, would be worth from ten to twenty. The practice has been indiscriminate slaughter. This has left the timber an easy prey to the fire, which has proved to be a greater enemy to the forests than the axe. The principal causes of fire are first, railroad trains; second, new settlers; third, hunters and sportsmen, a class of men for whom I have little love or respect. The railroad fires have been most destructive in this County, having burned over thousands of acres. In very few instances have the railroad companies paid any damages. They will not pay unless forced to do so, and few men have the courage or means to compel them to pay. After the fire has gone over the land once, it is likely to run again and again, as no care is taken to prevent it. I have in mind a lot of land from which the timber was cut thirty-five years ago. The next year a fire went over it. It came up to red cherry and poplar as is invariably the case here. Last year the poplar was cut and sold for pulp making, leaving a good growth of small pines, spruce, hemlock and birch, showing what nature will do when left to herself. I call to mind another lot of land from which the mature timber, both hard and soft, was properly cut twenty-five years ago. The fire was kept out. Last year it was cut again, and fully eight thousand feet of good spruce lumber was cut to the acre. In twenty-five years more a similar crop can be cut. The practice has been for lumbermen to sell lots to settlers at from two to four dollars per acre, usually on time, or for very little cash down. Then begins the clearing. The settler's fires frequently run beyond his lot, and often burn more in value of the lumberman's standing timber than the lot was sold for. As a rule, these settlers have not succeeded. After three, five, sometimes ten years, with small crops, hard work and poor fare, they have abandoned their places to the men holding the mortgage, which is often largely swollen by store bills. I have a case in point. A man bought one hundred and fifty acres of land within one mile of the railroad. The large spruce timber had been cut; there was left of small timber and other growth, twenty to thirty cords of wood to the acre: this wood was worth three dollars per cord on the railroad



Bath-house ~ Sand Bar State Forest Park



Picnicking ~
Calvin Coolidge
State Forest



Hiking
Mt. Mansfield
State Forest



Camping ~
Ascutney State Forest Park

FORESTS SERVE AS RECREATIONAL AREAS

line. This man worked hard for ten years to cut his wood; he cleared one hundred and twenty-five acres, built poor buildings, and then turned it over on a mortgage, owing seventeen hundred dollars. An adjoining lot of one hundred and fifty acres was similarly situated. The owner contracted the cutting and drawing of the wood to the railroad, realizing over twelve hundred dollars from the stumpage. This he did not fool away in clearing the land. The settler's fire ran over the other lot. Both lots are now in the same pasture, but the lot that was not cleared is the best. All good woodchoppers are not good farmers, and this is one of the difficulties. A man who can do nothing else thinks he must have a farm."

The Joint Committee on Forestry of the U. S. Congress rendered a report as required by Senate Concurrent Resolution 31 of the Seventy-fifth Congress. Meetings and hearings were held in most all regions of the United States.

Their recommendations were as follows:

1. *Forest Fire Protection.* Extension and intensification of cooperative protection against fire on private and state-owned forest lands by increasing the authorization of the Clarke-McNary Act for this purpose from \$2,500,000 to \$10,000,000, increasing the present appropriation by \$2,500,000 annually until the total authorization has been reached, provided the respective States pass legislation providing for proper State, county, and district fire protection and regulations governing minimum forestry practices to be administered as approved by the Secretary of Agriculture.

The principles on which to base such legislation might well include:

(1) That State legislation and standards of enforcement shall be satisfactory to the Federal Government, with mandatory provisions that Federal financial assistance, in fire control and regulation, be withdrawn if enforcement proves unsatisfactory.

(2) The Federal Government shall have discretionary authority to withhold other forest cooperative funds in whole or in part from any State which, after the formative period, does not satisfactorily administer or cooperate in regulation.

(3) That full opportunity shall be assured to forest-land owners directly concerned to (a) participate along with representatives of public, agricultural, labor, and other interested groups through advisory boards, in formulating special requirements which shall be subject to approval by designated and responsible governmental agencies, (b) appeal through nongovernmental boards or other channels for review and reconsideration of such requirements.

(4) The States shall have the opportunity to administer regulations with a reasonable, but definite, period of perhaps from 3 to 5 years within which to pass State legislation and apply same.

(5) The authority of and administrative action by the Federal Government shall be exercised by or through the Secretary of Agriculture.

2. *Forest Insects and Diseases.* Extension of the Clarke-McNary Act to provide for cooperative protection against forest insects and diseases on private and State-owned forest lands.

3. *Reforestation of Private Forest Lands.* Extension of the Clarke-McNary Act to authorize the furnishing of tree seed and seedlings to all landowners, and authorization of such amounts as are necessary for this purpose.

4. *Forest Extension.* We recommend that the provisions of the Cooperative Farm Forestry Act, approved May 18, 1937, be continued and expanded, and that sufficient annual appropriations be made to carry out the purposes of the Cooperative Farm Forestry Act.

5. *Cooperative Sustained-Yield Units.* Legislation authorizing the establishment of cooperative sustained units to enable sustained-yield management of intermingled public and private holdings conditional upon management and woods practices approved by the Secretary of Agriculture.

6. *Forest Credits.* Provision for a forest credit system to make long-term, low interest rate loans to private forest and naval stores operators through facilities already available in such agencies as the Reconstruction Finance Corporation, the Farm Credit Administration, and the Federal Land bank. These loans should be conditional upon both sound forest practice and sound investment. A system of forest credits suited to the peculiar long-term nature of the forestry and naval stores business will be an aid to forest conservation.

7. *Farm Forest Cooperatives.* Legislation authorizing cooperation with the States in encouragement and development of farm forest cooperatives, including financial aid in building and operating forest industries and woodworking plants.

8. *Leases and Cooperative Agreements.* Legislation providing for leases and cooperative agreements with private forest land owners, communities, institutions and States.

The purpose of this recommended measure is to (a) furnish technical experience in carrying out proper forestry practices, (b) overcome a serious financial handicap, (c) help this class of citizen to operate on a cooperative basis, (d) provide urgently needed employment, particularly in times of economic stress, and at the same time (e) afford an additional means of building up and managing deteriorated forests. Such a plan would provide sufficient flexibility for expanding the work program in times of unemployment and contracting it at other times.

9. *Forest Products and Forest Management Research.* Extension and intensification of forest products research and forest management research at the United States forest products laboratory and the United States forest experiment stations, provided that provision be made by the Secretary of Agriculture to get the results of forestry research to the public at large. Existing State agencies, agriculture colleges, and the public schools should be used where possible to accomplish this recommendation.

10. *State Forest Acquisition Act of 1935.* Amend the State Forest Acquisition Act of 1935, making it applicable to institutions, communities, and subdivisions of the State. Increasing the authorization to \$10,000,000 to be appropriated annually at an increased rate of \$2,500,000.

11. *Federal Forest Land Acquisition.* Federal forest land acquisition in our national forests should continue at its present rate and when possible should be accelerated. In purchasing such land particular emphasis should be placed on blocking up present scattered areas of forest land in national forests before additional national forests are established. We recommend the appropriation of additional funds annually for acquisition purposes in national forests in order to carry out this recommendation.

12. *Financial Tax Contribution to Local Government.* Legislation authorizing an equitable system of financial contribution to local government in lieu of taxes on forest land removed from the tax rolls through Federal acquisition.

There is a serious need for a general Government policy for cash contribution in lieu of taxes to counties containing Federally owned forest lands.

13. *National Forest Protection.* Provision for more adequate protection against fire, insects, and diseases on National forests.

14. *National Forest Management.* More intensified management of timber, forage, wildlife, recreation, and watershed resources on National Forests.

15. *Forest Survey.* Amendment to section 9 of the McSweeney-McNary forest research Act of 1928 to authorize an annual authorization of \$750,000 for early completion of the forest survey of the United States.

16. *Pulpwood Investigation.* To investigate the apparent monopolistic purchasing of pulpwood by pulp and paper mills under a contract purchase system from farmers and other owners, price fixing of paper and other pulp products under trade practice rules and regulations, including cost of distribution.

State Forester

The first state forest commissioner, Ernest Hitchcock of Pittsford first reported in 1906. Arthur M. Vaughan of Randolph was forest commissioner in 1907 and 1908. By the Acts of 1908 the office of state forester was established and on April 1, 1909 Austin F. Hawes became the first state forester. Under the Acts of 1917 the Commissioner of Agriculture became state forester by virtue of his office and he was authorized to appoint a deputy who shall be known as chief forester. W. G. Hastings was appointed chief forester in August 1917.

The legislature of 1923 enacted a law creating a forest service and in this service a commissioner of forestry, who had all the rights, powers and duties formerly vested by law in the state forester, (Commissioner

of Agriculture). Mr. Hastings resigned on September 25, 1923 and Robert M. Ross was appointed on February 4, 1924 and resigned on November 30, 1929. Perry H. Merrill was promoted to State Forester on December 1, 1929.

The legislature of 1935 established a department of conservation and development in which there was a forest service. The board of conservation and development was comprised of three persons. The department included a Forest Service, Fish and Game Service, Publicity Service and the State Geologist. The title of state forester was again adopted.

In 1943 the legislature established a department of natural resources under the direction of a five man state conservation board. The department included the same divisions as the Department of Conservation and Development.

The legislature of 1947 set up a separate Forest Service with a state board of forests and forest parks of three members. The state forester is executive secretary of the board.

Taxation

Up to 1947 there were two laws in regard to optional classification and taxation of timberlands. As a result of the recommendations made, by an interim commission to study forest taxation as authorized by the 1945 legislature, these laws were repealed. So now all private forest lands come under the general land tax laws.

Some of the conclusions of this committee are:—

“Lands which are uneconomical in private ownership should be acquired by the towns under the municipal forest act passed by the last legislature. One town is already using this act to acquire an isolated section in which the cost of road maintenance and school transportation far exceeds the tax revenue.

“Extra large holdings which are uneconomical in private ownership should be put into state forests. Example of such areas are high altitude tracts which have a slow rate of growth or areas which have been denuded by severe forest fires.

“Without facts we cannot have just taxation. This study is at least a beginning and the compilation of facts which should lead to a fairer and more just taxation base for our Vermont timberlands.

“The fact has shown up, as mentioned earlier in the report, that definite inequalities of appraisals of timberland are present. Inasmuch as this condition exists where the lists have acreage figures available, it raises the question of appraisals in towns where acreage figures are incomplete or entirely lacking. The conclusion that more inequalities would exist in the latter group of towns seems entirely logical.

“Forest land is no more often overtaxed than is any other type of real property. The difficulty in some cases seems to be unfair appraisal.

There is a great variation in the tax per acre that is levied on forest land. Take three adjoining towns in Washington county as an example: Town A, taxes on the average 10 cents per acre; Town B, at 11 cents per acre; Town C at 20 cents per acre. In some towns valuations vary from 10% to 200% of normal value. Property valuations between towns vary in the same ratio.

"The taxation of timberland would appear to be on the average well within reasonable limits. This can be deduced from (1) the disinclination of large timberland owners to sell their holdings or even those portions of their holdings which are cut over. (2) The very small amount of land that has been taken over by the towns for delinquent taxes.

"It is interesting to note that it is almost as much a habit of people to complain about their taxation as to talk about the weather. It is also interesting to note that when a complainer is pinned down, he rarely has the figures to show either the expenses or the income on the property. An attempt was made to get actual case histories of timberlots which covered a period long enough to give a true picture but such records were almost non-existent."

Reforestation

Some of the earliest plantings were made in 1880 on the Billings Estate in Woodstock. Not until 1906 did the state have a law establishing a state nursery to furnish seedlings to landowners for reforestation. In the spring of 1907 the state distributed 30,000 white pine and 5,000 black locusts. Since that date over 31,000,000 trees have been planted on idle acres in Vermont.

Why Plant Trees—

The chief reasons for planting trees are economic ones—planting trees pays. Idle land is a liability; with forests, an asset. Forests are the source of lumber, pulpwood, and other necessities which thru long years of use have become an integral part of civilization. Around the process of harvesting and converting the products of the forest into everything from cradles to coffins is built an enormous business which gives employment to thousands of people, and ramifies thru our whole national life. Then, forests aid in the control of waters. They help to stabilize river flow and to lessen flood dangers. They prevent soil erosion and the consequent loss of soil fertility and silting-in of reservoirs. Forests are the finest recreation centers. With the steady flow of population to the cities, together with the ever-quickening pace of modern life, the need for and value of recreation increases yearly. Forests are the natural home of fish, game, and wild fowl. Forests are beauty; without them Vermont would be a desert. FORESTS ARE WEALTH and every intelligent effort to add to them by planting new forests *on land unsuitable for other purposes* will have a beneficial effect upon our health, wealth, and happiness.

Where to Plant Trees—

Trees should be planted on lands which because of their location, physical characteristics, or of the owner's desire, are more adapted to the growing of tree crops than to other uses. In this class are abandoned pastures and mowings, areas devastated by fire, openings in established forests, and other non-utilized land areas. *It is not advocated that trees be planted on profitable farm or pasture land nor upon forest lands, recently cut-over, or on "brush" lands where young growth is coming in naturally.*

What Trees to Plant—

Species. Choice of species is limited to a few which thrive in Vermont. These may be planted either in "pure" stands, composed of but one species, or in mixtures composed of several species. Mixed stands are more difficult to establish than are pure stands, but from the standpoint of the forest to be grown, have many advantages. Mixtures should be by groups, *not by alternate rows*. The following species are recommended for the various kinds of land:

- (1) On abandoned pastures and mowing: white spruce, red pine, Norway spruce, red spruce, larch.
- (2) On burns: white pine,* white spruce, red pine, Norway spruce, red spruce, larch, white ash (if ash was present in the previous stand).
- (3) Openings in established forests: White spruce, white pine,* larch, white ash.
- (4) Other non-utilized lands: pines on light soils; spruce and larch on heavier soils; white cedar on poorly drained sites.

**Note on White Pine:* Due to the susceptibility of this species to injury or death from many agencies, extreme caution should be exercised in its use. Under no conditions should it be planted in pure stands on open land. It should not be planted on cut-over lands from which white pine was cut until the third season after cutting. Wherever planted, all of the currant and gooseberry bushes, both wild and cultivated, should be removed from within the planted area and from all of the territory within 900 feet of the plantation boundaries before June 1 following planting. The best results will be obtained by growing it in mixtures with hardwoods.

Size of Trees. Trees are grown in the nursery, first in seed beds, and then in transplant rows. Whether seedling or transplant stock should be used depends upon conditions of cover. Two or three year old seedlings may be used where competing vegetation is sparse or absent. Where there is a heavy sod or dense growth of bushes, transplanted stock should be used. If in doubt, use transplants.

Number of Trees. Trees are usually planted over an area at regular intervals. All things considered, a practical spacing is from 6 to 8 feet apart in rows spaced the same distance. With a 6 x 6 spacing, 1210 trees per acre are required; with an 8 x 8 spacing, 680. To aid in protecting the plantation from fire and to make it easier to inspect and improve

later, roadways should be left thru the area at intervals so as to divide the area into blocks of from 10 to 20 acres. See your County Forester and get his opinion.

When to Plant Trees—

Spring. Trees should be planted in the spring as soon as possible after the frost is out of the ground. This time varies from April 1 to 15, depending upon elevation and season. Planting may be continued until the buds open. IN GENERAL THE EARLIER THE PLANTING, THE MORE SUCCESSFUL IT WILL BE. Larch, in particular, should be planted early.

Fall. After growth has ceased in the fall, usually after the first good rains in September, plantations may be made. If properly made, there is no good reason why fall plantations should not succeed. Due to danger of heaving, especial care should be used with small stock and heavy soils.

How to Plant Trees—

Care of stock upon arrival and prior to planting. Before the trees leave the nursery, the planter is notified so that he may be watching for the shipment. Immediately upon their arrival, the trees should be called for, taken as near the planting area as possible, removed from the shipping package, and "heeled-in." "Heeling-in" consists of digging a small, V-shaped trench in a moist, shaded spot, as deep as the tree roots are long, spreading the trees in a thin layer along one wall, and covering the roots with SOIL. Trees cared for in this manner may be held for two weeks without damage. Care should be taken to keep the trees moist. On large areas, trees should be "heeled-in" in a number of conveniently located areas.

Care of stock during planting. The chief care to be taken during planting operations is to *prevent the drying out of the roots*. The fine rootlets of the young trees are extremely delicate, and may be seriously injured by a few minutes exposure to the hot sun, or drying wind. Roots should be kept covered and moist. During planting operations trees may be transported around the planting area in ordinary pails with several inches of water in the bottom. They should not be allowed to lie on the surface of the ground while a hole is being dug.

Preparation of ground. No preparation of the ground, such as plowing or harrowing, is necessary. The removal of competing vegetation is the only preliminary measure required. Scattered large trees should be girdled and alder and other brush should be cut back. The sod, litter, or other ground cover should be removed so that the roots of the trees may be firmly set in mineral soil. This latter operation may be and usually is accomplished as part of the planting operation. One or two swings of the mattock will clear away approximately a square foot in which to set the tree. On large areas which are reasonably smooth, this operation may be performed by plowing shallow trenches (3 or 4 inches

deep) at regular intervals across the area. Trees are then set in these furrows. The sod should NOT be placed back in the furrow.

Tools. For the average planter, the handiest and most efficient tool is the mattock or grub hoe. These may be used under practically any conditions. On light, unsodded areas, an ordinary garden spade may be used to advantage. For the planter of large areas, a number of tools are available, each of which has its particular advantage under certain conditions. The choice of tools on large jobs should be varied with the cover, stock, and soil conditions in order to utilize the labor efficiently.

Setting trees. Competing vegetation is removed by a plow prior to planting, or by the workman as a part of the planting operation. A hole is then made in the soil just large enough to receive the roots without "cramping" them. The roots are inserted in the hole, spread out, and firmly tamped with the heel. The tree should be upright, and planted to the same depth at which it grew in the nursery. This depth is indicated by a ring of light bark around the tree at ground level, called the root collar. A test of proper planting is to give each tree a slight tug after setting. If the tree pulls up, it is not properly set. Failure to set the tree firmly and at the right depth usually results in death or stunting. **THE IMPORTANCE OF PLANTING AT THE PROPER DEPTH CANNOT BE OVEREMPHASIZED.** Actual planting technique varies with the individual. A common practice is to drive the mattock blade perpendicularly into the ground, press the handle to the ground, twist it to the one side, insert the tree in the opening between the mattock and the soil, remove the mattock with one hand while holding the tree with the other, and tamp with the heel.

Organization of crew. The organization of crew will vary with the size of the job and with the individual. A common method is to work in units of four men. Three men use mattocks and plant trees while the fourth carries trees, passes them to the planters when the hole is dug, and keeps the crew in line. Another method is to work in units of two men, one man making the hole, and the other carrying trees and planting them. This method is particularly applicable when special planting tools are used. Still another variation is for each man to carry and plant his own trees.

Cost of planting. Planting costs include cost of stock and cost of labor and supervision. Trees for planting may be obtained from the State Nursery at the cost of production, F.O.B. Essex Junction, Vermont. To this cost, must be added transportation charges from these points to the planting area. Labor cost will vary with the conditions on the area (soil, cover, etc.), with the size of the stock, and with the experience of the crew. With labor at \$3 per day, the cost of planting, exclusive of stock, will vary from \$3 to \$6 per thousand trees planted, which is to say that one man will set from 500 to 1000 trees per day. Since the more trees a man sets per day, the lower the cost, there is a tendency on the part of many planters to speed up the process, and instill in the workmen the false (and often costly) idea that the goal is to set as many trees as possible per day, instead of the true idea that the purpose of planting trees is to set them in such a manner that they

will not only live, but will grow as fast as possible under the conditions. A dead tree in a plantation represents a total loss, not only of labor but also of stock.

Care of plantation. Like all other crops, forest crops need proper and timely care to produce the greatest harvest in the shortest time. Plantations should be fenced to exclude cattle. The forest must be protected from various injurious agencies—fire, insects, disease; it must be kept free from damaging weeds just as a garden must be; it must be thinned to maintain health and vigor and pruned to improve quality of product. Once a plantation is established, the owner should arrange for periodic inspections to determine the condition and need of treatment. The Vermont Forest Service will gladly cooperate with the owners with regard to proper care of plantations, and will furnish, upon application, literature dealing with the various aspects of forest protection and cultivation. The State Forest Service also maintains a County Forester who will consult with you on request.

Municipal Forests

There is hardly a city, village or town in Vermont but what has hundreds of acres of non-agricultural land that is producing little of value. These are the areas which should be set to work by reforestation. There are also areas which already have a second growth of forest trees, but in order to have these tracts produce the more valuable kinds of timber wise forest management is needed.

Individuals in Vermont are, each year, taking more interest in making their idle forest lands prove an asset rather than a liability. However, in order to bring the 4,000,000 acres of forest land in Vermont to a high state of productivity the state, cities and towns, villages and corporations must assist.

It requires several decades for trees to grow to sizes sufficiently large to produce good lumber. Therefore, the state and municipal governments which will continue indefinitely, are better able to hold and properly manage forest lands over the long period of years required to produce the better grades of lumber. The forest land of the individual will, in most cases, be managed with a view to more immediate returns and, therefore, the better grades of timber will not be grown on these areas.

A good start has been made by some of the cities and towns of Vermont in acquiring forest lands. However, when we consider that there are over three hundred cities, towns and villages in the state, there is plenty of opportunity for increasing the number of such municipally owned forests.

Municipal Forests

<i>Municipality</i>	<i>Acres Owned</i>	<i>Municipality</i>	<i>Acres Owned</i>
Arlington	115	Berkshire	100
Barre	460	Berlin	375
Bellows Falls	400	Bethel	150
Bennington	80	Brattleboro	120

Cabot	40	North Troy	103
Calais	168	Proctor	112
Castleton	13	Reading	383
Cavendish	400	Rochester	150
Chelsea	324	Roxbury	10
Chester	548	Royalton	40
Craftsbury	70	Rutland	4000
Danville	15	St. Albans	56
Enosburg Falls	4	St. Johnsbury Town	250
Essex Junction	752	St. Johnsbury Village	75
Fair Haven	100	Sheffield	140
Fayston	27	Springfield	44
Glover	122	Stowe	100
Grafton	100	Strafford	165
Granville	79	Swanton	12
Hardwick	50	Thetford	75
Highgate	2	Townshend	75
Hinesburg	300	Vergennes	900
Johnson Town	12	Vernon	60
Johnson Village	40	Washington	100
Lyndon	10	Waterbury	403
Lyndonville	100	Wallingford	100
Middlebury	170	Wilmington	287
Montpelier	1347	Windsor Village	20
Morgan	200	Windsor Town	100
Morristown	213	Woodstock	90
Newbury	4	Worcester	200
Newport	10		
Northfield	500		15,570

The City of Montpelier, under the administration of Mayor S. S. Ballard, started reforestation in 1912, and since then has planted 352,500 trees on the lands of the watershed in Berlin. The Village of Essex Junction owns a tract of 700 acres and under the leadership of Allen Martin and W. F. Chapin 574,425 trees have been planted. In most cases the trees planted furnish excellent examples of what can be done by making a small initial expenditure in forest planting.

How to Establish a City, Town or Community Forest

There is little doubt but that future generations will receive more benefits from municipal forests than the present generation. Therefore, in order for a city, town or community to establish a forest there first must be one or more persons or organizations interested in the future welfare of the community. Organizations such as Rotary, Kiwanis and Exchange Clubs might well take the lead in securing the establishment of municipal forests. Also civic organizations and Women's Clubs could do much in arousing local interest. Sections 4597, 4598 and 4599 of the General Laws of Vermont provide for the purchase and management of municipal forests. The State Forest Service will send a representative to towns interested in establishing forests and also give advice in forest planting and management to those municipalities which already own forests. One half the purchase price of municipal forest land up to \$600 in a biennial period will be paid by the state after the suitability of the land is approved by the state forester. Any portion of the \$600 not required for the purchase of land may be used by the municipality in reforestation of the land. The money obtained from the state is to be repaid

from the sale of forest products from the municipal forest. Trees for reforestation may be secured from the state forest tree nursery at a cost of a little over one-half cent each.

Other suggestions for help in creating a municipal forest are:

1. Have a committee of representative citizens investigate the possibilities of a town forest and put an article in the town warrant providing an appropriation for the purchase of the lands recommended by the committee or authorizing the sale of bonds for the purpose.

2. Have an organization like the Chamber of Commerce, the Women's Club, the Village Improvement Association, the Boy Scouts and Girl Scouts or any other civic organization take the lead or cooperate in presenting the matter to the voters at the town meeting.

3. Have any one or a group of the organizations raise the money for acquisition by public subscription, buy the land and present it to the town for a town forest.

4. Have the water supply area converted into a town forest.

5. Make the forest land of the Poor Farm into a town forest.

6. Have the committee solicit gifts of land for the purpose.

7. Urge some individual to make a gift of a memorial forest.

8. Create a forest as a memorial to the soldiers of the town who served in the War.

9. As a means of raising money ask individuals and business firms to subscribe enough money to pay for one or more acres of the land to be bought.

Value of Municipal Forests

Municipal forests have not been established long enough in this country for us to state definitely what such forests will yield in timber or financial returns. We can, however, see what have been the results of such forests in European countries where municipal forests have been established several hundred years. Some of these forests yield annually as high as \$12.00 net profit per acre and many yield \$6.00 profit per acre. Of course, intensive forest practice and close utilization is the general rule in Europe and it will be several decades before American conditions are such that we may expect as large financial returns. However, with a timber shortage confronting this country the value of forest products will rise rapidly and we might expect an annual net profit per acre of from \$3.00 to \$4.00 in a few decades. Such a yearly revenue would be of great assistance to towns in the maintenance of schools, roads and other municipal enterprises.

Not only are such forests of value from the timber producing standpoint, but they will furnish many indirect benefits. Labor will be furnished employment, especially during the winter months. Permanent local wood using industries can be established in or near such forests. Watersheds will be protected, which is of great importance in connection with pure water for municipalities. These forests will also furnish excellent recreational areas, especially those established near our cities and villages.

State Forests

State Forests were legalized under the Acts of 1908. In the fall of 1909 the State Board of Agriculture and Forestry purchased the first state forest of 450 acres in Plainfield. This area was called the L. R. Jones state forest after the late Professor L. R. Jones, one of the early forestry supporters in Vermont. Today there are twenty-four state forests with a total area of 68,936 acres.

List of State Forests

Name	Town Located	Date Established	Acres	
			Gift	Purchase
Aiken	Mendon	1912	....	800
Arlington	Arlington	1913	....	225
Camel's Hump	Duxbury, Fayston, Huntington, Starksboro, Waitsfield	1911	1,284 ²	6,095
Cambridge	Cambridge	1944	....	25
Coolidge	Bridgewater, Plymouth, Reading, Shrewsbury, Woodstock, Sher- burne	1925	324 ⁹	6,444
Downer	Sharon	1910	800 ³	....
Grafton	Grafton	1931	....	240
Groton	Groton, Marshfield, Peacham	1919	....	15,300
Hapgood	Peru	1910	100 ⁴	....
L. R. Jones	Plainfield	1909	....	600
Lyndon	Lyndon	1912	....	75
Maidstone	Maidstone	1938	....	450
Mathewson	Wheelock	1934	328 ⁸	....
Mt. Mansfield	Stowe, Underhill, Waterbury, Bolton, Cambridge, Morristown	1914	....	20,944
Okemo	Ludlow, Mt. Holly	1935	....	4,117
Proctor-Piper	Cavendish	1914	724 ⁵	763
Putnam	Worcester, Elmore	1914	1,400 ⁶	645
Roxbury	Roxbury, Warren	1930	....	4,185
Thetford Hill	Thetford	1931	260 ⁷	....
Townshend	Townshend	1912	....	700
Washington	Washington	1929	....	328
West Rutland	West Rutland	1913	....	350
Willoughby	Sutton, Westmore	1928	55 ¹⁰	1,350
Williams River	Chester	1931	....	125
The names of the donors are as follows:			5,175	63,761

² Joseph Battell

³ Charles Downer

⁴ M. H. Hapgood

⁵ Redfield Proctor (424) Leon S. Gay (300)

⁶ C. C. Putnam & Sons

⁷ Dwight Goddard

⁸ Ozias Mathewson

⁹ Mortimer R. Proctor

¹⁰ Town of Newark

Value of State Forests

Money appropriated for the purchase of State Forests is an asset rather than an expenditure. There are many benefits to be derived from State Forests some of which are as follows:

1. Private forestry practice is stimulated by example. Adjacent to State Forests many landowners are reforesting their idle land, weeding and thinning out their natural growth.

2. In Vermont there are thousands of acres of land which are producing little of value. State Forests provide a means of setting these lands to work by reforestation and proper forestry practice. There are approximately 4000 acres of plantations which have been made on State Forest areas.

3. The State can afford to wait longer for a crop of timber than the individual. Large State Forests will insure a future timber supply of large timber and create a continuous supply of raw material for permanent wood-using industries. Winter work will be furnished to many people.

4. Large State forests will have an important effect upon erosion and stream flow.

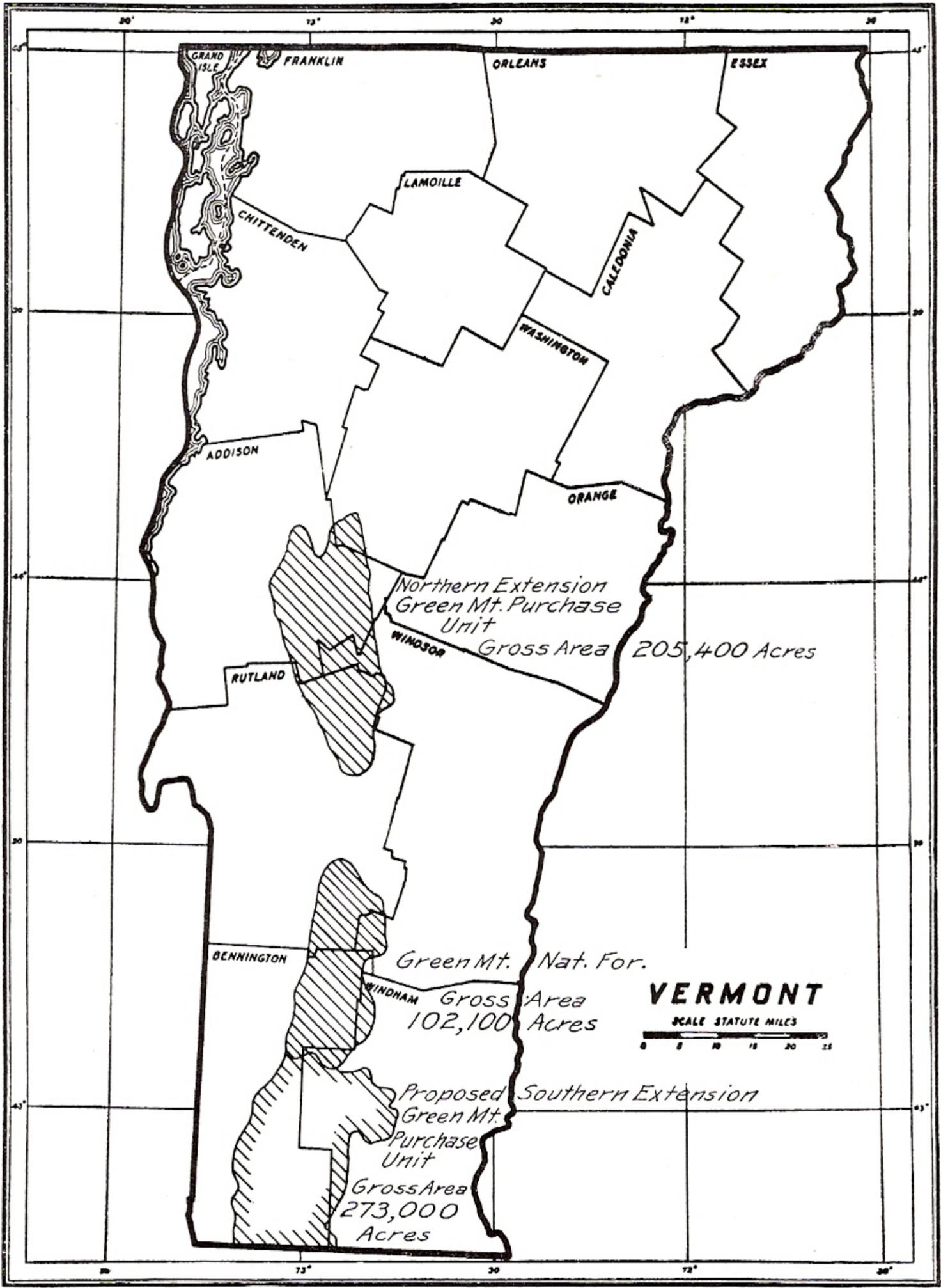
5. The State Forests also serve as recreational areas. There are many scenic areas along highways and about waterfalls which can be kept beautiful if acquired by the State either by gift or purchase. State forests provide public recreational areas, public hunting grounds and where feasible, sections should be set apart for game refuges.

Green Mountain National Forest

The purchase of lands for the Green Mountain National Forest is authorized under No. 1 of the Acts of 1925 which as later amended reads as follows:

"The consent of the state of Vermont is hereby given to the acquisition by the United States, by purchase, gift or condemnation with adequate compensation, of such lands in Vermont, as a board consisting of the governor, lieutenant governor, attorney general, commissioner of agriculture and state forester shall first approve of in the following towns: Bristol, Lincoln, Warren, Ripton, Granville, Hancock, Rochester, Pittsfield, Chittenden, Goshen, Middlebury, Salisbury, Leicester, Brandon, Mendon, Stockbridge, Winhall, Londonderry, Peru, Dorset, Danby, Landgrove, Weston, Wallingford, Mt. Holly, Mt. Tabor, Stratton, Somerset, Wardsboro, Dover, Wilmington, Whitingham, Readsboro, Searsburg, Sunderland, Glas-tenbury, Manchester, Woodford, Stamford, Jamaica, Bennington, Pownal, Shaftsbury, Arlington, Sherburne, and which in the opinion of the federal government may be needed for the establishment, consolidation and extension of national forests in the state. Said board shall approve areas within stated boundaries in said towns and not individual or separate tracts therein. Said board shall act only after it has the written approval of the selectmen of the town or supervisors of an unorganized town or gore within which such land, or a part thereof is located.

"The United States shall have jurisdiction to make and enforce such laws, rules and regulations as the United States shall deem necessary for the administration, protection and management of such national forests.



GREEN MTN. NATIONAL FOREST PURCHASE UNITS

“In all other respects, the jurisdiction over persons and property within such territory shall not be affected nor changed by reason of such acquisition of title to such lands by the United States.”

The gross area within these towns is approximately 580,000 acres of which 485,000 acres are considered purchasable and desirable for National Forest purposes. Purchases to July 1, 1947 aggregate 168,138 acres. For efficiency of administration the area has been divided into the northern, the central and southern ranger districts.

The land purchased is located in the following towns and counties:

<i>Addison County</i>		<i>Acres</i>	<i>Rutland County</i>		<i>Acres</i>
Bristol	4,648		Brandon	89	
Goshen	2,982		Chittenden	15,986	
Granville	12,697		Mt. Holly	2,531	
Hancock	12,189		Mt. Tabor	23,769	
Leicester	714		Pittsfield	2,290	
Lincoln	9,032		Wallingford	7,127	
Middlebury	2,427				
Ripton	16,535				51,792
Salisbury	2,576				
	<hr/>				
	63,800		<i>Washington County</i>		<i>Acres</i>
			Warren	3,027	
<i>Bennington County</i>		<i>Acres</i>	<i>Windham County</i>		<i>Acres</i>
Dorset	1,450		Londonderry	257	
Landgrove	591		<i>Windsor County</i>		<i>Acres</i>
Peru	16,944		Rochester	10,216	
Winhall	3,722		Stockbridge	158	
Sunderland	7,365		Weston	8,816	
	<hr/>				
	30,072				19,190

Under the acts of congress twenty-five percent of the gross receipts from the National Forest are paid back to the state and redistributed to the towns in proportion to the acreage of national forest in the respective towns.

The first national forest land was acquired in January 1932. The receipts and payments from 1932 on have been as follows:

Receipts of Green Mountain National Forest

(First Land Acquired January 25, 1932)

<i>As of June 30</i>	<i>Acres Purchased</i>	<i>Fiscal Year Receipts</i>	<i>Share of National Forest Towns</i>	<i>To Towns Per Acre</i>
1932	1,842	\$ 6	\$ 2	
1933	31,381	338	84	
1934	31,381	4,531	1,133	3.6c
1935	58,453	4,944	1,236	2.1c
1936	74,167	6,496	1,624	2.2c
1937	138,244	9,929	2,482	1.8c
1938	160,539	6,261	1,565	1.0c
1939	160,539	4,234	1,059	0.7c
1940	160,539	12,325	3,081	1.9c
1941	160,539	21,229	5,307	3.3c
1942	167,904	30,593	7,648	4.6c
1943	168,138	55,012	13,753	8.2c
1944	168,138	56,330	14,083	8.4c
1945	168,138	71,983	17,996	10.7c
1946	168,138	59,737	14,934	8.9c

During the period 1932 through 1940, the National Forest was being purchased, land was being surveyed and boundaries marked, roads being built and campgrounds, forest fire, wildlife and administrative improvements constructed. Commencing in 1941, additional timber was gradually put on the market and logging operators began to get acquainted with selective cutting methods. These operators have now found that they can afford to operate under conditions that assure another crop of timber in a few years. During Fiscal Year 1946, over 85% of the 12,500,000 board feet of timber sold was to previous purchasers of National Forest stumpage.

State Forest Parks

The legislature of 1921 established State Forest Parks. State Forest Parks are primarily for recreational use. There are twenty-one State Forest Parks with a combined area of 6,871 acres. In addition parts of several of the State Forests have been set aside for recreational use. Areas in the following State Forests are included; Coolidge, Grafton, Maidstone, Mt. Mansfield, Proctor-Piper, Thetford Hill, Townshend and Willoughby.

List of State Forest Parks

Name	Town Located	Date Established	Acres	
			Gift	Purchase
Ainsworth.....	Williamstown.....	1926	206 ¹⁴	226
Allis.....	Brookfield.....	1931	135 ¹	200
Ascutney.....	Windsor.....	1935	...	1,530
Bellevue Hill.....	St. Albans.....	1934	69 ²	...
Crystal Lake.....	Barton.....	1937	14 ¹¹	½
Darling.....	Burke, Kirby, Victory.....	1934	1,747 ³	...
Dutton Pines.....	Dummerston.....	1937	...	12
Elmore.....	Elmore.....	1936	30 ⁴	755
Gifford Woods.....	Sherburne.....	1931	12 ⁶	27
Granville.....	Granville.....	1927	900 ⁷	160
Hazen's Notch.....	Westfield.....	1934	60 ⁵	...
Hubbardton.....	Hubbardton.....	1937	...	40
Jamaica.....	Jamaica.....	1937	...	12*
Molly Stark.....	Wilmington.....	1940	100 ¹³	48
Mt. Philo.....	Charlotte.....	1924	160 ⁸	...
Monroe.....	Duxbury.....	1940	200 ¹⁶	...
Rood.....	Bethel.....	1938	21 ¹²	...
Sand Bar.....	Milton.....	1933	...	10
St. Albans Bay.....	St. Albans.....	1935	30 ⁹	15
Wilgus.....	Weathersfield.....	1931	129 ¹⁰	...
Branbury.....	Salisbury.....	1945	23 ¹⁵	...
The names of the donors are as follows:			3,836	3,035½

¹ Wallace L. Allis

² St. Albans Chamber of Commerce,
Hattie and Stewart Prindle

³ L. A. and Henry Darling

⁴ Citizens and Town of Elmore

⁵ Atlas Plywood Corp.

⁶ W. K. Barrows

⁷ Redfield Proctor

⁸ Mrs. Frances Humphreys

⁹ St. Albans Town and Chamber of Commerce

¹⁰ Col. Wm. J. Wilgus

¹¹ Barton Improvement Club, C. A. Nute,
F. R. Hastings

¹² S. E. Rood

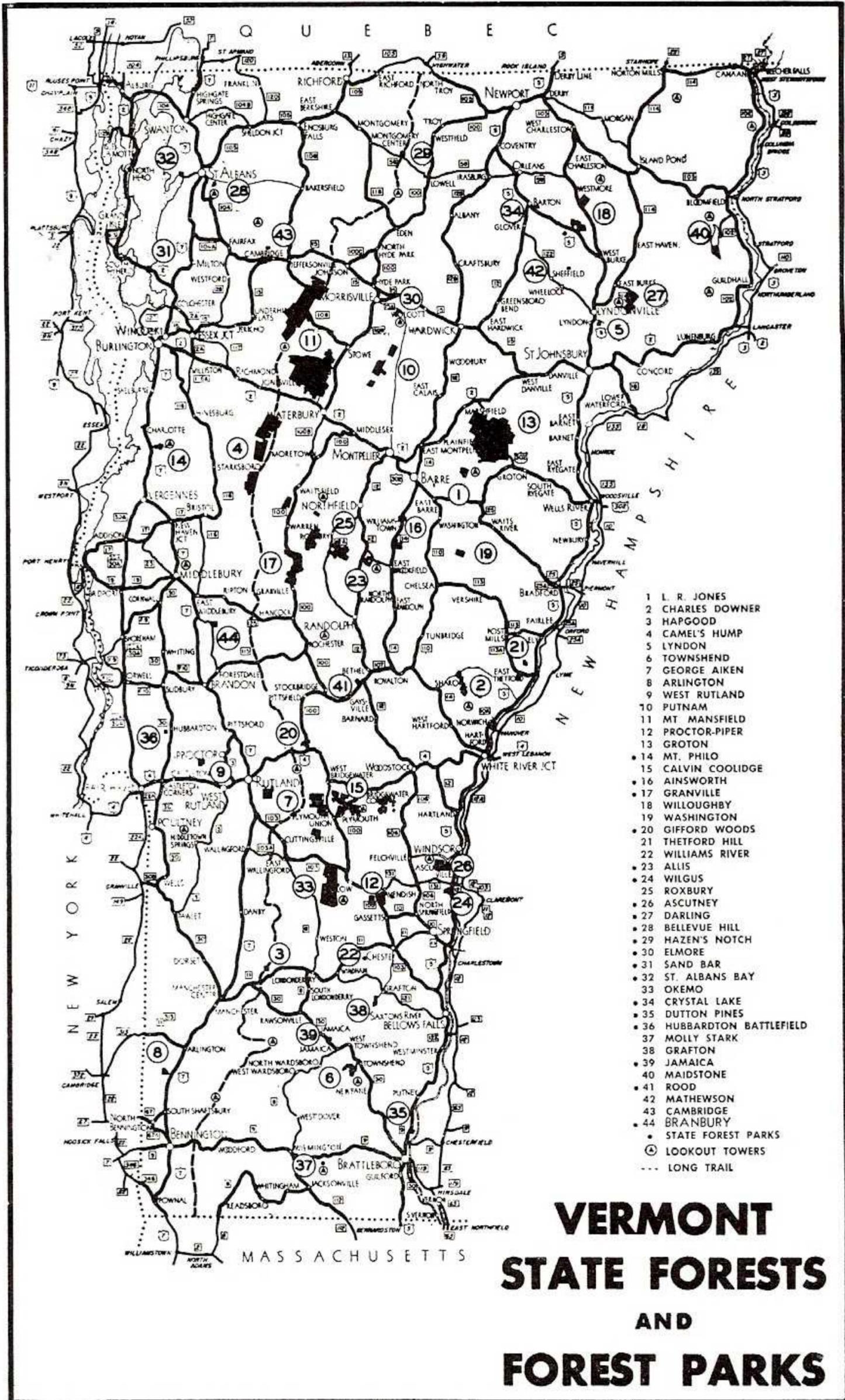
¹³ Citizens of Brattleboro and Wilmington

¹⁴ Miss Mary E. Waterman

¹⁵ Miss Shirley Farr

¹⁶ Will S. Monroe Est.

* Transfer by Governor under No. 23 of Acts of Special Session of 1936.



Administration

Vermont State Forest Parks and Forest Recreational areas are operated and maintained for the benefit and enjoyment of its citizens and vacationists from beyond its borders. Many of them are significant for their scenic attractions.

These areas offer to the public picnic sites, camping facilities including lean-to shelters, park shelters for group assemblies, bathing, fishing, hiking, hunting on the larger areas, and skiing. The areas are provided with good drinking water and modern toilet facilities.

Acquisition

Under Section 4567 of the Public Laws the State Forester, with the approval of the Governor, may accept gifts of land to the State, or may purchase land in the name of the State, the same to be developed and administered as State Forest Parks. State Forest Parks include those areas where the major use of the entire area is recreational.

Service and Maintenance

A service and maintenance fee of twenty-five cents per car of one to five persons is charged at all parks except Darling and Ascutney where the fee is fifty cents. These fees help meet the costs of labor and maintenance of the areas, fuelwood used, picnic tables and fireplaces. A charge for tent camping at fifty cents per night is made for each car of one to five persons. For lean-tos the charge is seventy-five cents per night. At bath houses a charge of ten cents per person for a locker is made.

White Pine Blister Rust Control

The White Pine forests of Vermont have always been a great asset to the State; a source of revenue to the owners and a foundation for some of the leading industries. In order to protect this valuable crop it has been necessary to conduct an organized campaign against an exotic disease which threatened to destroy it. At about the turn of the century, the Blister Rust was introduced into this country from Europe on imported white pine nursery stock. Some of this original infected stock was planted at various places in Vermont and from these sources, the disease has spread until we now find the damage scattered wherever we find the white pine growing in Vermont. The disease is caused by a parasitic fungus that lives alternately on white pines and *Ribes*. The term "*Ribes*" is used for brevity and means currant and gooseberry plants.

The blister rust spreads by means of wind-borne spores that are produced during the spring, summer, and fall. It enters white pines through the needles and grows into the bark, forming cankers. After the pines are infected, about 3 years elapse before the cankers become large enough to be easily recognized. The diseased bark is often swollen and gives the cankers a spindle-shaped appearance. Usually the cankered areas are surrounded by a yellowish discoloration of the bark. When

the cankers mature, blisters break through the diseased bark. These blisters are full of orange-yellow spores, called spring spores, which are most abundant in May. When the blisters break, the spores are scattered over large areas by the wind. The broken bark dies, but the fungus continues its growth in the live bark and produces new blisters each spring. The spring spores cannot spread the disease directly from one pine to another. They carry it only from infected white pines to Ribes leaves.

About three weeks after the infection of Ribes by the spring spores, small orange-yellow pustules appear on the under surface of the leaves. These pustules break open and liberate summer spores that spread the disease on Ribes from leaf to leaf and plant to plant. From late in June until the leaves drop, brownish hairlike outgrowths of the fungus appear on the under surface of the diseased leaves and produce fall spores that infect white pines. The fall spores are so delicate and short-lived that their infecting range is limited to short distances (seldom in excess of 900 feet) from diseased Ribes. This makes it possible to control the disease by destroying all Ribes in the vicinity of white pines.

White pine areas should be systematically cleared of Ribes. If these bushes occur in patches, they can be efficiently found and destroyed by one or two trained men. If scattered generally throughout an area, they can be most economically and effectively located and uprooted by a crew of three to six men supervised by an experienced foreman. Such a crew systematically examines all of the ground in parallel strips. The edge of each strip is marked with string or by dropping small pieces of paper, so that no portion of the ground will be overlooked or needlessly reworked. The bushes are uprooted by hand or, if firmly rooted, with a suitable grubber. Sprouting is prevented by carefully removing the crowns and large roots and by hanging the uprooted bushes in the crotches of trees or in other places, where they will not come in contact with the soil.

The initial destruction of Ribes on a white pine area will give protection to the trees for 5 years or more. However, some of the small Ribes may be overlooked; seeds in the soil may produce new plants; and sprouts may develop from improperly removed crowns. After several years of favorable growth conditions, these small plants and sprouts become a menace to the pines and should be systematically destroyed. Therefore, protected areas need to be periodically re-examined for Ribes. Five years can usually elapse before it is necessary to rework such areas. Unless delayed too long, reworking an area generally costs much less than the original working. One or two reworkings of an area are ordinarily sufficient to protect the pines to maturity. After cutting of the mature trees a new crop of Ribes will be started from seeds carried by birds. Thus the removal of Ribes is a continuing process with each new crop of pine.

Control in Vermont has been accomplished by a genial cooperative program which has included the State Forest Service, the United States Department of Agriculture, towns and individuals. While the major portion of the expense of the program has been borne by the federal and state governments the continued cooperation of towns and indi-

viduals is essential to the continued success of the program. In the past four years 37 towns have appropriated sums varying from \$100 to \$400 for carrying on the work in their towns. The total of such appropriations in the past four years has amounted to \$19,400. In addition individual pine owners have contributed \$1167 in the same period. This money is used to hire labor which works under the direction of trained men provided by the state and federal governments.

Under this cooperative program the pine areas of the State have been laid out and the currants and gooseberries have been eradicated from many of the control areas. Since 1918 over 711,000 acres have been worked and nearly 16 million currants and gooseberry plants have been removed. It will take several years longer before the control work is completed on the remaining 308,000 acres which have never been eradicated, but the results accomplished by the eradication of the currants and gooseberries are most encouraging.

The young growing stands of white pine can be protected from this disease at small cost and with the work carefully done under the direction of specialists from the Forestry Department there is every assurance that we can still consider white pine as one of our leading softwood species.

Insects and Diseases

Insects and diseases play an important part in the management of timber. Native insects and diseases in many cases seem to be increasingly destructive. This is probably due to the fact that the natural balance in the forests has been upset by our cutting and use of the forests. In addition we have a large number of pests which have been introduced from other parts of the world. These pests are often very destructive since they have no natural enemies to control them as they had in the countries from which they came.

Not all insects and fungus diseases are harmful and many of them are distinctly beneficial. Many insects prey upon other destructive insects and thus provide a natural control without which the destructive insects would increase in number indefinitely. Without the organisms which destroy wood our forests would soon become clogged with fallen trees and branches instead of returning to the soil for use by other trees.

Insects of various species increase in number at irregular intervals to the point of becoming extremely destructive. An outbreak of spruce budworm between 1910 and 1920 destroyed an estimated 15,000,000 cords of spruce and fir in New England. Between that time and 1940 the spruce budworm could be found throughout New England but their numbers have been so small that they caused almost no damage. At the present time the population of the spruce budworm is building up again in Maine, Canada and in New York with the probability that in time it will become a serious pest in Vermont again in the near future.

Insects and diseases affect trees from the seed to the time they become lumber. Some do their greatest damage when trees are young and others when the trees have reached old age.

Control of pests in our forests may be accomplished in a number of

ways. However, some methods are impractical because of their cost or the inaccessibility of the trees. Methods of controlling pests in shade trees are often of little value in our forests for this reason. Occasionally a pest is found for which there is no practical method of control. One such pest is the chestnut blight which has entirely removed the chestnut trees in the forests of Vermont. Whether the Dutch elm disease which is a disease carried by insects will fall in this category is still a question.

In general the best method of control of serious pests seems to be to keep our forests in good vigorous growing condition. Stands of a single species of tree seem to be more susceptible to damage than mixed stands. This is something which can be controlled in making plantations or in cutting existing stands of timber.

As a rule spraying is so expensive that it is not used to any extent. Dusting by airplanes has been used with considerable success in some cases to control insects. This method has been particularly successful with the use of DDT in the last few years.

Various specialized methods of control have been developed for specific pests. The removal of currant and gooseberry plants to control white pine blister rust is an example. A waiting period of three years before planting in cutover white pine areas has been found to reduce damage by Pales weevil. Such methods of control depend on special characteristics of the pest to be controlled.

Parasites of some insects provide an effective means of control. In some cases foreign insects have been controlled by introducing parasites from the original home of the insect. It has also been found that insects are often susceptible to bacterial diseases and when they become numerous conditions are favorable for the spread of such diseases among insects.

Without a combination of all these controls it is doubtful that we would be able to grow a crop of timber to maturity.

“Stages of Life. Insects of the higher type, including moths, butterflies, beetles and flies, pass through four regular stages of life—the egg, the larva, the pupa and the adult. The length of time spent in each of these stages varies with the kind of insect, as does the total length of life cycle.

“Eggs. Eggs are deposited by the adults upon or close to the food which the progeny are to eat. They may be laid singly or in groups, under protective matter or left bare; hence, conspicuous or exceedingly inconspicuous.

“Larva. The larva, which hatches from the egg, is the growing and, generally speaking, the destructive stage. In the case of the beetle it is called the grub, of the fly it is the maggot and of the moth or butterfly it is the caterpillar. And the caterpillar may be hairy and fuzzy, as is the general conception, or it may be smooth and slender and devoid of noticeable hair. In this connection, too, it should be pointed out that a caterpillar is not a worm, though that term has become attached to many moth larvae, such as the canker worm and the green-striped maple worm. A true worm is not an insect.

“Molting. A curious feature of the larval growth of insects is the

molting or changing of skin which is made necessary by the rapid growth of the creatures. Lacking bones, the structure of the larva is maintained by a glue-like matter called chitine which stiffens the skin. Naturally, the skin thus hardened can expand only to a certain limit and as the insect grows it has to cast off one old skin after another, at each change appearing in a fresh suit which has been developing underneath the old one. This process is called molting; and the number of molts varies according to the species. Four or five is the common number of many species. The period between molts is sometimes referred to as an instar.

• “*Pupa.* The pupa stage—represented by the chrysalis, in the case of the butterfly—is the outwardly inactive period of the insect’s life in which it is transforming from the larva to the adult. To casual observation a pupa usually presents slight appearance of being a living thing, though some are able to squirm about. In many cases pupae are formed within cocoons—sacks or cases woven by the larvae; many others are in earthen cells in the soil and still others simply lie in debris of various sorts. In the case of the flies—the diptera—the cocoon usually is formed of the last larval molt skin and is called the puparium.

“*Adult.* From the pupa comes the adult—sometimes called the imago. In most cases it is winged like the butterfly or beetle, and it is the perfect stage.

“In the cases of most of the insects with which we have to deal the adult is far less troublesome than is the larva. It appears to be the chief business of the adults to mate and deposit the eggs for the succeeding generation.

“*Metamorphosis.* The passage through these stages is called metamorphosis. Certain orders of insects have what is called incomplete metamorphosis. That is, there is no complete break between the larva or nymph, as it is called in this case, and the adult. The nymphs when they first hatch, bear a resemblance to the adults and gradually develop wings and other appendages. Grasshoppers are illustrative of this type as are also the true bugs such as squash bugs, bed bugs, etc. Though all insects are more or less flippantly called “bugs” only those of a certain group of the sucking type are entitled to the distinction.

“Certain lower species have but two real stages, for they produce living young instead of depositing eggs. Some of the scale insects are of this kind.

“*Chewing and Biting Insects.* Aside from the scientific classification and grouping of insects there is the practical division which puts the greater part of the nearly four hundred thousand known species of insects into one or the other of two groups; those which take their nourishment by biting out, chewing and swallowing pieces of their food and those which attain the same ends by sucking their food through tubes; thus, the chewing insects and the sucking insect. Knowledge as to the proper assignment of an insect within these two classes is of supreme importance in planning its control.”

The life history of a number of common Vermont insects is given in Bulletin No. 35 of the Vermont Department of Agriculture entitled "Important Tree Insects of Vermont" by Harold L. Bailey.

Tree diseases may be divided into three categories. (1) Those caused by conditions under which the tree lives such as high elevations, cold temperature, or improper light conditions (2) Virus diseases due to a virus transmitted from one plant to another. (3) The growth of parasites such as the molds and fungi. This third class includes most of the common tree diseases and are caused by separate organisms which live as parasites of the tree. The molds and wilts are usually found on leaves or the tender tissues of very young trees. Wilts of seedlings are a serious cause of the loss of young stock in tree nurseries. The fungi grow in both living trees and in dead or decomposing remains of trees. Fortunately most fungi are in the latter category.

Fungi have two general stages in their life cycle. In the vegetative stage they consist of a fine hairlike growth in the structure of the tree. After becoming well established they produce fruiting bodies some of which are similar to toad stools or the familiar "conks" so often seen on trees or dead wood. These fruiting bodies produce tiny fruiting bodies or spores which carry the organism to other trees. As a rule the spores enter the tree thru open wounds or dead branches.

Federal Legislation Affecting Forestry in Vermont

A. STATE FORESTS

THE FULMER ACT was approved August 29, 1935. The Act authorizes an appropriation of \$5,000,000.00 to acquire lands for state forests under certain conditions.

- a. Each state must have satisfactory tax delinquent laws.
- b. The state shall provide for the employment of a state forester who shall be a trained forester of recognized standing.
- c. All purchases must be approved by the National Reservation Commission.
- d. The state shall manage the forests under approved plans and pay all costs therefor.
- e. One-half the gross proceeds from such lands shall be paid by the state to the Federal government until the purchase price of such lands is completed. Then full title to such lands will be transferred to the state.

This act has never been taken advantage of by any state.

B. FARM FORESTRY

Section 5 of the Clarke-McNary Act of June 7, 1924 directs the Secretary of Agriculture "in cooperation with appropriate officials of the various states or in his discretion, with other suitable agencies to assist the owners of farms in establishing, improving, and renewing woodlots, shelter belts, windbreaks and other valuable forest growth, and in growing and renewing useful timber crops." The state must

expend during each fiscal year an amount at least equivalent to the federal funds expended.

This work was allocated to the Extension Service.

On May 25, 1925, Secretary of Agriculture, W. M. Jardine, set forth the following policy for the work.

“The Department believes that coordination of farm forestry extension within the several States will usually be most effective if the following practices are followed:

1. It is desirable for the State Forester and the Director of Extension to discuss thoroughly the general policy of forestry necessary for the State; the importance and place of timber growing in the agricultural program of the State; the ways in which extension work can most effectively promote the production of timber and the general forestry program of the State; and the need for and methods of giving assistance and information to farmers who own forest land. The forestry projects on the extension programs of both organizations and their working plans and subject matter should be discussed and mutually approved.

2. It is desirable for the State Forester to furnish the members of the Extension Service, by all practicable means including lectures at the State Agricultural College, information concerning the State forestry policy and practices.

3. It is desirable that the Extension specialists in forestry possess qualifications and an attitude toward the general forestry problems of the State which are acceptable to the State Forester, and that the selection of forestry extension specialists employed by either agency be subject to approval by both. It is advantageous to have members of the staff of the State Forester detailed to the Extension Service as extension specialists representing both agencies. In general, the interchange of personnel between the two organizations is desirable.

4. It is important that the Director of Extension should inculcate throughout his force an understanding of the need for forest protection as a necessary public activity as well as an essential part of the individual projects in timber growing. A similar understanding should be obtained of the regulatory and educational work of the State Department of Forestry in all phases of forest work in the State, including the control of forest insects and diseases. The efforts of the State Department of Forestry to secure more effective and more general protection of forests from fire and to advance other general phases of forestry in the State should have the active moral support of the Extension forces.

5. In States where the Forestry Department supplies forest planting stock, the use of such material should be included in the recommendations of extension workers to landowners. It is desirable that such recommendations be in accord with the planting program for the State adopted by the Department of Forestry.

“Projects may provide for the work being done by either one of the local agencies, or by both of them under a coordinated plan, as

shall be jointly determined by the State Extension Service and the State Department of Forestry. The funds furnished by the State for any project may be taken from State appropriations either for the Extension Service or for the Department of Forestry, or from both of these sources, as may be agreed upon by these agencies.

"The Extension Service of the Department of Agriculture will employ an extension specialist in forestry who shall be acceptable to the Forest Service. To the extent practicable the work done in the field under Section 5 projects will be inspected by this extension specialist. The regional staffs of the Office of Cooperative Extension Work and officials of the Forest Service employed under other sections of the Clarke-McNary Act will also assist in making these projects effective."

C. NORRIS-DOXEY ACT

The Norris-Doxey Act or the Cooperative Farm Forestry Act was approved on May 18, 1937. The Secretary of Agriculture is authorized in cooperation with the State Forest Service to pay half of the salary and expenses of foresters who give service to farmers and other small forest land owners, in finding a market for their timber and marking or designating trees which should be cut. Vermont has twelve county foresters, seven of whom are paid in part by the federal government (U. S. Forest Service). The county forester works in close cooperation with the extension forester, county agricultural agent and the Soil Conservation District Technical personnel so that there will be no duplicating or overlapping of efforts. Grand Isle County comes within the Franklin County District. At present the work in Essex County is divided between the Caledonia and Orleans County Foresters.

During the past fiscal year 15,241,000 board feet of timber and 3,800 cords of pulpwood were cut under good forest practices. Much other assistance to forest landowners was given.

D. PUBLIC WORKS

Public Act No. 5 of the 73rd Congress which was for the relief of unemployment gave a great boost to forest conservation and recreation in Vermont. The CCC built all of our park system, built roads in our state forests and parks, constructed fire towers and miles of telephone line, thinned and pruned thousand of acres of state and municipal forests. It trained men to work and use tools. This training proved valuable in World War II.

E. AGRICULTURAL CONSERVATION PROGRAM

Under this act much advance has been made in getting farmers to fence cattle out of their sugar orchards, reforest idle acres and prune and thin their natural forest stands.

F. CLARK-MCNARY ACT

The Clarke-McNary Act became law on June 7, 1924 and superseded the old 1911 Weeks Law. The federal government cooperates with the states in the granting of funds for fire prevention and coordinating and checking the work done and the expenditure of funds. Vermont receives now about \$21,000.00 annually from the federal government.

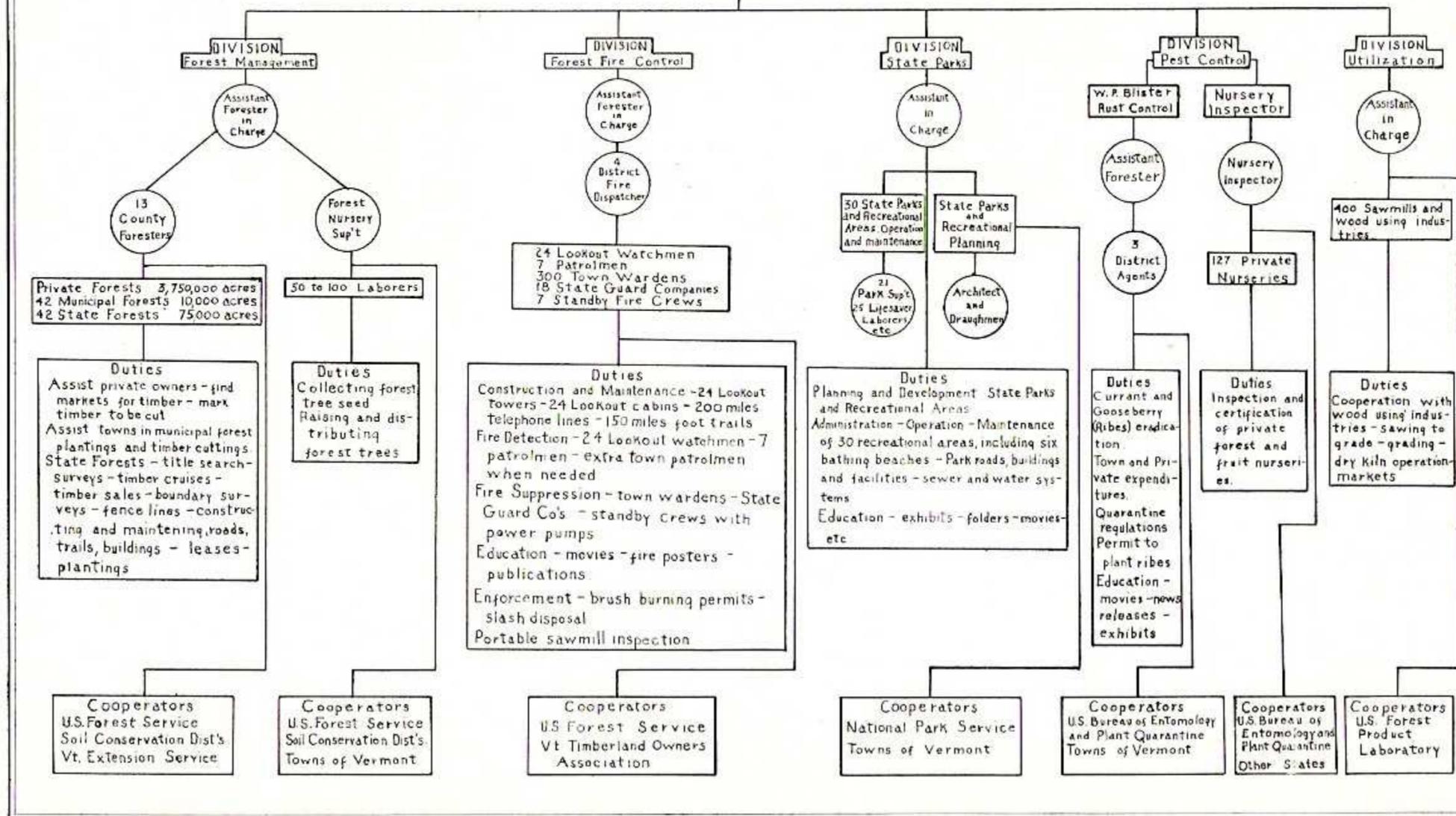
VERMONT

STATE BOARD FORESTS AND PARKS

FOREST SERVICE

STATE FORESTER

Deputy State Forester



State Legislation Affecting Forestry in Vermont

STATE BOARD OF FORESTS AND FOREST PARKS.

There is hereby established a state forest service to be administered by a state board of forests and forest parks. Such board shall consist of three members appointed by the governor, with the advice and consent of the senate. The members of the board shall be appointed for a term of six years, or unexpired portion thereof, in such manner that only one term shall expire in any biennium. The governor shall biennially designate a member of the board to act as chairman.

POWERS AND DUTIES OF STATE FORESTER.

The board of forests and forest parks shall, with the approval of the governor, appoint a state forester who shall be a graduate of a recognized forestry college with at least five years' experience. The state forester shall be executive secretary of the board and shall hold office for a term of six years or until his successor has been appointed and qualified, unless sooner removed by the board for cause, after hearing, with the consent of the governor.

The state forester shall have direction over all forest interests and all matters pertaining to forestry, and shall have charge of the nursery for forest seedlings. He shall be state firewarden, and in his discretion, may exercise all the authority of the firewarden in a town or gore and may do any act which such warden may do under the provisions of this chapter; and every person and town shall be governed and bound by such acts of the state forester as if the same had been performed by such warden.

The state forester appoints the town forest firewardens subject to the approval of the selectmen. He may appoint extra district wardens. He may also appoint special firewardens.

The state forester shall be a professionally trained forester and, with the approval of the governor, may conduct and report upon experimental investigations pertinent to forestry in cooperation with the Vermont agricultural experiment station and the United States forest service; provided that such station and service bear their proportional shares of the total expense involved in such work.

The state forester shall manage the state forests and state forest parks. He may impose reasonable fees for camping sites, the use of roads and any other facilities or buildings in these areas. A list of such fees imposed by the state forester shall be posted conspicuously in at least two places in the areas to which they apply. He shall collect data and make expert studies relative to state forest conditions. He may prepare bulletins, deliver addresses, lectures and demonstrations in forestry. He shall submit biennially to the governor a printed report of the activities of his department. He may prescribe rules and regulations for the use of the state forests and state forest parks. He may advise owners of forest lands in this state relative to the management of the same, provided that all necessary expenses incident thereto are met by those requesting such service.

The state forester by complaint to the proper prosecuting officer, shall cause the prosecution of a person who violates a provision of law relating to forests and forest fires, and shall cause actions to be instituted by the attorney general in behalf of the state against all persons trespassing upon or injuring any state forest property.

The state forester may prepare bulletins or circulars treating of forest fires, their prevention, the best methods of controlling and extinguishing the same, the laws of the state on the subject, the care of woodlands, the best methods of lumbering, the promotion or preservation of forest growth and kindred subjects, and such bulletins or circulars may be printed and circulated at the expense of the state and may be included in the printed report of the state forester.

The state forester may use such portion of the moneys apportioned for forestry as he deems advisable for the erection of shelters, lookout towers, storehouses or barns on any property under the control of such state forester.

The state forester may with the written approval of the governor prohibit the issuance of brush burning permits during periods of high hazard.

The state forester by virtue of his office shall be state nursery inspector.

Municipal forests are to be managed under the direction of the state forester.

The state forester with the approval of the governor may purchase lands for state forests.

REFORESTATION

The state forester, with the approval of the governor, may use such moneys apportioned for forestry as seems reasonable for the purchase of land suitable for nurseries. He may raise seedlings, sell them or use them on state forests. He may sell seedlings at not less than one half the cost of raising for planting on lands owned by municipal corporations, colleges, schools and churches.

WOOD USING INDUSTRIES

All portable sawmills by the acts of 1945 are required to be licensed by the state forester before operating. Non-residents must file a statement of financial responsibility or a bond.

The state board of forests and parks in accordance with No. 6 of the acts of 1945 has power to require the filing of annual reports by mills and operators covering timber products cut and lumber produced. This information is taken on forms approved by the U. S. Bureau of Census and the information made available to them.

Assistance is given to mill owners in the proper layout of a mill, how to grade logs, saw to grade and keep a mill in shape to cut good lumber. Much lumber can be saved by cutting to the exact thickness throughout its length.

According to the 1840 census there were 1081 sawmills. As of July 1, 1947 there were 535 sawmills of which 131 were classified as portable mills. There are in addition 182 woodusing industries which make everything from a small golf tee to an organ. These industries employ over

10,000 people in their plants and give work to many thousand more workers and farmers in the woods cutting logs and pulpwood.

PRIVATE FOREST MANAGEMENT

The 1945 legislature passed an act to set up voluntary forest cutting practices and to disseminate information in regard thereto. The administration of the act is now vested in the state board of forest and forest parks. The county foresters are operating under this act.

Duties. The board shall study the rates of growth and rates and methods of cuttings on privately owned forest lands and it is authorized to set up voluntary rules of forest practice. Said rules will be available soon.

State Policy. For the purpose of facilitating the state policy with respect to forest lands, it shall be the duty of all landowners and operators of forest lands so to manage, operate and harvest forest crops upon their respective lands, as to provide conditions favorable for regrowth.

1. All forest land on which lumbering operations are conducted after the passage of this act shall be left by the operator in a favorable condition for regrowth by reserving trees of commercial species sufficient under normal conditions to maintain continuous forest growth or to provide satisfactory restocking, so as to assure continuous or successive forest crops.

2. So far as practicable, all desirable seedlings and saplings shall be protected during logging operations.

FOREST FIRE PREVENTION

The Vermont Forest Service maintains 24 fire lookout towers which are manned during the months when fires are likely to occur. The Vermont Timberland Owners Association, a group of large landowners, assess themselves annually on a per acre basis to assist in fire prevention. They spend under the direction of the state forester about \$4,000.00 annually in paying for lookout watchmen and patrolmen. The responsibility for the suppression of forest fires rests with the towns. There are about 300 town firewardens who are appointed by the state forester. The state reimburses the town for one-half of their fire fighting costs.

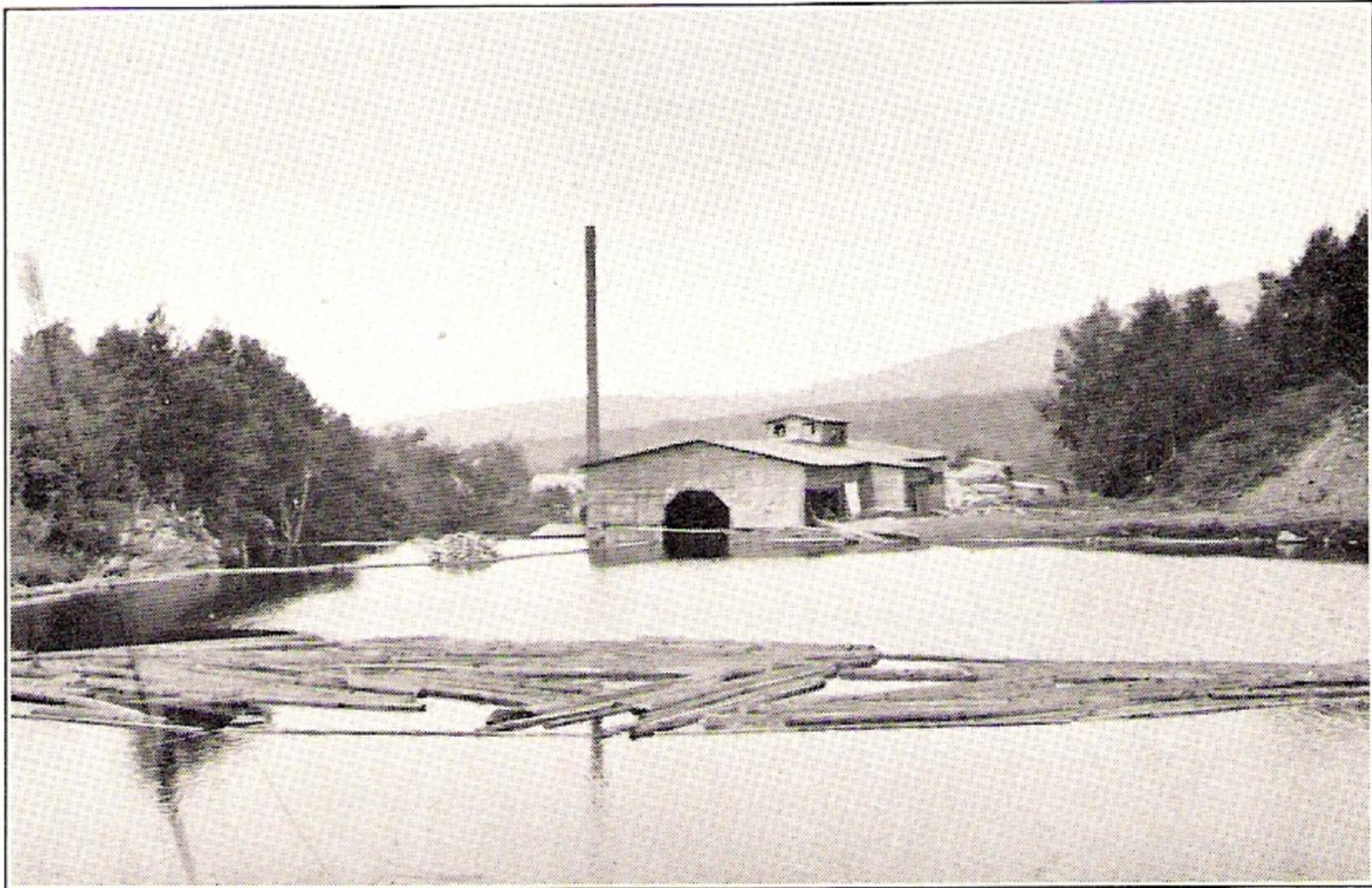
The most serious hazard to a forest is fire. Vermont is fortunate in having a climate which normally provides a low fire hazard. However, there are times when the hazard becomes high and before the establishment of the present fire control system large fires did considerable damage to the forests of the state. Such fires are destructive not only to the existing timber but remove the organic matter from the soil and leave the land in a condition which will produce nothing of value for a long period of time.

Over 95% of our fires are caused by human carelessness and are therefore preventable. The only fires which are not considered preventable are those caused by lightning and Vermont has comparatively few of these fires. The following table shows the average number of fires by various causes during the last ten years.

	<i>No.</i>	<i>Percent</i>
Lightning.....	5	2.3
Railroads.....	27	12.2
Campers.....	6	2.7
Smokers.....	55	24.8
Debris Burning.....	74	33.3
Incendiary.....	3	1.3
Lumbering.....	3	1.3
Miscellaneous.....	27	12.2
Unknown.....	22	9.9
	—	—
	222	100.0

From this table it can be seen that the principal cause of our forest fires is burning brush, grass and rubbish. Smokers are next in importance. These two causes account for more than half of our forest fires which we have and can be prevented by simply being careful to burn brush, grass and rubbish when it is safe to do so and by being careful in discarding cigarettes, cigars and pipe ashes.

During the past ten years the percentage of the forest area which has burned over has averaged .06 of one percent. This standard of forest fire control compares favorably with that of any other state in the country but much can still be done to cut down the number of fires which we have.

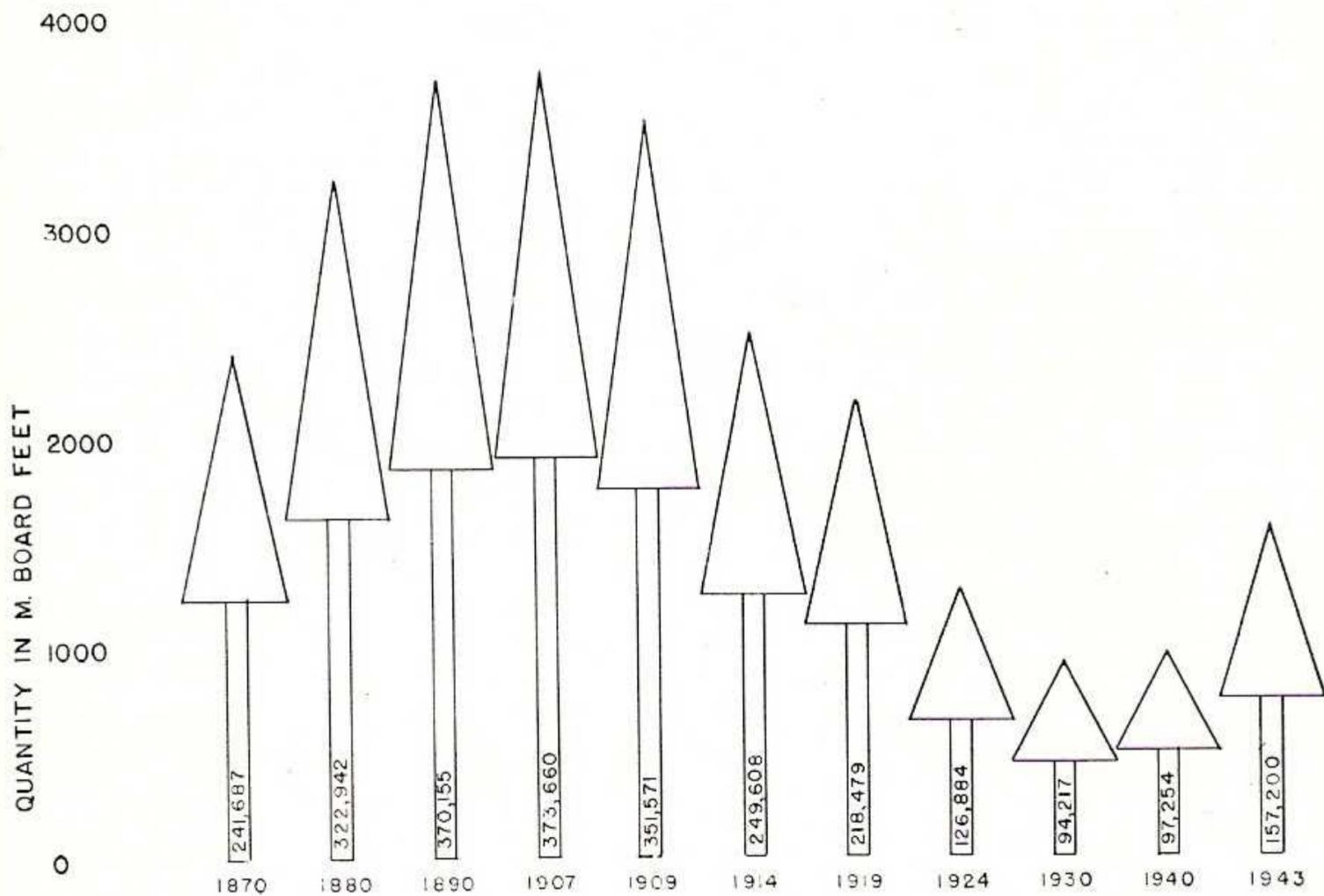


WOODUSING INDUSTRIES DEPEND UPON AN AMPLE SUPPLY
OF TIMBER

Fire permits. Permits to burn brush, grass or rubbish in the open must be obtained from the town forest fire warden during the period April 1st to June 15th and August 15th to October 31st.

Logging Slash. Slash resulting from logging operations must be removed from within fifty feet of any public highway and the boundary of the woodland of an adjoining owner.

· LUMBER PRODUCTION IN VERMONT ·



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