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Reforestation in Massachusetts



By J. R. Simmons, B.S., Assistant Forester

Under the direction of f. W. Rane, State Forester









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INTRODUCTION.

The first bulletin issued from this department on the subject of reforestation was published in 1910 by R. S. Langdell, assistant to State Forester Rane. This bulletin becoming quickly exhausted, a second edition with slight additions was offered in 1913. Only a few copies of the second edition now remain.

The present edition is undertaken for the purpose of bringing our experience and practice up to date, after having observed during the last ten years the trees grown in experimental plantations and the effects produced by soil and location in different parts of the State.

While experiments are still in progress we have come to pin our faith more and more to the cone-bearing species, to the elimination of deciduous trees. We must develop a forest that shall be as nearly as possible gypsy-moth proof, as well as immune to destructive disease. To this end we have recommended in the following pages only the trees that, up to the present time, have stood the test.

Inasmuch as the average landowner is more interested in the actual reclaiming of the land than in nursery practice, less space has been devoted in the present bulletin to the forest nursery, and greater emphasis is placed on the handling of young trees in the plantation. To those wishing to establish a forest nursery we recommend government Bulletin No. 76, which may be obtained for a small sum by writing to the Superintendent of Documents, Washington, D. C. The bulletin in hand will give the general principles of this phase of the work, but is intended primarily for those who have purchased nursery stock from the Commonwealth, or from some of the many reliable nursery firms doing business throughout the State.

SYLVICULTURAL CHARACTERISTICS OF TREES RECOMMENDED FOR PLANTING IN MASSACHUSETTS.

White Pine (Pinus strobus). - This species is placed first. both because of its marked adaptability to growth in this State and because of the universal demand for its lumber. It is but fair to say that the white pine blister rust offers some menace to clear plantations of this species, especially in Berkshire and Essex counties; but by making mixed plantings, and by eradicating currant and gooseberry bushes in the vicinity, white pine may be relied on to do its part in the conquest of the waste-land problem. Even the two-needle pines suffer from another species of blister rust (the alternate host being sweetfern), and the owner must expect to lose a few specimens of whatever species he may use through disease, insects, winterkilling or dry weather. The present system of planting provides for more trees than are ultimately necessary on each acre of ground, as well as for thinning, both natural and artificial. A plantation in which white pine represents the expectation crop, but in which enough trees of other varieties have been planted to provide for any emergency, is, in our judgment, the practical and ideal undertaking.1

The white pine may be found growing in all sorts of situations except in extremely wet soil. This does not mean that the tree grows equally well everywhere, for it undoubtedly prefers well-drained loamy sand, and there reaches its best development. Ideal conditions exist on the slopes and at the bottoms of old glacial deposits, so numerous all over the State.

Reproduction is by seed, which is produced at intervals of from three to seven years, called "seed years."

As regards size and rate of growth, white pine compares favorably with any of our eastern trees, and far exceeds most of them in these respects, reaching the best merchantable size in about fifty years. If left to grow undisturbed it reaches a size excelled only by trees of the Pacific coast, specimens having been

¹ Many of our lumbermen and most of our nurserymen, from their observations and experience, are still of the opinion that they will continue to plant white pine in pure stands as well as in mixed. Likewise, from correspondence and consultation with many of our leading plant pathologists and foresters as to diagnosing the future results of the white pine blister rust, the prevailing impression is that the presence of this disease does not warrant undue fear or exaggeration, or the abandonment of the white pine for reforestation purposes.





recorded that exceed 200 feet in height, with a diameter of 6 feet, while heights of 100 feet, with 3-foot diameters, are not uncommon.

The chief enemy of the pine forests in this State is fire, which, if it does not kill the trees, so weakens them as to render them liable to attack by several kinds of insects and fungi. The white pine is especially susceptible when young, even a slight ground fire being quite sufficient to completely kill it.

The leading insect enemies are the white pine weevil and the pine aphis. The weevil attacks the main shoot, and in some cases greatly damages young trees up to the age of ten or twelve years. Infested shoots should be pruned and burned during the summer months. The aphis is a small sap-sucking insect, and seldom does permanent damage. A simple spray will easily control it in the event that it appears in large numbers on a small area or on individual trees.

The gypsy moth, while it will eat pines as well as nearly every other kind of tree, does not invade pure stands containing pine alone. The brown-tail moth does not feed on pine.

The many uses of white pine are well known. Among them may be mentioned building timber of all kinds, laths, cabinet material, interior finish, woodenware, matches, flag poles, masts and boxes.

Red or Norway Pine (Pinus resinosa). - This tree, while common in northern New England, is not very familiar to residents of Massachusetts. It does not grow in pure stands, but usually in scattered groups with other conifers and hardwoods. The difficulty of collecting the seed in this locality renders the cost of raising the seedlings and transplants very high. Red pine, however, is a very excellent species, and compares favorably with white pine in many respects. It is more nearly immune from the blister rust of two-needle pines than any other member of that group, and represents a safe investment when planted in a favorable location. It prefers a dry sandy loam, outstripping the white pine on gravelly ridges, and will thrive in dry, rocky land. It should never be planted in the swamps or on poorly drained land. In rate of growth the red pine is more rapid than the white when young, though it is shorterlived in the long run. It reaches a height of 70 to 80 feet, with trunk diameter of 2 to 3 feet, and in old age develops an open, round-topped, picturesque head. The wood is light, hard, close-grained, pale red, with thin yellow sapwood. The lumber is largely used in construction of bridges and buildings, and for piles, masts and spars. For many purposes the lumber is mixed with that of white pine, and the two varieties are not distinguished.

Scotch Pine (Pinus sylvestris). — The Scotch pine is the common pine of northern Europe, occupying there the same place that the white pine does in this country as a timber tree. Its growth more resembles our red pine, both in quality of lumber and in the kind of soil preferred by the tree. In common with other pines, Scotch is not much subject to disease and insect attack, but is somewhat more sensitive to fire than red pine. Scotch pine is used for the same purposes as red pine.

Austrian Pine (Pinus Austriaca, Endl.) — The Austrian pine has been used successfully in this State in experimental plantations, and is recommended as a substitute for, or in mixture with, Scotch and red pine. It grows on a sandy soil and is a tree of very beautiful appearance, having long and heavy needles. It should not be used for underplanting except where the woods are open, or where heavy thinnings have been made.

Hemlock (Tsuga americana). — The hemlock, one of the most tolerant (shade-enduring) of the American conifers, prefers cold north and east slopes of the hillsides. Because of its ability to thrive even in dense shade, it will grow as an understory with other species, evergreen or hardwood, or in pure stands in all stages of growth.

The wood is being more and more used for building timber as the supply of other species grows scarcer, and some dealers prefer it to spruce for rough frame timbers. If care is not used in drying, it is likely to check.

Norway Spruce (Picea excelsa). — This is one of the principal timber trees of Europe, and is strongly recommended for planting in this country, possessing, as it does, all of the advantages of our native red spruce, with the added one of being a much more rapid grower. Our experience is that Norway spruce suffers much less from winterkill than pine, and recovers remarkably after suppression by hardwoods. It is especially de-



FIG. 4.—Evolution of a four-year white pine transplant. Seedling shown in upper lefthand corner is one year old.

FIG. 3. -- Four-year Scotch pine transplant.

sirable for underplanting in hardwood stands, a good combination being spruce and hemlock.

Red Spruce (Picea rubra). — This tree is the timber spruce of the northeast, and is now the most important species in New England in size of cut. It will grow in northern Massachusetts on the higher elevations, preferably in mixture with pine and hemlock. It will grow in the shade of other trees for many years, and shows marked recuperative ability when suddenly exposed to the light.

Growth is not rapid, and large size is not reached by this species; but good straight timber is produced, which finds a ready market. The limbs persist, as in the case of white pine, and the best clear timber is grown in mixed stands.

The tree reproduces itself well when the leaf litter on the ground is not too thick, and seedlings start readily under the mature trees of the same species, forming a stand containing trees of all ages.

The uses of the wood are well known, — building timber, piano sounding-boards, inside finish, clapboards and pulp-wood.

American Larch (Larix laricina) and European Larch (Larix decidua, Mill). — The American larch, also known as tamarack and hackmatack, is the only native deciduous conifer in Massachusetts. In winter, after the needles have been shed, it presents the appearance of a dead tree. It bears little resemblance to any of our native conifers, but closely resembles the European larch (Larix decidua, Mill), which may be distinguished by its larger cones, stouter twigs and more abundant leaves. The European larch is the more rapid grower, and will thrive in a less moist and less fertile soil than the native species. Larch should be planted in mixture with other trees, among which are recommended spruce, balsam, fir and hemlock. The principal uses are ship and boat timber, telegraph poles, fence posts and railroad ties.

Balsam Fir (Abies balsamea). — This tree is of small commercial importance in Massachusetts, but is recommended for certain areas where other more valuable species are hard to propagate, notably in swampy land, and for use in underplanting. It is sometimes planted in mixture and thinned out later for Christmas trees. Tolerance and comparative freedom from

insects and disease are arguments in its favor. Experimental plantations made by this department several years ago demonstrate that the balsam fir, like the Norway and red spruce, will hold out under a considerable amount of shade, and resume normal growth when released.

THE FOREST NURSERY.

The forest nursery represents the first step in the work of land reclamation. Seed-plots were at one time a favorite experiment among farmers and landowners, and plantations are in existence that were started in this way. But nature is prodigal in her waste of seed, and it was early discovered that by gathering and planting this waste seed in beds a high percentage could be germinated and brought to an age adaptable to low-cost reforestation. A three-year or four-year transplant may be used in grass or brush land where seed would not have one chance in a thousand.

Procuring the Seed.

The cone-bearing trees differ from the hardwoods in the matter of bearing seed, usually devoting a few years to preparation for a large crop. Our native white pine produces an abundant crop every five to seven years, and bears its seed in cones or burrs, which generally grow in clusters of twos or threes on the upper branches of the tree. There are two seeds at the base of each scale of the cone.

All coniferous seed should be gathered from the trees before the cone-scales have opened. The cones should be spread out on a smooth floor in the sun, raked over from time to time, and finally flayed until the seed has been completely threshed out. This should then be cleaned by winnowing, and kept in bags in a cool dry place, out of the reach of birds and mice. If properly stored the seed in most cases retains its vitality for a number of years.



FIG. 5.—Pine cones spread out to dry, in order that seed may be extracted.

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Raising Transplants from Seed.

Level or gently sloping well-drained land should be selected for a nursery, the soil being preferably a sandy loam, free from stones. Any length of bed is practicable, but the most convenient width is 4 to 6 feet, with walks 2 feet wide between the beds. The seed is planted in drills or broadcast, according to whether it is desired to leave the seedlings in the bed two years or three years before transplanting. The system that has proved most efficient in our nursery practice in Massachusetts is the construction of 12 by 4 foot beds, with a frame made of lath and fine-mesh chicken wire. The lath gives the young seedlings the proper proportion of light and shade, and the fine-mesh wire protects both seed and seedlings from mice and birds. A burlap cover is used for shading in place of leaves until the seed germinates and appears through the soil, at the end of which time the burlap may be removed for a portion of each day, and finally dispensed with, rolled up and stored for the following season.

A bed 12 by 4 feet takes approximately three-quarters of a pound of seed and produces from 5,000 to 15,000 seedlings, according to the kind of seed used and the success with which they are germinated. Seed may be planted in April or May, but it is usually more convenient to wait until June, when the season for digging transplants is over and more time can be devoted to the work of seeding and care of the new crop.

The seed germinates in about three weeks' time and makes its first year's growth within a couple of months. The seedlings are usually left in the original bed for two years, then transplanted into longer beds and spaced from $1\frac{1}{2}$ to 2 inches apart to prevent crowding. They remain here for two years more, and are then ready for permanent planting on wasteland.

A tree so planted is called a four-year transplant, and is the ideal tree for use in reforestation. In old pastures, where the grass is short and there is no great quantity of brush, the twoyear seedling may be used with success.

REFORESTATION.

How Trees should be planted.

HEELING IN.

When trees have been properly handled at the nursery they will arrive in good condition, packed in damp moss and tied in bundles of 25, 50 or 100, depending on the size and species. Scotch and Austrian pine are more bulky, as a rule, than white pine and spruce. The trees should be heeled in as soon as possible after their arrival. This requires the digging of a trench about 1 foot wide and 1 foot deep, and laid out as nearly as possible east and west. If only a few trees are involved in the shipment, and planting can be accomplished in a few hours' time, no trench will be necessary. It is advisable to first cover the roots with a light layer of earth, pour on a few pails of water, and then cover thoroughly with earth, leaving the tops exposed to light and air. Care should be taken not to cover any portion of the needles with earth, and in the event of dry weather the trees should be watered daily. A covering of burlap or paper will protect them from excessive heat, and will hold back the buds until the trees can be planted. One thousand trees require a trench about 12 feet long.

REQUIREMENTS FOR PLANTING.

We have experimented with various kinds of planting instruments, such as planting irons, bars, spades, etc., and find that the grub-hoe, or mattock, is the most practical instrument for all kinds of soil. Some of our foremen prefer the doubleheaded mattock, which on one side resembles an axe, and on the other an adz. The axe is used for cutting out a square hole in the sod or leaf-mold approximately 1 foot square, and the adz-like edge for lifting out the earth to a depth of 6 to 8 inches. The average man prefers the single-bladed adz-like mattock, similar to the one shown in Figs. 8 and 9. The most efficient crew consists of two men, one to make the holes and the other to do the planting. The trees are carried in a pail, which should be kept about half full of a mixture of water and



FIG. 7.-Two-man planting crew at work.



FIG. 8.-First step in making the hole.



FIG. 9. - Second step in making the hole.



FIG. 10. — Setting the seedling and covering the roots.



FIG. 11. — Firming the soil by pressure of the foot.

loam. The bundles should be untied before placing them in the pail. Sod should not be replaced, and each tree should be firmly set by pressing the earth about it with the foot. An experienced two-man crew can plant from 800 to 1,000 trees per day.

Spacing.

The best practice is to space the trees 6 feet apart each way. This method produces a tall, straight bole and prevents undue spreading. Flags may be set up at the end of the field as a guide to the crews, and moved over 6 feet as the end of the course is reached.

On moist situations Norway spruce or balsam fir may be planted alternately with white pine. If the pine is set 6 by 6 feet, and the fir or spruce set in the centers of the squares thus formed, the trees will be evenly spaced 3 feet apart. In from eight to ten years the fir and spruce will yield an incidental revenue if cut and sold as Christmas trees. It has the added advantage of rendering a plantation comparatively safe from any local disease or insect attack that may seriously deplete any one of the species used. And in this connection it may be said that the forest planter would do well to use at least two species of trees, even in the 6-foot spacing. When planting pine the combination recommended is white pine, alternated with red, Scotch or Austrian pine. Spruce may be alternated with hemlock, tamarack or balsam fir.

	Spacing.														
3 by 3 feet,			•			•									4,840
by 4 feet,															2,722
5 by 5 feet,								. 1							1,742
by 6 feet,														-	1,210
7 by 7 feet,															888
by 8 feet,															680
l0 by 10 feet,															435

Number of Trees required per Acre.

TIME TO PLANT.

Planting should be undertaken as soon as the frost is out of the ground in the spring, the months of April and May being preferable, in order that the young roots may get started before the dry season sets in. Spring planting is preferable to fall planting, as the roots having started will not be as likely to be heaved out by the frost; although under certain conditions fall planting is sometimes resorted to, as in a case where a piece of land is too wet to work in the spring, but becomes dry during the summer and fall. The time for fall planting depends largely on the season. The months of September and October are usually best in this State.

Care of the Young Plantation.

An ideal plantation requires very little care until it is old enough to be thinned, which under ordinary conditions would be at about the twentieth year; but preparation against possible disappointment and failure is as necessary in the matter of trees as in the raising of an agricultural crop, and weed-trees choke out a plantation in much the same way that witchgrass chokes out grain.

With the exception of old fields, described on another page, waste land will, in a short space of time, develop hardwood sprouts of questionable value; and even the old fields will occasionally reproduce unexpected crops of gray birch and popple seedlings, to the great detriment of the planted pine.

Most plantations must, therefore, be brushed over, in order that the young pine shall not be shaded out before it has "topped" the less valuable species growing around it. Nature has provided that, in the long run, the conifers will win in the struggle for supremacy, on account of longevity and general good health. But the struggle may last for centuries. The desired result can be obtained in less time through the medium of proper assistance on the part of man. The amount of cost will depend on whether the hardwood brush is simply lopped and left on the ground, or whether it is piled and burned. The latter is the better and safer method, but where the fire hazard is negligible the former is recommended. .



FIG. 12.—White pine transplants that were set in the open spaces among scrub oak following a forest fire. The small trees were four years old when set three years ago, and have grown on an average of from 1 to 2 feet each year during the past two years. They will undoubtedly overcome the oak.

Species most easily controlled.

Gray birch and popple, while abundantly prolific, do not cast a dense shade. Where these trees persist, money can be saved by liberal use of the bush scythe on portions of the lot where these trees are abnormally thick. Scattered birch and popple in the young plantation will often do good by supplying a light shade during summer, by rubbing off the lateral branches of the pine, and by helping to develop a long, straight leading shoot. In many cases it is advantageous to go over the plantation with a pair of pruning shears, snipping only the lateral branches of the hardwoods that interfere with the topmost branches of the pine. This method saves expense and develops good pine lumber.

Another species that may be classed under this head is oak, which, while it casts a very dense shade, is slow-growing and may be surpassed in height by the pine, provided the latter is given a reasonable amount of assistance. Where oak alone is involved, one thorough brushing will often meet the requirements, and the pine will gain the ascendency. The better grades of oak may be handled by "limbing up." Scrub oak is an inferior species and should be cut clean. Scrub oak following a fire may sometimes be crowded out in the course of time by planting the pine in the open spaces. This applies especially to certain portions of Cape Cod and Martha's Vineyard. (See Fig. 12.)

Species Difficult of Control.

The trees most difficult of control in the young plantation are the chestnut and the soft maple, on account of their very rapid growth. The chestnut bark disease cannot be depended upon to kill off sufficient sprouts to protect the pine, as sprouts will continue to spring up so long as there is any life in the old stump. Maple is equally fast growing, has no destructive enemies, and casts a dense shade. Repeated brushing is the only protection for a pine plantation made among maple sprouts.

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Suggestion for making a Pine Plantation among Dense Hardwood Sprouts.

When pine is greatly desired on land offering strong resistance by reason of its dense hardwood sprout growth, cuttings may be made about 12 to 15 feet apart, and the pines planted in these paths with the usual spacing. It is of course necessary to keep the area on which the pine is planted free from brush. In time a mixed stand will result, composed of protected pine and the best specimens of the prevailing natural hardwoods, in parallel sections. The State Department of Forestry has not undertaken this practice on any large scale, but recommends it on the basis of experiments thus far made.

Another good method which has been tried with success on several of our reforested lots is as follows: with a bush scythe or bill hook cut all hardwood sprouts around each pine over a space about 5 feet in diameter. This allows the pine to keep its main shoot free to the light, and results in a good mixed stand of pine and hardwood.

Fire Lines.

In event of undue fire hazard a good means of protection is to make a fire line around the plantation on the side where the greatest danger lies. This is done by cutting the brush and clearing the ground of all inflammable material on a strip about 50 feet wide. Warning notices may be obtained by application to the State Forester. The fire line is not practicable unless it is kept clean, but when cared for it often proves a vantage point from which destructive fires approaching from a distant area may be turned back and ordinary brush fires may be easily managed.

Types of Land Suitable for Reforestation.

The total area of Massachusetts is about 5,321,787 acres, of which 2,672,950 acres is land adapted only to the growing of trees. Of this area there are about 700,000 acres which at the present time constitute practically worthless tracts, being simply a tax to the owners, who at a very small outlay could bring the land back into profitable forest growth, as well as add to the scenic beauty of the section.

This land lies in tracts varying in size from one to thousands of acres. Practically every farm has a portion which at one time or another has been cut off, burnt over or allowed to lapse into a condition where it is no longer a source of revenue, — a piece of property which brings in no return, though it is still taxable. Lumbermen, mill owners, water-right companies and farmers all have some land which falls under one of the following types, and it is this sort of land which, fortunately, furnishes ideal conditions for forest planting.

CUT-OVER LAND.

Undoubtedly every lumberman in the Commonwealth owns one or more tracts of land which he has cut off, but which has not come back into any profitable growth and which gives no promise of a future crop.

Where the land cut off was previously growing pine it is not always advisable to reforest it the first or second season following, on account of the damage that is almost sure to result from the pine stump beetle (Hylobius pales). This beetle breeds in the bark of recently cut pine stumps, but dies out as the bark decays. It chews the bark of young conifers, girdling and sometimes killing them, and damages the lateral branches of larger growth.

Where the land cut off was previously growing hardwoods it is advisable to reforest as soon as possible, as the sprout and hardwood growths, if allowed to gain too great a headway, will hold the transplants in check, and expensive brushing will become necessary. In some cases hardwood sprouts are so persistent as to make reforestation a doubtful investment. Where doubt exists as to the advisability of planting such land, an application should be made to the State Forester for an examination.

BURNED LAND.

On land which has been subjected to repeated fires, destroying the growth and ground cover, the soil is left free to the action of the weather, to be quickly dried out by the sun, or,

if on a side hill, to be washed into the valley by rains. The seed or seedlings which may have been on the ground have been destroyed, and the land might lie for a long period of years before it would reseed itself naturally. Land of this type, therefore, should be set with considerable care, in order to obtain the best results. It is generally advisable to set a four-year-old transplant here rather than seedlings.

RUN-OUT FIELDS.

Many of the farms throughout the State have been allowed to decline, and are growing up to brush and undesirable hardwoods. Pasture lands especially are being encroached upon by some of our less valuable trees, such as chokecherry and gray birch, which so overshade the ground that good pasturage runs out, and the lot is abandoned for fields affording better forage. In many cases scattering white pines have crept in, and probably in time would seed in the whole piece; but the advanced growth, while doing good work in reseeding, would be of little value, as, growing so scattered, they would develop large lateral branches instead of giving a clear, straight bole so desirable in the best grade of lumber. If the lot could be set out with seedlings, and the trees allowed to grow in sufficiently dense stands, the lower branches would die off naturally, and smooth, clear lumber would be assured.

Underplanting in Thinned Stands.

Where woodland has been extensively thinned to eliminate undesirable species, or for the purpose of marketing the mature timber, underplanting is practicable and advisable. For this purpose a tolerant (shade-enduring) tree is necessary, and among the best species may be named the Norway spruce, the hemlock, the tamarack and the balsam fir. They should be planted in the open spaces as much as possible, or in such a way that they may not grow into the branches of other trees. Otherwise they must be released in a few years' time by cutting the older growth, and damage will result from felling.



Fig. 13.—A thinned stand of hickory. Ready for underplanting with spruce or hemlock, or with pine in the more open spaces.



Reforestation Work done by the State.

Under "An Act to provide for the purchase of forest land and for reforestation," passed by the Legislature of 1908, provision is made whereby private landowners may deed tracts of land suitable for reforestation purposes to the State, to be planted and handled under practical forest management, such owners reserving the right to redeem the land at any time within ten years for the actual amount expended. Provision is also made for the distribution of seeds and seedlings at not less than cost to landowners who are citizens of the Commonwealth.

The State has now acquired over 150 tracts of land under this act, comprising in all about 6,000 acres. The number of trees required in planting these areas, and in supplying the State institutions, the Metropolitan Water Board, the cities, the towns and the schools, has been so great that few, if any, have been left over for the private landowner until the present year. During the spring of 1918, however, we distributed at cost more than 500,000 four-year transplants of white and Scotch pine to citizens in all parts of the State. The price charged for these trees was \$7 per 1,000, representing the actual cost of raising them in our nurseries.

Acts of 1908, Chapter 478.

Reforestation Act.

SECTION 1. For the purpose of experiment and illustration in forest management, and for the purposes specified in section five of this act, the sum of five thousand dollars may be expended in the year nineteen hundred and eight, and the sum of ten thousand dollars annually thereafter, by the state forester, with the advice and consent of the governor and council, in purchasing lands situated within the commonwealth and adapted to forest production. The price of such land shall not exceed in any instance five dollars per acre, nor shall more than eighty acres be acquired in any one tract in any one year, except that a greater area may so be acquired if the land purchased directly affects a source or tributary of water supply in any city or town of the commonwealth. All lands acquired under the provisions of this act shall be conveyed to the commonwealth, and no lands shall be paid for, nor shall any moneys be expended in improvements thereon, until all instruments of conveyance and the

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title to be transferred thereby have been approved by the attorneygeneral, and until such instruments have been executed and recorded.

SECTION 2. The owners of land purchased under this act, or their heirs and assigns, may repurchase the land from the commonwealth at any time within ten years after the purchase by the commonwealth, upon paying the price originally paid by the commonwealth, together with the amount expended in improvements and maintenance, with interest at the rate of four per cent per annum on the purchase price. The state forester, with the approval of the governor and council, may execute in behalf of the commonwealth such deeds of reconveyance as may be necessary under this section: *provided*, *however*, that there shall be included in such deeds a restriction requiring that trees cut from such property shall not be less than eight inches in diameter at the butt.

SECTION 3. The state forester may in his discretion, but subject to the approval of the deed and title by the attorney-general as provided in section one, accept on behalf of the commonwealth gifts of land to be held and managed for the purpose hereinbefore expressed. A donor of such land may reserve the right to buy back the land in accordance with the provisions of section two, but in the absence of a provision to that effect in his deed of gift he shall not have such right.

SECTION 4. Land acquired under the provisions of this act shall be under the control and management of the state forester, who may, subject to the approval of the governor and council, cut and sell trees, wood and other produce therefrom.

SECTION 5. All moneys received by or payable to the commonwealth or any one acting on its behalf under the provisions of this act shall be paid into the treasury of the commonwealth.

SECTION 6. Land acquired under the provisions of this act, and subsequently reconveyed under the provisions of sections two or three, shall not be exempt from taxation on account of any plantation of trees set out or planted while it was held by the commonwealth.

SECTION 7. For the purpose of assisting in reforestation a portion, not exceeding twenty per cent of the money authorized by this act to be expended may be used by the state forester for the distribution at not less than cost of seeds and seedlings to land owners who are citizens of the commonwealth, under such conditions and restrictions as the state forester, subject to the approval of the governor and council, may deem advisable.

SECTION 8. The state forester shall replant or otherwise manage all land acquired by the commonwealth and held by it under the provisions of this act, in such manner as will, in his judgment, produce the best forest growth both as to practical forestry results and protection of water supplies.

SECTION 9. All acts and parts of acts inconsistent herewith are hereby repealed.

SECTION 10. This act shall take effect upon its passage.

FORM OF APPLICATION USED IN ASKING FOR AN EXAMINA-TION OF WOODLAND.



Massachusetts State Forester, State House, Boston.

The State Forester is charged with the work of promoting the perpetuation, extension and proper management of the forest lands of the Commonwealth, both public and private (1904, Chap. 409, Sect. 2). The department is open for consultation on forest and shade tree planting, woodlot management, wood and lumber markets, prices, the control of insects and diseases affecting woodland and shade trees, taxation, and all matters pertaining to the care of woodland and ornamental trees. In matters pertaining to fruit growing, however, go to your local county agricultural agent. While good advice can be given through correspondence, office interviews and publications, often a personal examination of the property or trees, themselves, by one of my technical assistants where the advice can be extended on the ground, is the only satisfactory method of procedure. The only charge for such service is the traveling expenses of the forester making such examination. If you care to have such an examination, fill out the attached application blank and mail to our office. A brief description of the land and the problem involved will assist us.

> F. W. RANE, State Forester.

APPLICATION FOR AN EXAMINATION.

Signed .							•				•							
Address										•								
Telephon	e																	





