

COMMONWEALTH-OWNED  
FORESTS  
AND REFORESTATION

A Report

of the

JOINT STATE GOVERNMENT COMMISSION



to the

GENERAL ASSEMBLY

of the

COMMONWEALTH OF PENNSYLVANIA

SESSION OF 1951

The Joint State Government Commission was created by Act of 1937, July 1, P. L. 2460, as amended 1939, June 26, P. L. 1084; 1943, March 8, P. L. 13, as a continuing agency for the development of facts and recommendations on all phases of government for the use of the General Assembly.

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LETTER OF TRANSMITTAL

*To the Members of the General Assembly of the Commonwealth of Pennsylvania:*

Pursuant to House of Representatives Concurrent Resolution No. 74, of the 1949 Session of the General Assembly, herewith is submitted a report dealing with Commonwealth-owned forests and reforestation.

In accordance with Act of 1943, March 8, P. L. 13, Section 1, the Commission created a subcommittee to aid in studying forests and reforestation.

On behalf of the Commission, the cooperation of the members of the subcommittee is gratefully acknowledged.

BAKER ROYER, *Chairman.*

*Joint State Government Commission*

*Capitol Building*

*Harrisburg, Pennsylvania*

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## SUMMARY OF FINDINGS

I. As the result of its geographical location and climate, Pennsylvania was originally one of the most heavily forested areas in the United States. Timber formed the foundation of the state's first industry. Through indiscriminate cutting, waste, careless use and fire, the timber resources of the state were reduced until they reached an all-time low of 8,000,000 acres in 1915.

II. At present, Pennsylvania's forest area comprises 15,000,000 acres, which represents about 52% of the land area of the Commonwealth. The Department of Forests and Waters manages 1,730,534 acres of state-owned forest lands and 29,028 acres leased from the federal government for 99 years.

III. The reforestation of Pennsylvania is a joint venture between the Commonwealth, which owns and manages forest lands, and the private individuals who own forest lands or land suitable for reforestation. It is also a long-term venture, since the growing cycle of timber from seedling to mature tree ranges from 75 to 100 years.

IV. The profitability of investments in forests may be estimated on the basis of the long-term trends of annual costs and the expected revenues from the sale of timber. The Department of Forests and Waters believes that the present annual expenditure of \$.50 per acre is not likely to increase in the future; that the cost to the Commonwealth of land suitable for forest development will remain close to the historical price of \$2.46 per acre, unless land is bought

in such quantity or in such manner as to bid up land prices; and that the stumpage value of timber will remain approximately at present levels. On these assumptions, which derive considerable support from extensive historical data, the present rate of return, which is slightly in excess of three per cent, may be expected in the foreseeable future.

V. On the average, the private investor's rate of return appears to be the same as that of the Commonwealth. The difference between the tax cost per acre to the private investor and Commonwealth in-lieu payment per acre approximately equals the cost of the services furnished by the Commonwealth without charge to private investors.

VI. The General Assembly has sought to encourage the private landowner to engage in sound forestry practices by differential taxation of forest lands. Seven bills providing for differential tax treatment of forest lands have been passed by the General Assembly. All seven statutes have been declared unconstitutional. The evidence strongly suggests that, in the absence of a constitutional amendment, legislation providing for differential forest taxation is futile.

VII. In 1949, the General Assembly appropriated funds for the execution of the first phase of a twenty-year program submitted by the Department of Forests and Waters, which provides for the acquisition of additional forest lands, preparation of an inventory of forest resources, maintenance and extension of roads and trails, protection, education and demonstration of proper forest practices, research, reforestation and the expansion of the timber marketing program.

VIII. Today, Pennsylvania wood consumption is about  $2\frac{1}{4}$  billion board feet per year, of which less than half is produced in Pennsylvania.

IX. Although the demand for timber is strong, Pennsylvania producers have access to but limited current market information. At present, the Department of Forests and Waters issues a monthly marketing bulletin, and, under the twenty-year program, plans further activity to facilitate the marketing of Pennsylvania's forest products.

## **SUMMARY OF RECOMMENDATIONS**

The Joint State Government Commission recommends that:

I. The long range policy for the administration of Commonwealth-owned or managed forest lands be continued and that the appropriation for the acquisition of forest land be limited so as not to encourage an increase in the price of land.

II. The Constitution be amended to permit classification of forest lands for tax purposes.

## Section I

### CHANGES IN THE FOREST AREA OF PENNSYLVANIA

Originally, Pennsylvania's 29,000,000 acres were almost entirely forested with heavy stands of virgin white pine, hemlock and hardwoods. "The original forest was composed of many and valuable species often occurring in dense stands. The richness of our forest flora is due to its favorable location with reference to climatic and physiographic factors. Pennsylvania is the meeting ground of many northern and southern species. In the western part of the state one finds outposts of species common to the Mississippi Valley, while in the southeastern part some of the species of the coast region are found. Some of the northern species have their southern limits here, or else follow the mountains toward the south, while some of the southern species have their northern limits here, usually migrating northward through the valleys. The forests in the southeastern and the western parts of the state are composed almost entirely of hardwoods, while the central and the northern or mountainous parts are composed of a mixture of hardwoods and conifers. One may find the hardwoods by themselves and the conifers by themselves, or they may occur in mixture."<sup>1</sup>

So favorable are the climatic and geographical conditions in Pennsylvania for the growth of trees that it has been estimated that the approximately 175 species of trees native to

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<sup>1</sup> Joseph S. Illick, *Pennsylvania Trees*, Pennsylvania Department of Forests and Waters, Bulletin 11 (Reprint of Fifth Edition of 1925), p. 12.

the state constitute less than one-quarter of the total number of species which can be grown successfully.<sup>2</sup>

### **A. Depletion of the Forests in Pennsylvania**

The vast timber tracts, which seemed inexhaustible to the early settlers, provided charcoal for the iron and steel industries, ties for railroads, wood for fuel, lumber for homes and buildings, and the material out of which wagons, carriages and railway coaches, as well as furniture, barrels and boxes were made. As the increasing population of the state turned forest land into farms and as expanding industry consumed more and more wood, the amount of standing timber in the state grew smaller. The swiftness with which the timber of the state was destroyed is indicated by the fact that, as early as 1791, the Philadelphia Society for the Promotion of Agriculture offered medals for the planting of locust trees for posts and treenails.<sup>3</sup>

The dwindling forest reserves of Pennsylvania were a source of concern to the conservation minded. Between 1860, when Pennsylvania led all other states in the production of timber, and 1900, when the production of timber in Pennsylvania about equalled its consumption in the state, various efforts were made to halt the depletion of the forests and to promote the acquisition of forest lands by the state. These efforts, while they formed the basis for later conservation programs, did little to re-establish Pennsylvania as a timber producing area of importance.

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<sup>2</sup> See Appendix A for listing of trees native to Pennsylvania and a discussion of trees adaptable to the Pennsylvania climate.

<sup>3</sup> W. N. Sparhawk, "The History of Forestry in America," *Trees, Yearbook of Agriculture for 1949*, (Washington: U. S. Department of Agriculture), p. 703.

## **B. State Efforts to Restore Forests**

The Division of Forestry was created in the Pennsylvania Department of Agriculture in 1885. Two years later, under the leadership of Dr. Joseph T. Rothrock, the Commonwealth initiated a policy of establishing state forests through the acquisition of tax delinquent lands and through other purchases. Despite these efforts, by 1915, the wooded area in the state had been reduced to 8,000,000 acres. Since that time, however, Pennsylvania's forest area has nearly doubled and is now estimated at 15,000,000 acres, or approximately 52% of the total area of the state. Today the Commonwealth, when compared with other states, ranks third in the acreage of its state forests, fifth in the acreage of its state parks and sixth in the acreage of community forests. Pennsylvania is 36th in national forests.<sup>4</sup>

Over the years since 1898, the forest land holdings of the Commonwealth of Pennsylvania, as distinct from privately owned forest lands, have been increased until in 1950 they numbered 1,730,534 acres.<sup>5</sup> To this total should be added 29,028 acres of federal lands under 99 year lease to the state, which brings the total area of forest land under the jurisdiction of the Department of Forests and Waters to 1,759,562 acres. An additional 81,387 acres are under the management of the department as state parks. Other departments also manage Commonwealth-owned land, some of which is wooded but which is not specifically administered as forest land. In addition, there are now some 3,000,000 acres of waste or marginal land in Pennsylvania which are

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<sup>4</sup> A. G. Hall, "Pennsylvania in a National Forestry Program," *Forest Leaves*, XXXIV, No. 3, May-June 1949, p. 7.

<sup>5</sup> See Appendix D, Reference Table I, p. 37.

capable of producing economically no other crop than timber, and which could be added to the forest lands of the state.<sup>6</sup>

### **C. Current Forest Program**

Though the forest lands in Pennsylvania have been increased, until 1949, no coordinated long-range program had been developed. In that year, the General Assembly appropriated funds for the execution of the first phase of a twenty year program which had been submitted by the Secretary of Forests and Waters.

The program calls for the acquisition of additional forest land by the state, an inventory of forest reserves (in this connection, an aerial survey is under way), the extension of roads and trails, the expansion of protection facilities, intensification of research and education in forestry, an increase in reforestation projects, and the enlargement of the marketing program which is basic for the development of any industry.

### **D. Reforestation**

Reforestation is a joint venture between the Commonwealth and the private landowner. It is also a long-term venture, since the growing cycle of timber from seedling to mature tree ranges from 75 to 100 years. There are two generally recognized methods of reforestation—"artificial" reforestation and "natural" reforestation. Under the first method, trees are either manually or mechanically planted. Under the second method, growing trees—periodically thinned—reseed the land.

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<sup>6</sup> M. F. Draemel, Secretary of Forests and Waters, "Twenty Year Plan of the Department of Forests and Waters Relating to State Forests and State Parks," submitted to the Appropriations Committee of the General Assembly of Pennsylvania, September, 1948.

As regards the methods of reforestation, it seems to be reasonably well established that the natural growth method is most suitable to the areas in Pennsylvania where the development of forests is economically feasible. There are, however, some exceptions to the general rule. In Pennsylvania, the most important exceptions occur in the case of areas which have been subjected to strip mining. If forests are to be established in these areas, the trees must be planted.



The first part of the paper discusses the general theory of the subject. The second part is devoted to the application of the theory to the case of the present problem. The third part contains the numerical results and a comparison with the experimental data. The fourth part is a summary and conclusions.

## Section II

# PROFITABILITY OF REFORESTATION

### A. *Profitability as a Yardstick*

For the Commonwealth, profitability in the dollar-and-cent sense of the term is not a universally applicable yardstick. The application of the profitability yardstick presupposes that costs and returns of a venture can be adequately measured in terms of money.

In the case of forest ventures some of the returns cannot be readily measured in terms of dollars. For example, forests provide, in addition to a timber crop, ground cover which increases the usable water supply, minimizes soil erosion, reduces the possibility of floods and offers food and shelter for wildlife and recreation areas for the citizens of the state.

Though it is generally agreed that maintenance of the water table, prevention of soil erosion, and flood control are of considerable benefit, the measurement of the benefits, and particularly their allocation, is not beyond controversy. Whatever one's judgment regarding the economic value of these benefits, such value must be added to the profits as commonly measured in forest operations.

### B. *The Commonwealth*

Consideration of the profitability of investments in Commonwealth-owned forests requires an analysis of the long-term trends between land costs and annual charges and revenues from the sale of stumpage timber. Tables I and II, on the following page, show the per acre costs for natural commercial forests (lands which will grow timber at a profit) and the expected returns under a scientifically managed timber program.

**Table I**  
**Costs of Natural Commercial Forests for a**  
**100-Year Growing Cycle**  
**(Based upon experience for period 1900-1949)**

<i>Costs</i>	
Land .....	\$2.46 per acre
Charges:	
Annual payments in lieu of local taxes .....	.05 per acre per year
Protection .....	.04 per acre per year
Management (administration, cultural treatment, roads, etc.) .....	.41 per acre per year
Total Charges .....	\$ .50 per acre per year

From: Commonwealth of Pennsylvania Department of Forests and Waters.

**Table II**  
**Timber Returns of Natural Commercial Forests**  
**For a 100-Year Growing Cycle**  
**(Based upon experience for period 1900-1949)**

<i>Age of Trees in Years</i>	<i>Total Board Feet in Trees 4" and Over in Diameter at Breast Height Per Average Acre</i>	<i>Board Feet Removed from An Average Acre<sup>a</sup></i>
0	.....	.....
30	1,500 (Remove 20%)	300 <sup>b</sup>
50	4,500 (Remove about 22%)	1,000
70	9,000 (Remove about 22%)	2,000
100	18,000	18,000

From: Commonwealth of Pennsylvania Department of Forests and Waters: Based on a timber survey made from November, 1933, to November, 1939.

<sup>a</sup> Stumpage volume for thinnings and harvest cutting.

<sup>b</sup> An improvement cutting which yields timber of little or no value.

## 1. Costs—

The cost figures in the above table were computed by the Department of Forests and Waters on the basis of actual expenditures for the past 50 years. A compilation of expenditures for the year 1949 shows per acre charges to be \$.48.<sup>7</sup> The increase from 5 to 7½ cents (in 1950) for payments in lieu of local taxes will increase per acre expenses to about \$.50—approximately equal to the average historical cost per acre. These tabulations support the contention of the Bureau of Forests that per acre expenditures on state forest lands tend to be constant over long periods of time. Hence, for purposes of calculation, a charge of \$.50 will be used.

The cost of future land acquisitions depends upon several factors. The 1,730,534 acres acquired by the Commonwealth since 1898 were purchased at an average price of \$2.46 per acre, well within the legal limit of \$10 per acre.

It may be noted<sup>8</sup> that the average price paid per acre for 27 acquisitions between 1940 and 1948 is \$3.65. Much of this land contained young timber growth. For purposes of estimation, it is reasonable to assume that the natural timber growth on future acquisitions will be negligible. Under the circumstances, the future cost of land acquisitions may be expected to be close to the average price of \$2.46 per acre of present holdings provided the Commonwealth does not purchase land in such quantities, or in such manner, as to bid up land prices.

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<sup>7</sup> See Appendix D, Reference Table 2, p. 38.

<sup>8</sup> See Appendix D, Reference Table 3, p. 39.

## 2. Returns—

### a. *Estimated Stumpage Prices*

Attempts to present historical stumpage prices from which the expected revenue trend may be estimated are complicated by the paucity of price figures. Stumpage prices for selected years, 1910 to 1949, estimated on the basis of such data as are available, are reproduced below in Table III.

**Table III**  
**Estimated Stumpage Price of Saw Timber,**  
**Selected Years 1910-1949\***

<i>Year</i>	<i>Estimated Price per Thousand Board Feet</i>
1910 .....	\$4.90
1920 .....	12.00
1930 .....	7.71
1940 .....	7.88
1941 .....	7.62
1942 .....	7.80
1943 .....	8.34
1944 .....	9.78
1945 .....	11.40
1946 .....	15.54
1948 .....	10.31
1949 .....	13.00

\* For methods of estimation see Appendix B, p. 34.

### b. *Return Rates*

With the above cost and price estimates, it is possible to compute the expected average rate of return over a 100-year growing cycle of investments in forest lands. Table IV, below, shows the rate of return which may be expected at various levels of average stumpage prices per thousand board feet.

**Table IV**  
**Estimated Rate of Return at Various Levels of**  
**Average Stumpage Prices\***

<i>Average Stumpage Price Per Thousand Board Feet</i>	<i>Average Return or Rate of Interest Over a 100- Year Growing Period</i>
\$2.70	.25%
3.07	.5
4.00	1.0
5.29	1.5
7.05	2.0
9.47	2.5
12.79	3.0
17.31	3.5
23.42	4.0

\* For method of calculation see Appendix B, p. 34.

Table IV shows that, if the stumpage price of timber at the time of sale is \$12.79 per thousand board feet, the Commonwealth receives a return of 3 per cent from its forest lands. At prices above \$12.79, the return is larger; at prices below \$12.79, smaller. It may be noted that at 1949 stumpage prices (see Table III) the average return is slightly larger than 3 per cent.

### 3. "Artificial" Reforestation—

The input-output relationship for the artificially reforested land differs greatly from that for naturally reforested land. The cost items incidental to the use of the two methods are identical, except for a planting expense of ap-

proximately \$25 per acre. The cost difference, however, is more than compensated for by differences in return which, for naturally reforested land, is estimated at 21,000 board feet per acre and, for artificially reforested land, 62,000 board feet per acre.

Although the superiority of artificial reforestation, when climatically and topographically feasible, is well established, only 4.4 per cent, or 77,000 acres, of the Commonwealth's forest lands are economically suitable for artificial reforestation.<sup>9</sup>

#### **4. Annual Returns from Commonwealth-Owned Commercial Forests—**

As was pointed out previously<sup>10</sup> the Commonwealth forests suitable for commercial lumbering operations are still in the developmental stage.

The Department of Forests and Waters believes that, at the present time, the average annual cutting should not exceed 150 board feet per acre. About 1,400,534 acres of Commonwealth-owned forests are suitable for commercial lumbering operations.<sup>11</sup> Under a systematic cutting program calling for 150 board feet per acre, the 1949 stumpage price of \$13.00 per thousand board feet would have produced Commonwealth revenues in the amount of \$2,700,000.

As the Commonwealth forests mature, the rate of tree growth will be accelerated, and increased annual cuttings will become feasible. If the forested area remains constant, increased cutting in accordance with accepted forestry practice will increase Commonwealth revenue.

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<sup>9</sup> See Appendix D, Reference Table 4, p. 40.

<sup>10</sup> See above, Section I, C.—Current Forest Program, p. 8.

<sup>11</sup> See Appendix D, Reference Table 4, p. 40.

## C. *Costs and Returns of the Private Investor*

### 1. *Costs*—

Although the annual charges or costs of private investors in Pennsylvania forest lands appear to be identical (\$50 per acre) with Commonwealth costs, the components of the two totals differ in some respects.

Effective 1950, the Commonwealth is required to make annual payments of 7½ cents per acre in lieu of taxes. No average tax payment for the private investor is readily computable, but it would appear that typical tax payments range from 10 to 15 cents per acre. Certain auxiliary services, such as fire protection and forest research are furnished by the Commonwealth free of charge to private landowners. The difference between the tax cost per acre to the private investor and Commonwealth in-lieu payments per acre approximately equals the cost of the services furnished by the Commonwealth without charge to private investors. Hence, total charges per acre are approximately \$50 per year.

The private investor purchases land in the same market as the Commonwealth, and reasonably can be expected to pay the prevailing price provided his forest purchases are of comparable size.

### 2. *Returns*—

What scanty evidence is available suggests that, on the whole, private operators obtain the same stumpage prices as the Commonwealth. The cases which do not conform to this rule seem to be largely due to the fact that, simultaneously with the historic decrease of lumber production in Pennsylvania, disintegration of the market mechanism for forest products has taken place.<sup>12</sup> The disintegration of

<sup>12</sup> See below, Section III—Paragraph 4, p. 23.



what used to be an organized market in Pennsylvania has more serious consequences for the typical private operator than for the Commonwealth. The private investor, by virtue of the relatively small size of his tracts, generally is not in a position to offer or sell continuously and hence cannot establish stable contacts with prospective buyers.

### 3. Cost-Return Relationship—

In view of the approximate equality of the private investor and the Commonwealth from both a cost and return point of view, the rate of return to the private investor will equal that received by the Commonwealth—slightly better than 3 per cent at 1949 stumpage prices.

In this connection, it has been observed that, depending on soil and climate conditions, the nation's forests produce from 3 to 5 per cent on the investment. At the same time, agriculture, a basic industry in this country, over a long period of years has done no better than 2 to 2½ per cent.<sup>13</sup>

Compared to other forms of investment (except tax-free securities) investments in forest lands offer the advantage of a lower federal income tax. The federal government recognizes returns from timber land as capital gains. If the asset is held for a period longer than six months, only one-half of the return is considered taxable income. Because of the progressivity of federal tax rates the average return after taxes depends on the amount of acreage. For a plot of 100 acres the average rate of return after taxes is 2.8 per cent at 1949 stumpage prices.<sup>14</sup>

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<sup>13</sup> Richard H. D. Boerker, *Behold Our Green Mansions*, (Chapel Hill, N. C.: University of North Carolina Press, 1945), pp. 288-289.

<sup>14</sup> See Appendix C.

#### 4. Differential Taxation of Forest Lands—

As previously noted<sup>15</sup> the typical tax payment per acre is at present 10 to 15 cents. This is a charge which the investor must pay annually for some fifty years<sup>16</sup> before he may expect any monetary return from his woodlot. Furthermore, the uncertainty regarding future tax rates is not an inducement for a long-term investment.

In fact, there is good reason to believe that it has not been the weight of local taxation that has discouraged private investment in forests in the past, but the uncertainty regarding future local tax burdens.

The assessment statutes of the Commonwealth provide that taxable real property shall be assessed at "actual value."<sup>17</sup> The evidence shows conclusively that this statutory requirement is not complied with in a single taxing district within the Commonwealth.<sup>18</sup> In fact, it is the custom in rural Pennsylvania to assess property on the average at about 30%. This average, in turn, hides a multitude of variations in the assessed market value ratios of individual pieces of property. Under the circumstances, the owner of tracts of forest land is deprived of reasonable assurance that his effective tax rate—that is, the dollars of tax payable on his acreage—will remain stable or move with the effective tax rate of the community. Assuming no change in the millage rate, the assessment of forest lands at current market

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<sup>15</sup> See above, Section II, C., 1. Costs, p. 17.

<sup>16</sup> See above, Table II, p. 12.

<sup>17</sup> Act of 1933, May 22, P. L. 853, as amended 1939, May 16, P. L. 143, 72 PS § 5020-402.

<sup>18</sup> See: Commonwealth of Pennsylvania Tax Equalization Board, Certifications of Market Value of Taxable Real Estate, furnished to the Superintendent of Public Instruction, Commonwealth of Pennsylvania, June, 1949.

values would reduce the rate of return by one third. Such a condition does not encourage long-term investment.

Many states have seen fit to encourage private investment in forest lands by means of systems of differential taxation of forest lands. These systems either diminish the weight of local property taxes or eliminate the taxes altogether. At present, of the forty-eight states, only twenty-one do not make provision for the special taxation of forest lands.<sup>19</sup> In eight states, the state constitution, usually by a fairly recent amendment, explicitly permits special provisions for taxing timber lands. Nineteen states have accorded special tax treatment to timber lands without special constitutional authorization. Several of these states—Florida, Indiana and Missouri—have constitutional restrictions prohibiting tax exemptions similar to those in Pennsylvania, but forest provisions in general laws have either not been challenged in the courts or, as in the case of Florida, the courts have sustained the constitutionality of the legislation.

In Pennsylvania, the history of attempted differential taxation of forest lands has been a history of conflict between the legislature and the courts. The legislature has repeatedly (in 1887, 1897, 1901, 1905, 1913, 1933, and 1935) enacted bills providing for reduced or deferred taxes on timbered property. In every case, the courts have declared the statutes unconstitutional.

The most recent legislative attempt to encourage private reforestation is represented by the Act of 1935, July 18, P. L. 1196, 32 PS § 75, which provided that timber stands in "auxiliary forest reserves" be assessed at not more than \$1.00 per acre and that a tax of 10 per cent of the stumpage value of the trees be imposed at the time of cutting. The

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<sup>19</sup> For rates of forestry taxation in selected states, see Reference Table 5, p. 41.

act was declared unconstitutional by the Pennsylvania Supreme Court in the case of *Clearfield Bituminous Coal Corporation v. Thomas*, 336 Pa. 572, (1939).

The court held that this legislation contravened the State Constitution because (1) it exempted property which the Constitution does not permit the legislature to exempt and (2) it represented an invalid classification.

In view of the consistent decisions on the subject which have been made by the Pennsylvania courts since 1906, it is unlikely that legislation providing for differential taxation of forest lands would be upheld in the absence of a constitutional amendment.

### Section III

## LUMBER DEMAND AND SUPPLY IN PENNSYLVANIA

The demand for lumber in Pennsylvania is far in excess of the supply of Pennsylvania-grown timber.

For example, Pennsylvania produced only 600,080,000 board feet of the total 1,674,093,000 board feet used within the state in 1947. (See Reference Tables 6 and 7.) Miscellaneous wood products increased the Pennsylvania production to 1,014,091,000 board feet and total consumption in 1947 to 2,249,358,000. In other words, of the almost 2¼ billion board feet of wood products consumed within the state, less than half were state-produced. An increased supply of Pennsylvania-grown timber can be expected to find a ready home market.

As growth on the forest lands of Pennsylvania, both privately and state owned, reaches maturity, the production of wood will continue to rise. As lumber production in Pennsylvania increases, the need for an organized market for forest products will become increasingly acute.

In connection with this market, one author, discussing large privately owned forests, observes: "Perhaps the greatest obstacle facing the private timberland owner in the North is disorganized and fluctuating markets. The statement appears paradoxical, because the North consumes far more wood than it grows. But timber depletion has led to a scarcity of dependable wood processors. . . . Lacking experience and capital, they saw boards varying in thickness, realize a poor-grade outturn, improperly pile and season the lumber, and fail to get top prices. They are obliged therefore to buy

their logs and stumpage cheaply. . . . Many owners have felt that they must acquire their own processing plants if they are to have a ready market for all products of the forest."<sup>20</sup>

In a number of states, marketing cooperatives have been organized for cooperative marketing of forest products. In Pennsylvania, however, the agricultural cooperative laws specifically exclude timber products.<sup>21</sup>

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<sup>20</sup> Hardy L. Shirley, "Large Private Holdings in the North," *Trees, Yearbook of Agriculture for 1949*, p. 271.

<sup>21</sup> The Agricultural Cooperative Law was amended in 1929 to exclude timber products—"agricultural products shall include all agricultural, horticultural, vegetable, fruit, and floricultural products of the soil, livestock and meats, wool, hides, poultry, eggs, dairy products, nuts and honey, but shall not include timber products." 1919, June 12, P. L. 466, § 1; 1929, May 1, P. L. 1201, § 1.

## APPENDICES

**APPENDIX A**  
**Varieties of Trees Which Can Be Grown**  
**Successfully in Pennsylvania**

**PART I**

*Tree Species Native to Pennsylvania and Exotic Species  
Which Have Been Common Within the  
State for a Long Period*

The following listing indicates the nativity of each species, the location in Pennsylvania where the trees occur and the areas in Pennsylvania where the species may be successfully planted.

KEY—n.—north  
s.—south                      N. A.—North America  
e.—east  
w.—west                      U. S.—United States  
c.—central  
(thus e. N. A. means eastern North America, etc.)

	<i>Common Name</i>	<i>Native</i>	<i>Occurrence in Pa.</i>	<i>Suitable Growth Locations in Pa.</i>
<b>BIGNONIA FAMILY</b>				
Catalpa bignonioides	Catalpa	s. U. S.	rare	s. e. & s. w.
C. speciosa	Western C.	c. U. S.	s. w.	s. & s. e.
<b>BIRCH FAMILY</b>				
Betula alba	White Birch	Europe	s. e.	throughout
B. lenta	Cherry B.	e. N. A.	throughout	throughout
B. lutea	Yellow B.	e. N. A.	throughout	throughout
B. nigra	River B.	e. N. A.	throughout	throughout
B. papyrifera	Paper B.	n. e. N. A.	n. e.	n. & n. w.
B. populifolia	Grey B.	e. N. A.	e. & s. e.	throughout
Carpinus caroliniana	Ironwood	e. N. A.	throughout	throughout
Ostrya virginiana	Hop Hornbeam	e. N. A.	throughout	throughout
<b>CASHEW FAMILY</b>				
Rhus Vernix	Poison Sumac	e. N. A.	throughout	throughout



	<i>Common Name</i>	<i>Native</i>	<i>Occurrence in Pa.</i>	<i>Suitable Growth Locations in Pa.</i>
<b>DOGWOOD FAMILY</b>				
<i>Cornus alternifolia</i>	Pagoda Dogwood	e. N. A.	throughout	throughout
<i>C. florida</i>	Flowering D.	e. N. A.	throughout	throughout
<i>Nyssa sylvatica</i>	Black Gum	e. N. A.	throughout	throughout
<b>EBONY FAMILY</b>				
<i>Diospyros virginiana</i>	Persimmon	e. U. S.	s. e. & s. w.	c.
<b>ELM FAMILY</b>				
<i>Celtis occidentalis</i> & vars.	Hackberry	e. N. A.	throughout	throughout
<i>Ulmus americana</i>	American Elm	e. N. A.	throughout	throughout
<i>U. fulva</i>	Slippery E.	e. N. A.	throughout	throughout
<b>FIGWORT FAMILY</b>				
<i>Paulownia tomentosa</i>	Empress Tree	Asia	s. e. & s. w.	s. c.
<b>GINSENG FAMILY</b>				
<i>Aralia spinosa</i>	Hercules Club	N. A.	w. & c.	throughout
<b>HEATH FAMILY</b>				
<i>Oxydendrum arboreum</i>	Sourwood	s. e. U. S.	s. w.	s. & s. e.
<b>HICKORY FAMILY</b>				
<i>Carya cordiformis</i>	Bitternut	e. N. A.	rare	throughout
<i>C. glabra</i>	Pignut	e. N. A.	throughout	throughout
<i>C. illinoensis</i>	Pecan	c. U. S.	rare	throughout
<i>C. laciniosa</i>	Kingnut	e. N. A.	rare	throughout
<i>C. ovata</i>	Shagbark Hickory	e. N. A.	throughout	throughout
<i>C. tomentosa (alba)</i>	Mockernut	e. N. A.	throughout	throughout
<i>Juglans cinerea</i>	Butternut	e. N. A.	throughout	throughout
<i>J. nigra</i>	Black Walnut	e. N. A.	throughout	throughout
<i>J. regia</i>	English Walnut	Eurasia	rare	throughout
<b>HOLLY FAMILY</b>				
<i>Ilex opaca</i>	Holly	e. N. A.	s. e.	s. e. only
<b>HONEYSUCKLE FAMILY</b>				
N. B. Here belong several species of Bush Honeysuckle ( <i>Lonicera</i> ) and Arrow-wood ( <i>Viburnum</i> ) which are tall shrubs or small trees.				
<b>LAUREL FAMILY</b>				
<i>Sassafras albidum</i>	Sassafras	e. N. A.	throughout	throughout

	<i>Common Name</i>	<i>Native</i>	<i>Occurrence in Pa.</i>	<i>Suitable Growth Locations in Pa.</i>
<b>LINDEN FAMILY</b>				
	<i>Tilia americana</i>	Common Basswood	N. A.	throughout
	<i>T. heterophylla</i>	White B.	N. A.	c. & w.
	<i>T. Michauxii</i>	Hairy B.	N. A.	rare
<b>MAGNOLIA FAMILY</b>				
	<i>Liriodendron Tulipifera</i>	Tulip Tree	e. N. A.	throughout
	<i>Magnolia acuminata</i>	Cucumber Tree	e. N. A.	s.
	<i>M. tripetala</i>	Umbrella Tree	e. N. A.	s. e.
	<i>M. virginiana</i>	Swamp Magnolia	e. N. A.	s. e.
<b>MAPLE FAMILY</b>				
	<i>Acer Negundo</i>	Box Elder	e. N. A.	throughout
	<i>A. pennsylvanicum</i>	Moosewood	e. N. A.	throughout
	<i>A. platanoides</i>	Norway Maple	Europe	throughout
	<i>A. pseudo-platanus</i>	Sycamore M.	Europe	throughout
	<i>A. rubrum</i>	Red M.	e. N. A.	throughout
	<i>A. saccharinum</i>	Silver M.	e. N. A.	throughout
	<i>A. saccharum</i>	Sugar M.	e. N. A.	throughout
<b>MULBERRY FAMILY</b>				
	<i>Broussonetia papyrifera</i>	Paper Mulberry	Asia	s. e.
	<i>Machura pomifera</i>	Osage Orange	U. S.	s. w. & s. e.
	<i>Morus alba</i>	White Mulberry	Asia	throughout
	<i>M. rubra</i>	Red M.	e. N. A.	throughout
<b>OAK FAMILY</b>				
	<i>Castanea dentata</i>	Chestnut	e. N. A.	largely extinct
N. B. Many hybrids between our Chestnut and Old World species have been developed and some will doubtless grow well in Penna.				
	<i>Fagus grandifolia</i>	Amer. Beech	e. N. A.	throughout
	<i>F. sylvatica</i>	European B.	Eurasia	rare
	<i>Quercus alba</i>	White Oak	e. N. A.	throughout
	<i>Q. bicolor</i>	Swamp O.	e. N. A.	throughout
	<i>Q. borealis (rubra)</i>	Red O.	e. N. A.	throughout
	<i>Q. coccinea</i>	Scarlet O.	e. N. A.	throughout
	<i>Q. imbricaria</i>	Shingle O.	c. U. S.	w.
	<i>Q. macrocarpa</i>	Overcup O.	e. N. A.	throughout
	<i>Q. montana (Prinus)</i>	Chestnut O.	e. N. A.	throughout
	<i>Q. Muhlenbergii</i>	Basket O.	e. N. A.	rare
	<i>Q. palustris</i>	Pin O.	e. N. A.	throughout

	<i>Common Name</i>	<i>Native</i>	<i>Occurrence in Pa.</i>	<i>Suitable Growth Locations in Pa.</i>
Q. Phellos	Willow O.	e. N. A.	s. e.	s. e.
Q. rubra (falcata)	Spanish O.	e. N. A.	s. e.	s. e. & s.
Q. stellata	Post O.	e. N. A.	throughout	throughout
Q. velutina	Black O.	e. N. A.	throughout	throughout

N. B. Not listed are several shrubby species and numerous hybrids.

#### OLIVE FAMILY

Chionanthus virginica	Fringe Tree	s. e. U. S.	s. w.	s. & s. e.
Fraxinus americana	Common Ash	e. N. A.	throughout	throughout
F. Nigra	Swamp A.	e. N. A.	throughout	throughout
F. pennsylvanica	Green A.	e. N. A.	throughout	throughout

#### PEA FAMILY

Cercis canadensis	Redbud	s. e. U. S.	s. e. & s. w.	c.
Cladrastis lutea	Yellow-wood	s. e. U. S.	s.	s. e. & s. w.
Gleditsia triacanthos	Honey Locust	e. N. A.	throughout	throughout
Gymnocladus dioica	Kentucky Coffee-tree	e. N. A.	mostly s.	s. e. & s. w.
Robinia pseudacacia	Black Locust	s. U. S.	mostly s.	throughout

N. B. Not listed are several exotic species hardy in the state, e.g. Pagoda Tree, Golden-rain (Laburnum), Mimosa-tree (Albizia), etc.

#### PINE FAMILY

Abies balsamea	Canada Fir	e. N. A.	n. e.	n. & n. w.
Juniperus virginiana	Red Cedar	e. N. A.	throughout	throughout
Larix decidua	European Larch	Europe	s. e.	throughout
L. laricina	American L.	e. N. A.	n. e.	throughout
Picea Abies (excelsa)	Norway Spruce	Europe	throughout	throughout
P. glauca (canadensis)	White S.	e. N. A.	n. e.	n. & n. w.
P. mariana	Black S.	e. N. A.	n. e.	n. & w.
P. rubens (rubra)	Red S.	e. N. A.	n. & w.	n. & w.
Pinus nigra	Austrian Pine	Europe	throughout	throughout
P. echinata	Yellow P.	e. N. A.	throughout	throughout
P. pungens	Table Mt. P.	s. e. U. S.	s. c.	s. e. & s. w.
P. resinosa	Red P.	e. N. A.	n. e.	n. & w.
P. rigida	Pitch P.	e. N. A.	throughout	throughout
P. Strobus	White P.	e. N. A.	throughout	throughout
P. sylvestris	Scotch P.	w. Europe	throughout	throughout
P. virginiana	Scrub P.	e. N. A.	throughout	throughout
Thuja occidentalis	Arbor Vitae	e. N. A.	n. & w.	n. & w.
Tsuga canadensis	Hemlock	e. N. A.	throughout	throughout

#### QUASSIA FAMILY

Ailanthus glandulosa	Tree of Heaven	Asia	throughout	throughout
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	<i>Common Name</i>	<i>Native</i>	<i>Occurrence in Pa.</i>	<i>Suitable Growth Locations in Pa.</i>
<b>ROSE FAMILY</b>				
	<i>Prunus americana</i>	Wild Plum	e. N. A.	throughout
	<i>P. avium</i>	Sweet Cherry	Europe	throughout
	<i>P. Cerasus</i>	Sour C.	Europe	throughout
	<i>P. padus</i>	European Bird C.	Europe	s. e. throughout
	<i>P. pennsylvanica</i>	Fire C.	e. N. A.	throughout
	<i>P. Persica</i>	Peach	Eurasia	throughout
	<i>P. serotina</i>	Rum Cherry	e. N. A.	throughout
	<i>P. virginiana</i>	Choke C.	e. N. A.	throughout
	<i>Pyrus communis</i>	Pear	Europe	throughout
	<i>P. Malus</i>	Apple	Europe	throughout
	<i>Sorbus americana</i>	Mt. Ash	e. N. A.	n. e. & c. n. & n. w.
	N. B. Not listed: Many species of Hawthorn ( <i>Crataegus</i> ); numerous cultivated varieties of Cherries, Plums, Apples, Crabapples.			
	Pears, etc., as well as several species of Shadbush ( <i>Amelanchier</i> ), most of which are tall shrubs; also scores of ornamentals, mostly of Asiatic origin.			
<b>RUE FAMILY</b>				
	<i>Ptelea trifoliata</i>	Wafer Ash	e. N. A.	rare c. & s. e.
	<i>Zanthoxylum Americanum</i>	Prickly A.	e. N. A.	rare s., s. e. & s. w.
<b>SOAPBERRY FAMILY</b>				
	<i>Aesculus glabra</i>	Ohio Buckeye	e. N. A.	w. throughout
	<i>A. Hippocastanum</i>	Horse Chestnut	Europe	throughout
	<i>A. octandra</i>	Sweet Buckeye	N. A.	w. & c. throughout
<b>STORAX FAMILY</b>				
	<i>Halesia carolina</i>	Silver-bell	s. e. U. S.	s. w. s. & s. e.
<b>WILLOW FAMILY</b>				
	<i>Populus alba</i>	White Poplar	Europe	throughout
	<i>P. balsamifera</i>	Balsam P.	e. N. A.	n. e. & n. w. c.
	<i>P. candicans</i>	European P.	Europe	n. w. throughout
	<i>P. deltoides</i>	Carolina P.	e. N. A.	throughout
	<i>P. grandidentate</i>	Large-toothed Aspen	e. N. A.	throughout
	<i>P. nigra</i>	Lombardy P.	Europe	throughout
	2 var. <i>italica</i>			
	<i>P. tremuloides</i>	Aspen	e. N. A.	throughout
	<i>Salix Alba</i>	White Willow	e. N. A.	throughout
	<i>S. fragilis</i>	Crack W.	e. N. A.	throughout
	<i>S. nigra</i>	Black W.	e. N. A.	throughout
	N. B. There are many other species of <i>Salix</i> , but nearly all of them are shrubs.			
<b>WITCH HAZEL FAMILY</b>				
	<i>Liquidambar Styraciflua</i>	Sweet Gum	e. N. A.	s. e. throughout

## PART II

### *Exotic Tree Species Adaptable to Pennsylvania's Climate*

The approximately 175 tree species native to Pennsylvania constitute less than one-quarter of the total number of species that could be successfully grown in this state from the standpoint of biological possibility. Botanical and forestry literature indicate that at least 800 exotic tree species\* would be adaptable to Pennsylvania's soils and climate.

The listing of exotic species that could be expected to grow in Pennsylvania requires consideration, for each species, of climatic and soil requirements, and of probable genetic variability within the species. Unfortunately, information on these points is extremely meager or more often completely lacking.

#### *Climatic Considerations*

There is adequate information on the climate of Pennsylvania. Winter temperatures are important limiting factors for tree growth and survival. For the state as a whole minimum temperatures are not excessive; the average annual minimum temperature range is from  $-15$  to  $+5$  degrees Fahrenheit. Of equal significance is the fact that the topography divides the state into four quite distinct climatic regions, each with different potentialities for tree growth.

1. The southeast with moderate temperature extremes has generally ample and dependable rainfall (38-46 inches), and a growing season of 170-200 days.

2. The mountain section has somewhat greater extremes of temperature, a somewhat shorter growing season (130-165 days), and 3-4 inches higher annual precipitation. The summer rainfall, however, is geographically less uniformly distributed than in the southeast.

3. The high northern counties, the coolest part of the state, with occasionally severe winter temperatures have a short growing season

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\* The word tree as used in this report means a woody plant with one main stem and at least 12 feet tall. This is the commonly accepted definition.

which averages less than 130 days. Annual precipitation is variable throughout this section, ranging from 35 to 45 inches.

4. The western section, with a continental climate, has more changeable temperatures and more frequent precipitation than the other regions. Here the growing season varies from 140-175 days.

Information on the climatic requirements of exotic trees is inadequate and widely scattered. There is scant information on the *latitudinal and elevational* limits of the natural range of the tree species of Asia, Central America (mountain species) and southern South America. And such information is also incomplete for an appreciable number of European and North American trees. For this reason it is impossible to set definite limits to the climatic extremes under which exotic trees are hardy even in their native habitat. Furthermore, although we do have fair knowledge of broad climatic zones, there is seldom, except for North America and Europe, reasonably exact climatic information on the smaller geographic units, which usually represent the known range of exotic tree species. For most exotic species, we are faced with very limited information on the geographic range, and on sound climatic data even where the range is reasonably well known.

#### *Soil Considerations*

Information on soil requirements is also meager. Since Pennsylvania has a reasonably wide variety of soils this is of relatively minor importance in listing those species that could be grown somewhere in the state. It is important, however, for deciding how extensively and in what quantity an exotic could be grown throughout the state.

#### *Genetical Considerations*

Most tree species are genetically variable. This is apparent from the relatively large number of taxonomic varieties which have been described; usually an indication of genetic variability within a species in its taxonomic characteristics. Inherently different physiological races or varieties, commonly called "geographic" or "climatic" races, also exist in many tree species, although exact information on this point is available for only a very few American and European species.

Biologically, the most important difference between such geographic races is their adaptability to different climatic conditions, although they may exhibit little or no difference in their outward appearance (i.e. in their taxonomic characteristics). The existence and adaptability of such physiological races can often be predicted if reasonably sufficient information is available on the natural latitudinal and elevational distribution of the species.

*Previous Culture in the United States*

If an exotic species has been grown in the United States under climatic conditions similar to those in Pennsylvania, it is reasonably certain that it will also grow in this state. But the fact that an exotic species has failed in this state, or in a similar eastern climate, does not necessarily prove that some other climatic race of the same species could not be grown successfully in Pennsylvania.

Seed collectors have usually gathered tree seeds from the most convenient, rather than from the climatically, most promising locality. Some Japanese trees (and possibly some southern South American species) undoubtedly have failed in the eastern United States because they represented low elevational races; mountain races of such species probably would have been hardy. Past failures of some of our western American species in the East, may be attributable to use of the wrong geographic race.

## APPENDIX B

### Methods of Estimating Stumpage Prices of Saw Timber

In the basic calculations in Tables I to IV, which show costs and revenues over a 100-year growing cycle, revenue is derived chiefly from the sale of saw timber in units of a thousand board feet. Hence, all estimates of stumpage prices shown in Table III are for saw timber in units of a thousand board feet.

1. For the years 1940-1946 the estimated stumpage price of saw timber has been calculated from the average stumpage price received by the Commonwealth and the per cent of total board feet sold in the form of cord wood. These items are shown below.

<i>Year</i>	<i>Total Timber Cut on State Forests (In Thousands of Board Feet)</i>	<i>Total Receipts from Timber Cut</i>	<i>Average Stumpage Price per 1000 Board Feet</i>	<i>Per Cent of Total Bd. Ft. Sold in the Form of Cord Wood</i>
(1)	(2)	(3)	(4)	(5)
1940 .....	9,302	\$52,091	\$5.60	38.8
1941 .....	11,622	61,945	5.33	40.7
1942 .....	12,799	91,257	7.13	11.5
1943 .....	19,105	145,962	7.64	11.0
1944 .....	21,166	183,298	8.66	14.4
1945 .....	17,799	172,294	9.68	18.3
1946 .....	21,666	275,592	12.72	20.8

The Department of Forests and Waters reports that during this period it received approximately \$2.00 per thousand board feet for timber sold in cord units. If the total volume of timber cut is reduced by the volume of timber sold in the



form of cord wood; and receipts from cord wood are removed from the total receipts, the remaining board feet and revenue are for saw timber. Division of these items results in an average stumpage price for saw timber.

2. The estimates for 1910, 1920 and 1930 have been calculated on the basis of mill prices† for those years and on the assumption that the relationship between mill prices and stumpage prices did not differ from the relationship which prevailed during 1939-1943.
3. The estimated price for 1948 was calculated in the same manner as the price for 1940-1946; however, the volume of timber cut during this year was considerably smaller than for the years 1940-1946. It is probable that the average size and species also differed from the previous years. This may account for the relatively lower price.
4. Price for 1949 represents an estimate supplied by the Department of Forests and Waters.

### Calculation of Rates of Return at Various Stumpage Prices

With a land cost of \$2.46 per acre and annual charges of \$.50 per acre and specified cuttings at the 50th and 70th years, the rate of return for a 100-year growing cycle may be calculated from the following formula:

$$2.46 (1 + x)^{100} + .50 \left( \frac{(1 + x)^{100} - 1}{x} \right) = Y (1 + x)^{50} + 2Y (1 + x)^{30} + 18Y + 2.46$$

Where  $x$  = rate of return,  $Y$  = average stumpage price.

In the calculation, it has been assumed that returns at 50 and 70 years are reinvested at the same rate as the initial investment.

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† Henry B. Steer, *Lumber Production in the United States, 1799-1946*, U. S. Gov't Printing Office, Washington, 1948, pp. 116-225.

## APPENDIX C

### Calculation of the Rate of Return After Federal Income Taxes on 100 Acres of Timberland Over a Period of 100 Years

Costs:

Investment in Land .....	\$246.00
Annual cost (yearly investment) .....	50.00

Returns (Based on 1949 Prices):

At 50 years (less taxes) .....	\$1,192.00
At 70 years (less taxes) .....	2,384.00
At 100 years (less taxes) .....	20,528.00
Residual land value .....	246.00

The costs and returns are diagrammed below; returns at 50 and 70 years are assumed to accumulate interest at the same rate as initial investments.

Years	0	50	70	100
Costs: \$246 land investment and \$50 annual cost				<i>Final Value of Returns</i> Residual Land Value ..... \$246 Return at 100 years (less taxes) \$20,528  <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 80%;">                         Return (less taxes) — \$2,384 (1 + R)<sup>30</sup>                          \$2,384                     </div> — \$1,192 (1 + R) <sup>50</sup>
		Return (less taxes) \$1,192		

The following formula gives the rate of return (= R):

$$246 (1 + R)^{100} + 50 \left[ \frac{(1 + R)^{100} - 1}{R} \right] =$$

$$1192 (1 + R)^{50} + 2384 (1 + R)^{30} + 20,528 + 246$$

By successive approximations: R = 2.83%

## APPENDIX D

### Reference Table 1

#### STATE FOREST LAND ACQUISITIONS BY YEARS

(As of January 1, 1950)

<i>Year</i>	<i>Number of Acres Acquired</i>	<i>Year</i>	<i>Number of Acres Acquired</i>	<i>Year</i>	<i>Number of Acres Acquired</i>
1898	17,009.9	1917	5,593.5	1935	1,485.2
1900	78,130.7	1918	14,459.8	1936	1,075.9
1901	44,396.5	1919	16,459.3	1937	421.7
1902	175,047.4	1920	59,783.3	1938	—1.7
1903	87,984.5	1921	17,760.8	1939	1,043.9
1904	142,243.1	1922	4,273.7	1940	2,304.1
1905	86,625.3	1923	766.3	1941	158.2
1906	67,848.5	1924	334.4	1942	310.4
1907	50,808.2	1925	172.3	1943	1,069.7
1908	75,230.9	1926	660.4	1944	.....
1909	99,300.6	1927	607.0	1945	47.5
1910	17,183.5	1928	39,639.5	1946	.....
1911	32,426.1	1929	118,001.3	1947	19,774.7
1912	15,987.1	1930	138,443.4	1948	20,443.5
1913	11,777.1	1931	116,335.0	1949	34,533.0
1914	9,354.6	1932	64,814.9		
1915	3,639.5	1933	37,584.6		
1916	8,135.5	1934	49.4	Total	1,730,534

From: Commonwealth of Pennsylvania, Department of Forests and Waters.

*Reference Table 2*

**EXPENDITURES ON STATE FOREST LANDS—  
1949 \***

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Administration (Harrisburg office) .....	\$84,000
Forest Protection .....	68,950
Forest Management .....	235,937
District Administration .....	333,462
Payments in lieu of taxes .....	109,457
<hr/>	
Total Expenditures .....	\$831,806
Expenditures per acre .....	.48

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From: Commonwealth of Pennsylvania, Department of Forests and Waters.

\* Bureau of Forest expenditures not incidental to the growing and harvesting of wood are not included. Two major items excluded are expenditures for the operation of tree nurseries and expenses incurred in protecting private forest lands from fire. No attempt has been made, however, to allocate expenditures for administration which include aid to private woodland owners, educational and public information activities. Therefore, actual costs per acre are probably less than the figure indicates.

Reference Table 3

PURCHASE PRICE AND ASSESSED VALUE OF  
 SELECTED FOREST LAND ACQUISITIONS  
 BY THE DEPARTMENT OF FORESTS  
 AND WATERS  
 (1940-1948)

<i>County</i>	<i>Area in Acres</i>	<i>Price Paid per Acre</i>	<i>Assessed Value per Acre</i>
(1)	(2)	(3)	(4)
Adams .....	893.93	\$10.00	\$2.15
Bradford .....	100.93	3.50	1.00
Bradford .....	63.25	2.50	2.50
Cameron .....	850.00	6.00	3.00
Cameron .....	350.00	4.00	3.00
Cameron .....	80.70	4.00	3.00
Centre .....	819.06	2.25	1.00
Centre .....	440.00	4.00	1.27
Clearfield .....	13,500.00	4.00	1.72
Clearfield .....	523.20	3.00	2.00
Clinton .....	1,101.25	3.50	2.00
Clinton .....	472.00	2.50	2.00
Clinton .....	221.00	3.50	2.00
Elk .....	990.00	2.80	2.75
Elk .....	539.00	3.50	2.00
Fayette .....	388.88	8.50	5.00
Juniata .....	537.50	3.00	1.25
Juniata .....	105.70	4.00	1.00
Lycoming .....	100.00	3.75	2.00
Monroe .....	413.00	5.00	2.50
Potter .....	7,865.00	2.50	2.00
Snyder .....	320.00	4.70	2.75
Snyder .....	173.00	3.50	1.50
Tioga .....	2,257.00	2.25	2.50-3.00
Tioga .....	929.35	4.00	2.00
Tioga .....	122.00	3.00	1.75
Union .....	67.52	3.00	1.00
Average .....		3.65	2.00

From: Commonwealth of Pennsylvania, Department of Forests and Waters.

*Reference Table 4*

**LANDS ADMINISTERED BY THE  
BUREAU OF FORESTS**

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State Forest Land (January, 1950) .....	1,730,534 acres
Naturally Reforested Land (Commercial and Non-Commercial Forests) <sup>a</sup> .....	1,653,534 acres
Commercial Forests <sup>b</sup> .....	1,323,534 acres
Non-Commercial Forests <sup>c</sup> .....	330,000 acres
Artificially Reforested Land (Commercial Forests) <sup>d</sup> ...	77,000 acres
Total Commercial State Forest Land (1,323,534 plus 77,000) .....	1,400,534 acres

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From: Commonwealth of Pennsylvania, Bureau of Forests, Department of Forests and Waters.

<sup>a</sup> These lands consist chiefly of cut-over forests and a small percentage of open fields that were reforested by seed from cut and standing trees and sprouts from stumps and roots of cut trees. Planting of seedlings grown in nurseries is not necessary except on occasional open sections that are not fully stocked with valuable trees.

<sup>b</sup> Commercial Forests are lands which will grow timber at a profit.

<sup>c</sup> Non-Commercial Forests will not grow timber at a profit because of inaccessibility and poor growing conditions. The chief purpose of these forests at present is watershed protection. It is very likely that ultimately a large portion of this area will become productive.

<sup>d</sup> These lands were planted with forest trees of commercial importance.

*Reference Table 5*

**RATES OF FORESTRY TAXATION IN  
SELECTED STATES**

<i>Tax on Timber and Classified Lands</i>			
<i>State and Type of Classification<sup>a</sup></i>	<i>Fixed Assess- ment Per Acre</i>	<i>Annual Specific Tax Per Acre</i>	<i>Timber Sever- ance Tax</i>
(1)	(2)	(3)	(4)
Indiana			
Forest Planta- tions	\$1.00	.....	.....
Iowa			
Forest Reserva- tions	\$4.00	.....	.....
Maine			
Reforestation Lands	Exempt for a pe- riod of 20 years.	.....	.....
Michigan			
Commercial Forest Reserve	.....	\$.05	Graduated from 2% if harvested in the first year of classification to 10% in the ninth and subse- quent years.
Michigan			
Woodlot	Not more than \$1.00.	.....	5%
Oregon			
Forest Crop Lands	.....	\$.05 west of sum- mit of Cascade Mountains, \$.025 east of summit of Cascade Moun- tains.	12.5%
Washington			
Reforestation Lands	\$1.00 west of summit of Cas- cade Mountains. \$.50 east of sum- mit of Cascade Mountains.	.....	1% for each year property classif- ied. Maximum rate of 12.5%.

**Reference Table 5 (Continued)**

<i>Tax on Timber and Classified Lands</i>			
<i>State and Type of Classification<sup>a</sup></i>	<i>Fixed Assessment Per Acre</i>	<i>Annual Specific Tax Per Acre</i>	<i>Timber Severance Tax</i>
(1)	(2)	(3)	(4)
Wisconsin Forest Crop Lands	.....	\$.10	10%
Wisconsin Special Class- ification	.....	Graduated from \$.40 to \$.15 dur- ing first 8 years of classification. Thereafter \$.10.	Graduated from 2% in first year of classification to 10% in the ninth and subse- quent years.

<sup>a</sup> The requirements for classification vary from state to state. Of importance in the determination of eligibility for classification are: size of the plot, number of trees per acre, maturity of the timber and restrictions on other uses.



*Reference Table 6*

**LUMBER CONSUMPTION AND PRODUCTION  
IN PENNSYLVANIA**

<i>Year</i>	<i>Consumption Bd. Ft.</i>	<i>Production Bd. Ft.</i>
1879	1,567,538,000	1,734,000,000
1889	1,992,787,000	2,440,000,000
1899	2,791,837,000	2,333,278,000
1910	3,242,342,000	1,241,199,000
1918	2,274,000,000	445,313,000
1919	2,694,526,350	358,719,000
1920	2,719,200,000	368,102,000
1922	2,485,866,000	333,289,000
1923	2,786,537,000	361,068,000
1926	2,505,444,000	318,797,000
1928	2,027,182,000	238,615,000
1930	1,404,197,000	208,762,000
1932	595,552,000	72,929,000
1934	701,869,000	146,752,000
1936	926,630,000	187,592,000
1941	1,354,245,000	212,499,000
1942	1,379,585,000	398,877,000
1943	..... <sup>a</sup>	447,046,000
1944	.....	498,624,000
1945	.....	463,688,000
1946	.....	526,037,000
1947	1,674,093,000	600,080,000

From: Commonwealth of Pennsylvania, Department of Forests and Waters.  
<sup>a</sup> Data for 1943-1946 not available.

*Reference Table 7*

**TOTAL LUMBER AND WOOD CONSUMPTION,  
PENNSYLVANIA, 1947**

	<i>Total Consumption Bd. Ft.</i>	<i>Consumption Pa. Production Bd. Ft.</i>	<i>Consumption Imported Bd. Ft.</i>
<b>1. LUMBER</b>			
Wood Using Industries .....	273,247,000	104,110,000	169,137,000
Planing Mills and Retail Yards .....	918,351,000	93,963,000	824,388,000
Custom Sawn Lumber .....	9,786,000	9,786,000	.....
Railroads .....	119,125,000	51,143,000	67,892,000
Mines			
Anthracite .....	100,258,000	92,465,000	7,793,000
Bituminous .....	226,630,000	225,020,000	1,610,000
Others .....	26,696,000	23,593,000	3,103,000
Total .....	1,674,093,000	600,080,000	1,074,013,000
<b>2. MISCELLANEOUS WOOD PRODUCTS</b>			
Mine Props			
Anthracite .....	692,790 Tons	138,558,000	133,869,000
Bituminous .....	164,053,382 Lin. Ft.	131,242,000	131,242,000
Lagging .....	48,335,455 Lin. Ft.	13,423,000	13,423,000
Sprags .....	1,356,846 Pcs.	376,000	376,000
Poles .....	7,326,173 Lin. Ft.	15,959,000	.....
Piles .....	44,901 Lin. Ft.	449,000	205,000
Pulp, Distillation and Defiberization			
Wood .....	576,637 Cords	275,258,000	134,896,000
Total .....	575,265,000	414,011,000	161,254,000
Grand Total .....	2,249,358,000	1,014,091,000	1,235,267,000

From: Commonwealth of Pennsylvania, Department of Forests and Waters: Compiled from questionnaires sent to the wood-using industries of Pennsylvania.