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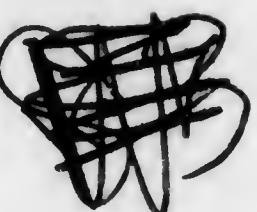
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PLATE I. View from South Mountain Reservation, near Mont Alto, Franklin County, Looking Into Cumberland Valley

PENNSYLVANIA

DEPARTMENT OF FORESTRY.

REPORT

FOR THE

YEARS 1903 AND 1904,

TOGETHER WITH SOME SUGGESTIONS CONCERNING THE
PRESENT NEEDS AND THE FUTURE POLICY
OF THE DEPARTMENT,

AND

BRIEF PAPERS UPON SUBJECTS CONNECTED WITH FORESTRY.

HARRISBURG, PA.:
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1905.

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PENNSYLVANIA

DEPARTMENT OF FORESTRY.

OFFICIAL LIST.



THE STATE FORESTRY RESERVATION COMMISSION.

Robert S. Conklin, President, Columbia, Lancaster County.
J. T. Rothrock, M. D., Secretary, West Chester, Chester County.
John Fulton, Johnstown, Cambria County.
Mira L. Dock, Harrisburg, Dauphin County.
S. B. Elliott, Reynoldsville, Jefferson County.

Meetings of the Commission are regularly held on the first Friday in each month.

OFFICE OF THE COMMISSIONER OF FORESTRY.

Commissioner of Forestry, Robert S. Conklin, Columbia, Lancaster County.
Deputy Commissioner of Forestry, Irvin C. Williams, Esq., Royersford, Montgomery County.
Clerk, A. Elwyn Strode, West Chester, Chester County.
Clerk, George W. Howard, Chester, Delaware County.

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LETTER OF TRANSMITTAL.

December 31, 1904.

Honorable Samuel W. Pennypacker, Governor of the Commonwealth:

Sir: I have the honor to present herewith my Report for the Department of Forestry since June 1, 1904, the date of my appointment as Commissioner of Forestry.

The Report of my predecessor in office, Dr. J. T. Rothrock, is hereto appended and covers his administration of the office of Commissioner of Forestry and the work done by the Department during the year 1903 and for the year 1904, to and including May 31.

There are also submitted herewith the Report of the State Forester, Mr. George H. Wirt; a report upon the Camp Sanatorium for poor Consumptives, at Mont Alto, by Dr. Addison M. Rothrock; a report upon the State Forest Academy at Mont Alto (included in the report of Dr. J. T. Rothrock, and of the State Forester); a paper detailing a "Rational Method for the Cultivation of the Willow," by Mr. Paul E. Arnold; a "History of Forest Fire Legislation in Pennsylvania, as Province and State," by Irvin C. Williams, Esq., Deputy Commissioner of Forestry; and a statement of the amount of timber cut and the losses by forest fires during the two years covered by this Report, tabulated from information collected by the Department.

I desire to thank you for your uniform courtesy, ready co-operation, and unwavering interest in the cause represented by this Department, a work which is constantly on the increase and coming to be most important, affecting as it does the well-being of our citizens and the whole industrial life of the Commonwealth.

I have the honor to be, with great respect,

Your most obt.,

ROBERT S. CONKLIN,
Commissioner of Forestry.

REPORT OF THE COMMISSIONER OF FORESTRY.

Since June 1, 1904, the Commonwealth has acquired for forestry purposes, through purchases made by the State Forestry Reservation Commission, the following lands:

	Acres.	Perches.
Adams and Franklin (South Mountain Reservation),	238	145
Franklin and Fulton,	5,025	82.5
Juniata and Mifflin (Rothrock Reservation)	1,097	53.6
Centre,	3,368	81
Pike,	6,182	110
Clinton and Centre (Hopkins Reservation),	641	121
Clinton (McElhatton Reservation),	1,301	40
Lycoming (Loyalsock Creek Region),	5,903	41
Lycoming and Tioga,	54,214	117.7
Union, Centre, Snyder, Mifflin and Huntingdon (Central Reservation),	27,998	145.6
 Total,	 105,972	 137.4



Including the lands acquired for the same purpose during Doctor Rothrock's term of service, the Commonwealth now owns and has under forestry control the following lands:

	Acres.	Perches.
Adams and Franklin (South Mountain Reservation),	40,323	77
Franklin and Fulton,	7,859	13.5
Juniata and Mifflin (Rothrock Reservation),	7,805	110.6
Cumberland,	860	
Dauphin,	3,353	93
Lackawanna,	2,853	147
Wyoming,	1,176	90
Bedford,	5,686	54
Huntingdon (Trough Creek Region),	6,146	155
Monroe,	5,622	4
Elk,	2,263	
Clearfield,	17,546	116
Cameron,	22,752	153

Centre (Nittany Mountain),	4,135	28
Centre,	3,974	121
Potter,	47,377	80
Pike,	47,810	124
Clinton and Centre (Hopkins Reservation),	88,518	39
Clinton (McElhatton Reservation),	7,394	99
Lycoming (White Deer Creek Region),	3,617	99
Lycoming (Loyalsock Creek Region),	5,903	41
Lycoming and Tioga,	72,272	37.7
Union, Centre, Snyder, Mifflin and Huntingdon (Central Reservation),	144,310	100.2
Total,	549,565	22

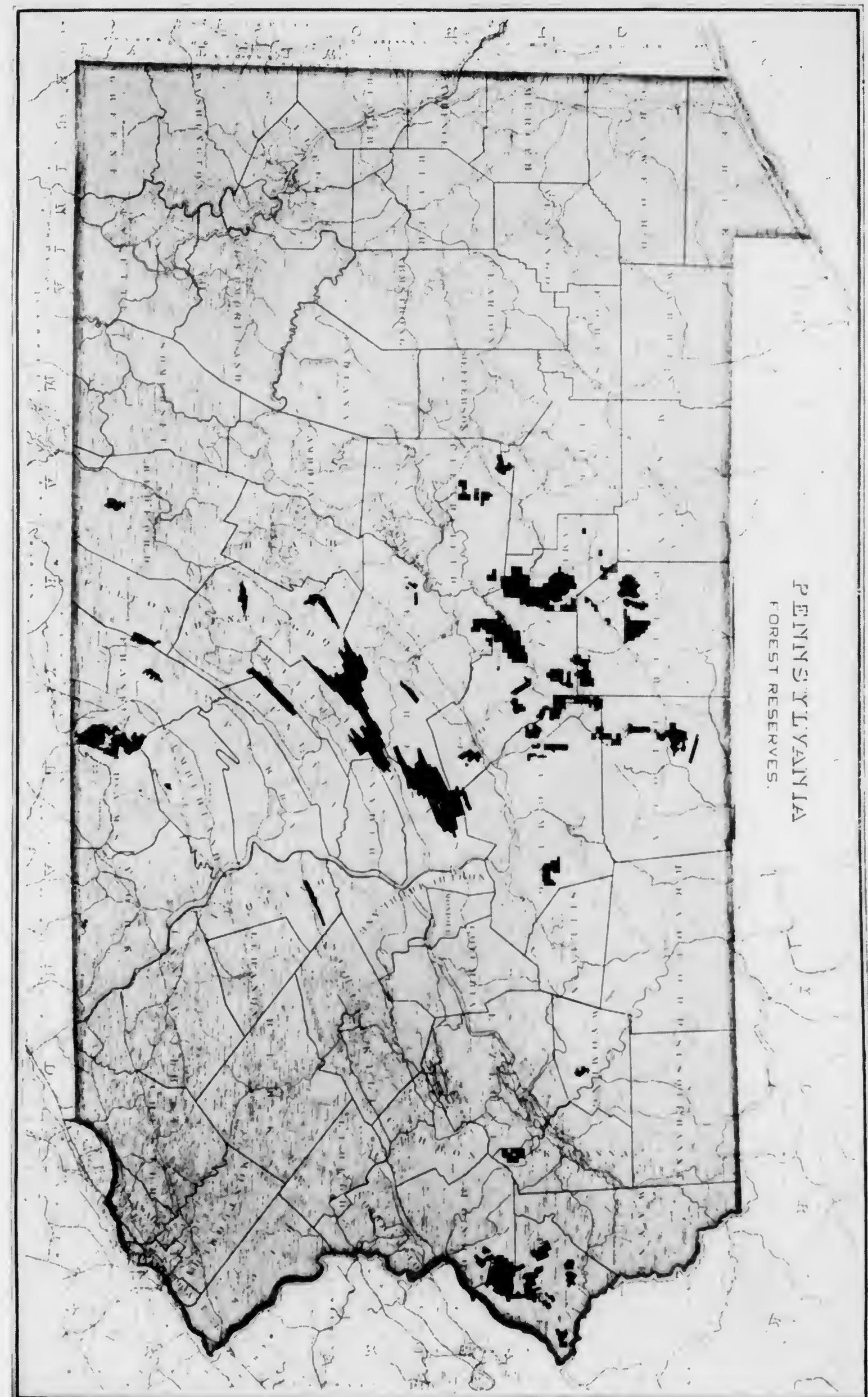
Forest Taxation and Tax Sales.

Under the provisions of the acts of March 30, 1897, P. L. 11, and April 28, 1899, P. L. 98, the Commonwealth has purchased at tax scales in various counties 56,069 acres for forestry purposes. Of this amount 32,821 acres have been redeemed by the owners within the limitation period of two years, leaving a balance of 23,248 acres to which the State's title has become perfect and indefeasible. This area is included in the statement last above exhibited.

Some curious facts are met with in connection with tax sales. It was a dictum of a former Governor of the Commonwealth that every acre of land in the State, no matter how poor or where situate, is worth at least a dollar. Under the above acts we have purchased lands at tax sales for a price as low as two and one-half cents per acre. Other prices in a number of instances are seven, eight, nine and fourteen cents per acre.

Since large areas are advertised and sold every two years for unpaid taxes, the query naturally arises: Why are the taxes not paid? We find the answer in a further search of tax records. For illustration, a tract of 1,100 acres, partly lumbered, in a certain county, was valued for taxation purposes in the year 1902 at \$2.22 per acre, and the taxes on this land for that year were ten mills for county purposes, ten mills for road purposes, thirteen mills for school purposes, and eight mills for poor purposes. Seated and highly productive land could not long bear a taxation rate of forty-one mills. Much less then can it be borne by unseated and, in this case, unpro-

PLATE II. Map of Pennsylvania, Showing State Forest Reserves.



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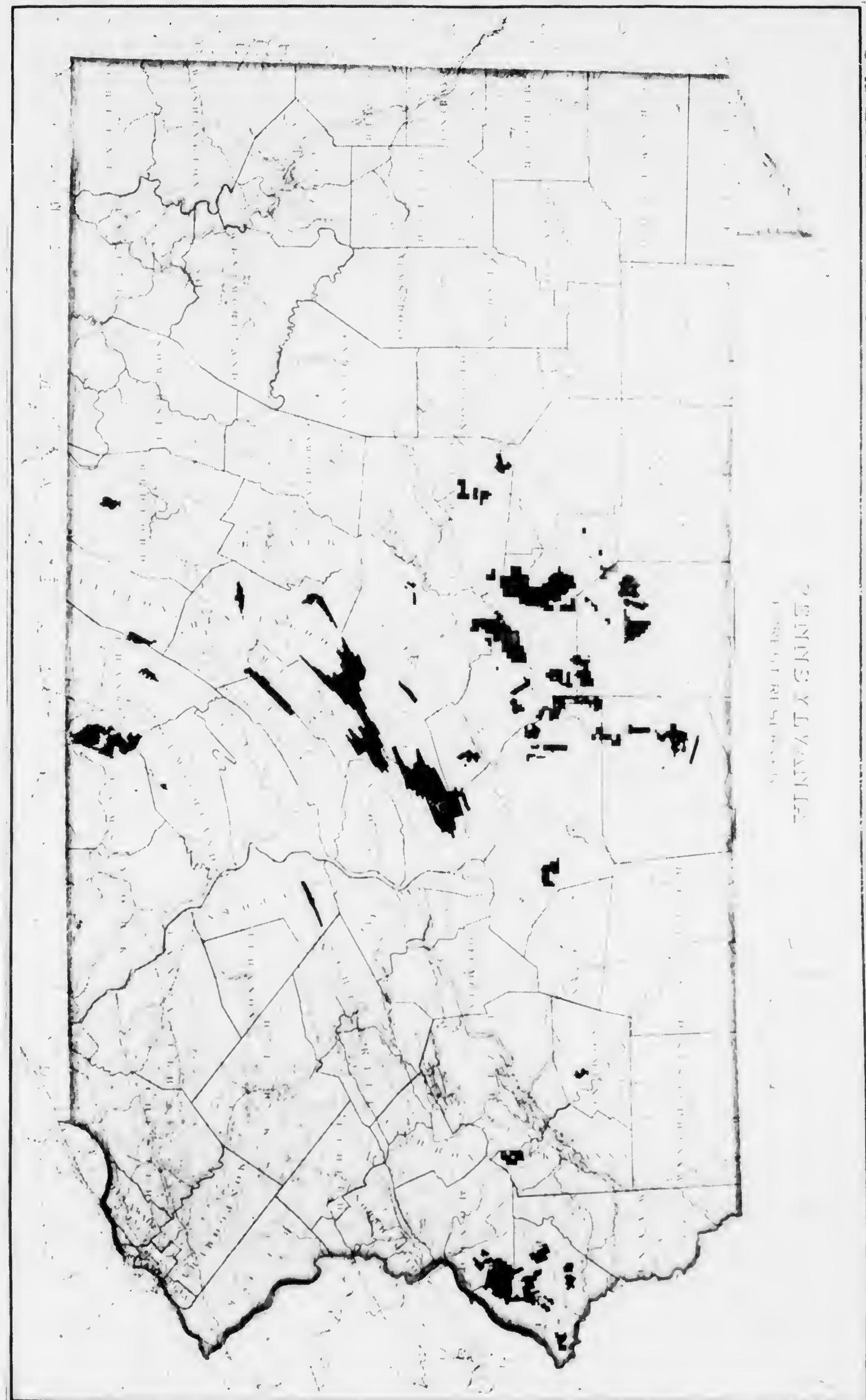
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PLATE II. Map of Pennsylvania. Showing State Forest Reserves.



ductive land. It is cheaper for the owner, after he has removed all marketable timber, immediately to abandon his lands to tax sale.

In the year 1904 the treasurer of Dauphin county advertised nearly 6,400 acres of land to be sold for taxes, or about two per cent. of the entire area, and Dauphin county is comparatively well seated.

Full and fair contemplation of the above facts can lead only to the conclusion that unproductive forest lands in the hands of private owners should be exempt, or nearly exempt, from taxation, and should be taxed only when they yield their returns to the owner. It is the experience of this Department that the excessively high rate of taxation is the direct cause of the abandonment of large areas.

Forest Administration.

Scientific forestry methods have thus far been applied to only a small portion of the reservation areas. The time and the resources of the Department have, to the present, been almost fully occupied with the acquisition of lands. What has been done and what is now under way may be found more fully described in the reports of the State Forester and the former Commissioner of Forestry.

The time is nearly at hand when the whole reservation area must be subjected to this treatment if good results are to be looked for. Many tracts are in a condition for immediate treatment and improvement cuttings will be required more rapidly than the present resources of the Department can take care of the demand. The money return to the State, simply from thinning out undesirable trees, is not inconsiderable. This is shown by the work being done now on the Mont Alto Division of the South Mountain Reservation, where the areas thus treated are returning several times their original cost to the State, while they are at the same time maintained with an improved forest covering rapidly growing into great value.

The first great need was land. A large area is now in hand, and purchases are being rapidly made. The time is not far distant when the State will own and control one million acres for reservation purposes. Lands may, no doubt, be had for some years to come, within the limit of purchase price prescribed by law. When they no longer can be had for that price, the State will still have in reserve its power of eminent domain.

With holdings now aggregating nearly one thousand square miles, we must begin the work of business-like administration. It has been suggested that 25,000 acres is a convenient size to establish for the reservation unit. No warden can patrol more than 5,000 acres and do it well. Five wardens to a reservation, with a forester and an assistant forester at the head of it, will constitute a reservation administrative force of seven men constantly occupied with duties

other than manual labor, but which all must be ready to render when emergency demands.

For this reason we have begun the training of a class of native Pennsylvania forest administrative officers at the Forest Academy, who will not only know the theory of their work, but, from actual practice, will be schooled in the doing of every species of labor likely to come under their direction in actual practice. This may be an idea peculiar to Pennsylvania. If it is, we are glad of it. At the same time we believe it to be good business sense and propose to follow this method. A sufficient number of planters, sawyers, axemen and other laborers can usually be found in the immediate neighborhood, and mountain labor of this character is not expensive.

Forest Nursery.

The forest nursery at Mont Alto, which, at the time of the last Report, had been established one season, has been steadily improved and enlarged. No more ideal spot could be found upon the whole reservation for growing seedling trees than the one now occupied for that purpose. Many thousands of young trees have been started therein. When of sufficient age these will form the stock from which plantings are to be made in all available places upon the reservation. Fifteen thousand young white pine trees now form the nucleus of our first white pine plantation.

Surveys.

The recommendations with respect to surveys, the breaking up of the lands held for forestry purposes into distinct reservations of suitable size, the placing thereon of a sufficient number of trained employes for the purpose of care and watchful oversight, and the undertaking of forest improvement in obedience to the laws of scientific forestry, contained in the report of Doctor Rothrock and the State Forester, form our present and immediate future reservation needs. All of these suggestions I most respectfully and earnestly desire to emphasize.

It is a necessity that when the reservations are acquired they should have an accurate demarcation by means of correct surveys. Maps of the reservations ought to be made therefrom, showing all lines, roads and trails. Topographical surveys could then follow, giving location of springs, streams and other surface features most valuable to be known in the progress of reservation development. The State foresters could make their timber and valuation surveys and immediately proceed with the application of the principles of practical forestry.

Present Reservation Needs.

Every reservation would be the better for having its own nursery. Each should be supplied with a stone crusher, a traction engine, a sufficient number of saws operated by steam, water or electric power, and, when the reservation is comparatively level, a steam road roller would be a valuable adjunct. The protection which could be accorded the reserves with a force no larger than above stated would be such that we might look for almost a complete cessation of timber stealing and forest fires could be controlled and fought from every vantage point.

It is hoped to establish a sufficient number of shelters or outposts at convenient points on the reservations for the use of wardens and other employes. These may be buildings small in size and of the cheapest character, unless intended for regular residence. All should be connected with each other and with the reservation administration office by private telephone. Each reservation should be in similar connection with the Department, but not necessarily over private wire. The German signal towers, mentioned in the report of the State Forester, would be of great use where there is no telephonic connection, or if for any cause such communication should become interrupted. Each reservation has need of, at least, one good team of draft horses or mules, together with such heavy wagons and sleds as may be most necessary to carry on the work.

Roads and Trails.

Next after the need of means and trained men for reservation work is the necessity for roads and trails. Every part of the reservation should be accessible. Administrative and improvement work can scarcely be carried on without them. Then again these would form the surest means of preventing the spread of fire. It is of little use to cut lanes and then allow the floor to become covered with grass and small brush, a result sure to follow unless the ground is kept bare by its use as a road. The trails need be little more than mere paths, large enough for a horse and rider, making short cuts where roads could not well be built.

Reservation roads can be built for comparatively little money. For expensive macadam or other modern systems of road making there is no need. A well-drained road with hard earth floor, kept in repair, and maintained open and clean, will meet every demand.

There is a growing belief that the public roads running into and through forest reservations should be wholly under the care and keeping of the Department of Forestry. The township supervisors,

as a rule, give them scant attention, and, in order to make them passable, the Department must of necessity assume some care. While it is true the Department is by law permitted to spend \$25.00 per mile in their repair, the great difficulty experienced in procuring honest and efficient work for the money expended is one of the reasons little money has been used in work of this character.

Then, again, as the lands are acquired by the State, they are immediately removed from taxation. In mountainous townships this places an additional hardship upon the remaining lands, both seated and unseated. We can scarcely be surprised that neglect of reservation roads will follow. Such removal from taxation directly contributes to excessive tax rates hereinbefore mentioned. If every supervisor did his full duty with reservation roads, the remaining private lands in a township would bear this burden without any immediate return from the reservation to compensate. I am convinced that suitable legislation directed as above suggested would meet with the approval of all citizens and taxpayers directly affected by present conditions.

In accord with the provision of law and the above suggestions, some of the main roads in the Mont Alto Division of the South Mountain Reservation have been repaired and are now maintained in good condition. Citizens of the locality who use these roads commend the work of the Department in the highest terms. What was formerly a wretched mountain road has been converted into a good highway.

The work of new road building on this reservation, done mainly by the students of the Forest Academy, is more fully described elsewhere in this volume.

Appropriations.

The question has been asked whether it would not be better to receive from the Legislature, for the use of this Department, a specific appropriation to carry on the administrative work, rather than have these expenses paid out of the general fund, as provided by section seven of the act of February 25, 1901. Speaking from the experience derived from the use of present methods, the answer is: No, not at this time. The Forestry Commission is and has been more than careful in the matter of current expenses. It is their endeavor not to spend a dollar unnecessarily, and they conscientiously believe they have not done so. The present needs of the Department are large, but expenditures are always kept below the needs. Large sums might and probably ought to be spent at this time in the various directions of which mention is made herein, but it has been the policy of the Commission to make haste slowly. The desire is

to see a solid, healthy growth and gradual development rather than the opposite. They believe that the people generally approve this course, and what the people command is that with which they will be best satisfied. As soon as the people demand greater activity, greater protection to reservations, greater administrative development, the Commission and the Department stand ready instantly to respond.

The reason specific appropriations would not be most appropriate at this time is that we are constantly meeting new conditions. It would be almost an impossibility to forecast for two years the amount to be appropriated. Extraordinary demands may require extraordinary expenditures and without the appropriation to meet them the Department would have to abandon its work. We believe that with the present business-like and conservative management of the affairs of the Department the best results may be attained for the people of the State through the present methods.

Rules.

In accordance with the provisions of existing law the Forestry Commission is empowered to make rules and regulations for the government of the reservations. The Commission therefore, on the 5th day of August, 1904, by resolution, adopted the following rules:

RULES FOR THE GOVERNMENT OF THE STATE FORESTRY RESERVATION LANDS.

(Adopted by resolution by the State Forestry Reservation Commission, August 5, 1904.)

1. The game and fish laws of the State must not be violated.
2. Birds' nests must not be destroyed or in any other manner interfered with.
3. Open camp fires or other fires must not be made, except in a hole or pit one foot deep, encircling the pit so made by the earth taken out.
4. Every camp fire or other open fire must be absolutely extinguished before the last member of the party using it leaves the locality.

5. Lighted matches must not be thrown upon the ground. In every case they must be allowed to burn out or be otherwise extinguished.

6. Living trees must not be cut down or injured in any manner. Dead and down timber may be used for camp fires.

7. No person will be permitted to erect a camp who has not accepted in writing the camping rules and received a camping permit.

8. Every person receiving a camping permit must report to the Commissioner of Forestry at Harrisburg any violation of law or of the rules for the government of the State Forestry Reservation Lands coming under his observation.

9. No permanent camp or other structure may be erected on the reservation.

10. The pre-emption of any ground as a special camp site to the exclusion of others who may desire to camp near, and who have permission to camp on State lands, will not be permitted.

11. All persons who desire to picnic upon the State Forestry Reservation lands, remaining for a less time than a day, and not overnight, are not regarded as campers and will not be required to procure a camping permit, but will be governed in all other respects by these rules.

12. During the month of November in each year no dog of any description shall be used for hunting purposes on the State Forestry Reservation Lands, nor shall any such dog during that month be taken by hunters into camps on said lands.

13. The making of fires by hunters who stand on deer or other "runways" is forbidden.

14. The placing of advertisements on the State Forestry Reservation Lands is prohibited.

15. Superintendents, wardens, detectives, and all other Reservation employees are required to remove immediately from State lands all persons who take deer running dogs thereon, and to kill the dogs when found in pursuit of deer. They are also required to remove therefrom all persons who do not properly guard their camp or other fires so as to prevent destruction of State property by the starting of general forest fires, or campers who do not have proper camping permits.

All persons who desire to camp upon the State Forestry Reservation Lands must first apply to the Commissioner of Forestry. A blank application containing the rules for the government of campers will be forwarded to the applicant, who must sign and return the same to the Commissioner. If in proper form, in the absence of other objections, a permit will be granted.

Persons who violate the laws or any of the above rules will subject themselves to immediate arrest without warrant, to be dealt with according to law; and may be denied all future privileges of camping, hunting or fishing on the State Forest Reservation Lands.

All State Forest Reservation employes, without first procuring a warrant, are vested by act of Assembly with power to arrest on view all persons detected by them in the act of trespassing upon any forest or timber land within the Commonwealth, under such circumstances as to warrant the reasonable suspicion that such persons have committed, are committing, or are about to commit some offense against any of the laws now enacted or hereafter to be enacted for the protection of forest and timber lands. They are likewise vested with similar powers of arrest in the case of offenses against these rules, or for offenses committed against the laws for the protection of the fish and game found within the State Forest Reservations.

All constables are requested, in case fire occurs within their townships, to notify the constables of the adjacent townships toward which the fire is traveling.

During the season of 1904, this Department issued over 2,000 permits to campers. These were mainly hunters who were encamped on the State lands during November, the deer hunting season. In order to bring these rules before the people, especially before those who were likely to be more affected thereby, we had a circular letter mailed to every newspaper in the State, with a request for publication. In a very large number of instances this request was granted.

The effect of the rules has been good. Few violations have been reported, and, with probably 3,000 hunters upon the reservations during the deer season, not a forest fire was reported from this source. The sportmen of the State and the people generally have given them their approval, and the Department has been in receipt of many letters containing words of commendation.

Permits are to be had for the asking, and without charge. The applicant presents his application in writing, wherein he agrees to abide by the rules, and, if there are no objections filed against him or otherwise known to the Department, the permit is issued. All that we desire to know is the names of those who are camping, where they are located, and for what length of time. If a camper knowingly violates these rules, the Department reserves the right to refuse the grant of future privileges.

Prosecutions.

At many places near the reservations we have been annoyed by petty thievery. Before these lands came into the reserves they were the prey of all who chose to avail themselves of their supposed right to take therefrom all kinds of timber, both standing and fallen.

Camping parties would heretofore locate themselves thereon without the knowledge of the owners and destroy growing timber at pleasure. To break up this practice it became necessary to forbid every one taking anything from the reservations. While it is true dead and down timber should be removed, we have steadily refused the privilege unless it could be done under the care of a forest officer.

The following prosecutions were brought during the period covered by this report:

Jan. 23, 1904,	S. S. Craft, Snow Shoe, Centre county; cutting timber at hunters' camp; fined,	\$20 00
Mar. 8, 1904,	Ephraim Naugle, Tarrtown, Adams county; removing wood from reservation; fined, 5 00	
Mar. 30, 1904,	Frank Tasker (col.), Brownsville, Franklin county; cutting trees; fined, 5 00	
May 3, 1904,	Abraham Creager, Tomstown, Franklin county; removing wood; fined, 5 00	
June 15, 1904,	John Butler (col.), Brownsville Franklin county; cutting trees; fined, 20 00 (And in default of payment was committed to prison.)	
July 20, 1904,	Edward Trash, Tomstown, Franklin county; removing wood; fined, 5 00	

The following named persons voluntarily made settlement for illegally cutting trees:

Jan. 23, 1904,	James Craft, Snow Shoe, Centre county, ..	\$5 00
" " "	David Chambers, William Haines and Geo. Uzzle, Snow Shoe, Centre county,	25 00
May 9, 1904,	Charles Welsh, Tomstown, Franklin county,	2 50
" 28, "	Harry E. Brown, Black Gap, Adams county,	10 00

The Forest Academy.

In accordance with the provisions of an act of Assembly, approved May 13, 1903, the Commissioner of Forestry has established a Forest Academy at Mont Alto, Franklin county, on lands belonging to the South Mountain Reservation, for the purpose of providing instruction in forestry. The academy is in charge of Mr. George H. Wirt, State Forester. The work at this school is now in its second year and is being successfully carried on.

During the first year of the existence of the academy everything done was of necessity largely experimental. We believe now that



PLATE III. Pennsylvania Forest Academy and Forestry Students, Mont Alto, Franklin County.

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		=====

The following named persons voluntarily made settlement for illegally cutting trees:

Jan. 23, 1904,	James Craft, Snow Shoe, Centre county, . .	\$5 00
" " "	David Chambers, William Haines and Geo. Uzzle, Snow Shoe, Centre county,	25 00
May 9, 1904,	Charles Welsh, Tomstown, Franklin county,	2 50
" 28, "	Harry E. Brown, Black Gap, Adams county,	10 00
		=====

The Forest Academy.

In accordance with the provisions of an act of Assembly, approved May 13, 1903, the Commissioner of Forestry has established a Forest Academy at Mont Alto, Franklin county, on lands belonging to the South Mountain Reservation, for the purpose of providing instruction in forestry. The academy is in charge of Mr. George H. Wirt, State Forester. The work at this school is now in its second year and is being successfully carried on.

During the first year of the existence of the academy everything done was of necessity largely experimental. We believe now that

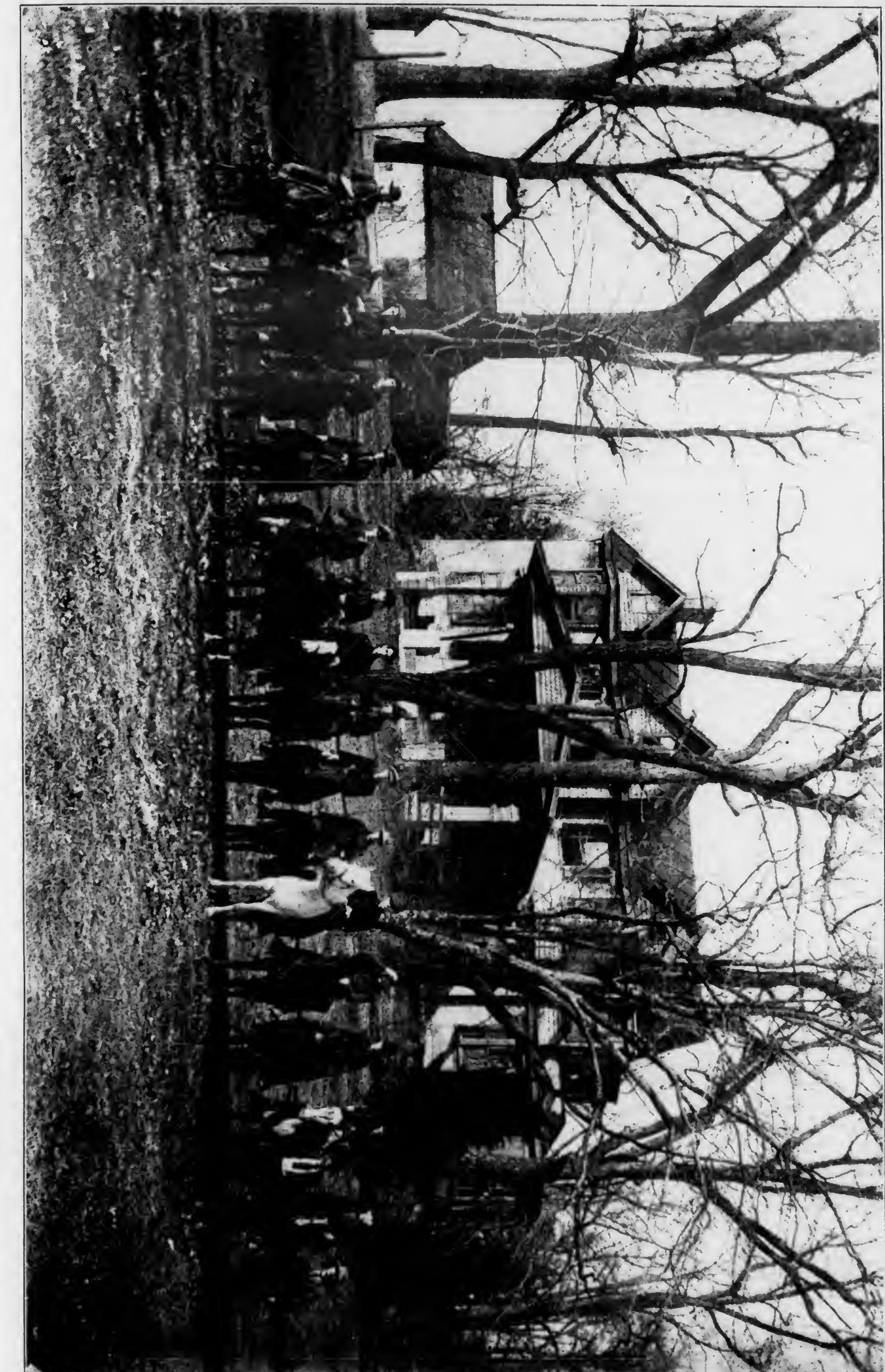


PLATE III. Pennsylvania Forest Academy and Forestry Students, Mont Alto, Franklin County.

the purposes and plans of the institution are well in hand, and that it will do the work for which it was established, and in a satisfactory and successful manner.

Four students were admitted immediately upon the opening of the academy, in June, 1903. In September following ten new men, selected by the Commissioner of Forestry, were added, making the first regular class in the institution. One has since been assigned to State reservation work in Pike county, and the class at this time contains thirteen members.

The men of the first class were paid at the rate of \$30.00 per month, out of which they were obliged to maintain themselves. We learned from experience that it will be cheaper for the State and better for the students and for the school to reverse this policy, i.e., maintain the student at the expense of the State and pay him nothing. This is the policy which was employed when the second class was admitted in September, 1904, seven students being received at that time. Students now admitted will furnish nothing but their personal clothing, a uniform such as may be adopted, and a horse and riding outfit, every thing else being provided by the State, including tuition and use of books.

The students chosen for the work at the academy must possess the qualifications demanded for that work. We require that they shall be competent physically to do the manual labor and competent mentally for the scientific and literary part of their training.

A competitive examination has therefore been decided upon as the best and fairest means of making selection of students. Every applicant must submit the record of a physical examination, which must be made and certified to by a regular practicing physician. If this prove satisfactory the applicant will be allowed to enter the test for education qualifications, provided he is within the age limits of from 17 to 25 years.

The examination for educational qualifications is conducted only in what is known as the common school branches. A good common school or ordinary high school education will enable an applicant to pass successfully. The examination for the class last admitted was held at Harrisburg, August 26, 1904, and was conducted by a committee of well-known educators who prepared the questions, conducted the examination personally, and marked and graded the papers.

Appointments are made from those having the highest averages and in the order of their standing. By these means every applicant is afforded an equal opportunity with every other applicant, and no possibility of favoritism can be present.

If the Legislature see fit to continue the appropriation for carry-

ing on the work there—and that it is a necessity goes without saying—another class of ten students will be admitted in September, 1905. We hope to keep the classes at ten each and with the three years' course as now adopted, the academy will have at all times thirty students. The first class will be ready for practical work on the reservations, in the service of the State, about June, 1906.

We hope in this way and by these means to develop a class of men for State service upon our present and future reservations. To this end their training is made both theoretical and practical, and it is believed that at the end of their three years' course they will be equipped for the work to be done. Assignments will then be made upon different reservations as circumstances may require.

The course, as at present outlined, is as follows:

First Year.

First Term: Arithmetic, book-keeping, business law, physical geography, botany, forestry.

Second Term: Algebra, book-keeping, business law, study of soils, meteorology, botany, forestry.

Second Year.

First Term: Geometry, commercial geography, elementary law, civil and criminal, embracing the duties of constables, fish, game and forest wardens, advanced botany, dendrology, forestry.

Second Term: Trigonometry, economic zoology, civil government, geology, forestry.

Third Year.

First Term: Surveying, leveling, draughting, physics, German or French, inorganic chemistry, forestry.

Second Term: Triangulation, topography, draughting, elementary political economy, road making, German or French, forestry.

During the practical work periods in the first and second years, and at other convenient times, in addition to the field work in forestry, lectures will be delivered at stated intervals on medical emergencies, physiology and hygiene.

The recommendation made by Doctor Rothrock, in his report, with respect to cavalry drill for the students, we believe to be sound and something which would produce good results. The need of expert horsemanship among the forest officers is constantly felt and at no time more so than in the fire seasons. In addition, they become sworn officers of the law with power to make arrests without warrant. A knowledge of cavalry tactics and the attendant drill and

training therein cannot be otherwise than beneficial to the State service.

Some efforts have been made looking toward securing a competent instructor in tactics and one who would also be qualified to teach the higher branches in mathematics. At the time of this writing no definite arrangements have been made.

The Camp Sanatorium.

Under the authority of an act of Assembly, approved May 15, 1903, the Commissioner of Forestry was authorized to select a suitable site and erect buildings, within the bounds of the forest reservation in Franklin county, to be used as a sanatorium for poor consumptives. For this purpose there was an accompanying appropriation of eight thousand dollars.

A suitable locality among the white pines of this reservation was chosen. Buildings were erected and equipped. An unfailing and pure water supply was provided, without possibility of contamination, and the camp opened for the reception of patients in the early summer of 1903. Through the munificence of private persons, friends of the cause, some cabins were erected on this site a few months before the passage of the above act. These formed the nucleus of the camp and proved the value of the open-air treatment at this place.

A further discussion and description of the camp sanatorium will be found herein in the reports respectively of Dr. J. T. Rothrock, under whose direction and oversight the camp was successfully established, and Dr. Addison M. Rothrock, the physician in charge of the camp.

Illustrations.

The illustrations appearing in this Report are such as we deem necessary properly to set forth facts, conditions, and theories herein contained. A good picture is frequently worth pages of descriptive matter, and there is no mistaking the object described. The imagination of the reader needs not to be called upon for assistance.

There is no intention whatever to make this Report a "picture book." Not an illustration has been inserted for the purpose of embellishment or padding. We feel that each is here for a good purpose, that it illustrates some fact. Not all persons who read the Report will have the privilege or opportunity of visiting the reservations and seeing for themselves the conditions and facts herein described. We know then of no better way in which to bring these vividly before the people than by means of well-selected illustrations.

**EXCERPTS FROM REPORTS MADE TO THE DEPARTMENT BY
FOREST WARDENS IN 1903.**

Adams County.

No fires on the Caledonia Division of South Mountain Reservation.

About 6,500 acres burned over on the Mont Alto Division, same reservation; almost all standing growth killed; 30,000 cords of wood killed, not totally destroyed; constables fought fire when called upon; all fires believed to have been maliciously set; small game and insectivorous birds suffered.

Clearfield County.

About 500 acres burned over; much only partially burned and will die later; probably 100,000 feet B. M. destroyed.

"Constables in this county pay no attention to fires. They never have been paid for anything done. I think they had best not be encouraged, for if they do get paid they would maliciously start them to get work."

Centre County.

(See Clinton County.)

Clinton County.

Three small fires; 2,000 acres burned over; land mostly barren; loss not great; about 50,000 feet B. M. destroyed.

Constables paid no attention to fires, which were caused by railroads; pheasants and rabbits destroyed.

Franklin County.

(See Adams County.)

Huntingdon County.

One hundred and fifty to two hundred acres burned; loss slight; mainly small saplings.

Constables refused to go out, as required by law; they are informed it is not their duty (by county officials).

Fires are believed to have been started maliciously, as well as by bee hunters. Turkeys and pheasants were destroyed.

Mifflin County.

About 4,000 acres burned. All the tracts of the Rothrock Reservation burned more or less; some all over, others but small parts. Turkeys, pheasants, woodcock, squirrels, rabbits and many small birds destroyed.

Monroe County.

About 1,448 acres burned over. Young timber all killed; bark on pine trees badly scorched; origin unknown. Constables did their duty.

"Secure the good-will of the people who live in the woods. Circulate literature through the State, in cities as well as in country places, which will teach the purpose of forestry and the damage done by fires. A great many fires are started by inexperienced hunters and fishermen."

Young pheasants, rabbits and fawns were destroyed.

Pike County.

About 2,200 acres burned over. Some constables did their duty, others did not. All fires were started maliciously and intentionally.

"_____ was heard to say: 'Now is the time to burn the woods, in the old of the moon, when the sap is down, then the pasture will start quickly.'"

A fire in May kills all the young pheasants and deer.

Potter County.

About 1,200 acres burned over. Loss about 80,000 feet B. M. Constables did their duty. One fire was started maliciously, two were accidental. More assistance is needed. Pheasants and rabbits destroyed.

Tioga County.

(Covered by report from Potter county.)

EXCERPTS FROM THE REPORTS MADE TO THE DEPARTMENT BY FOREST WARDENS IN 1904.

Adams County.

About 145 acres burned over. One-fourth of the standing growth will die. Constables did their duty and were paid by the county. "It is the opinion that careless arbutus hunters caused two fires."

Bedford County.

No fires on State lands in 1904. The constables did their duty in suppressing fires in other parts of the county and were assisted by the warden.

Clinton County.

No fires of any consequence on State lands.

Franklin County.

About 665 acres burned, 100 of which were State land. Timber all young and all killed. Constables responded promptly and did their duty. One fire without doubt of incendiary origin, and another believed to have been started by soft paper gun wads from old muzzle loading guns.

Huntingdon County

Four fires reported covering 3,575 acres. Young timber all damaged. Two fires caused by an engine used in lumbering operations. Turkeys, pheasants and rabbits killed. Cass and Union township constables were at the fire. County refuses to pay the constables.

Mifflin County.

No fires on State lands.

Monroe County.

About 3,600 acres burned. All young timber killed. (See report on Pike county, in which some of this area is located.)

Pike County

Two hundred and fifty acres burned over. No large timber killed, but young timber all killed. The constable was not at the fire, which was extinguished by the forest wardens and some hunters.

It is believed the fire was started by hunters who used this method of driving the deer from cover.

Potter County

Two thousand acres burned over adjacent to State land. "The fires were prevented from reaching the State reservation by the admirable work of our constable and men sent out by the owners of the land. All the constables did their duty." (The above is worthy of special mention. R. S. C.)

Fires started from railroad locomotives.

"The best method of preventing forest fires that I know of is to give people living near the State lands to understand that if they set fires and they communicate with the State lands, they will be reported to the Forestry Commission and will be punished to the full extent of the law.

"This is what I did last spring and it worked well."

Snyder County.

About 500 acres burned over. No constables at the fire. Fires believed to have been set maliciously.

Tioga County.

About 1,000 acres burned over. Timber nearly all small and about four-fifths killed. "Chas. Sabin, constable, of Stony Fork, Tioga county, Pa., failed to do as ordered."

Rabbits and pheasants killed.

Union County.

(See Snyder county.)

AMOUNT OF TIMBER CUT AND LOSSES FROM FOREST FIRES DURING THE YEARS 1902 AND 1903.

Tabulated statements of the amount and kind of timber cut in the State of Pennsylvania, during the years 1902 and 1903, will be found on the following pages. These amounts are from reports made to the Department by those engaged in the lumbering industries.

While it is true that Pennsylvania is not yet barren of timber, it is also true that the rate of cutting is greater than the rate of reproduction. If it were not so, there would be little need for the application of the principles of scientific forestry to conditions as found in this State.

The tables setting forth the fire losses are deserving of careful study. They raise the question, why is such waste permitted? It

will, no doubt, continue to be thus until the people of this Commonwealth reach wiser conclusions, when the officers of the law do their whole duty in enforcing the statutes made to better these conditions, and when county officials cease to grasp every opportunity to be used as an excuse for evading a ready compliance with our most salutary laws relating to re-forestization and forest protection.

REPORT OF DEPARTMENT WORK TO MAY 31, 1904.

BY J. T. ROTHROCK, M. D.

Existing law permits but does not require an annual printed report from the Commissioner of Forestry. There are certain conclusions which I have reached after eleven years of experience as the official head of the forestry interest of Pennsylvania, and I desire to embrace this final opportunity of placing them upon record.

State forestry is a matter of business and not of sentiment. It is commenced and continued because the most vital interests of the public demand it. Hitherto it has been resorted to only after serious damage has been done to the public interests by excessive reduction of the forested area of the country. This statement is equally true of this country and of those portions of Europe in which forestry has long been practiced and where it now has attained its most general and most scientific development. Under every government, State forestry seems to have arisen to remedy existing evils induced by private or corporate use of the woodlands. As a rule a hard necessity has obliged each government in turn to protect existing and restore wasted forest areas, because the perpetuity and prosperity of the Nation's life depended upon it. No government seems to have commenced this work before great damage had been wrought within its area. The previous experience of and injurious consequences to other countries were wholly neglected or overlooked.

It is unfortunate that so long a period must elapse between the commencement of forestry operations and the realization of the good results which they are expected to produce, and that the injurious consequences in the meanwhile should be constantly increasing. For example, it is perfectly clear that the State of Pennsylvania is today paying the penalty for denuding our mountain sides of timber, and that this penalty will probably increase in severity for the next half century, in spite of restorative measures now in progress.



PLATE IV. Corner in White Pine Plantation. Two Years After Planting.

On June 1, 1904, Pennsylvania was in actual possession of 443,592 acres, 44.6 perches of land. This land was located in the following counties:

	Acres.	Perches.
Adams and Franklin (South Mountain),	40,084	92
Franklin and Fulton,	2,833	91
Juniata and Mifflin (Rothrock Reservation),	6,708	57
Cumberland,	860	
Dauphin,	3,353	93
Lackawanna,	2,853	147
Wyoming,	1,176	90
Bedford,	5,686	54
Huntingdon (Trough Creek Region),	6,146	155
Monroe,	5,622	4
Elk,	2,263	
Clearfield,	17,546	116
Cameron,	22,752	153
Centre (Nittany Mountain),	4,135	28
Centre,	606	40
Potter,	47,377	80
Pike,	41,628	14
Clinton and Centre (Hopkins Reservation),	87,876	78
Clinton (McElhatton Reservation),	6,093	59
Lycoming (White Deer Creek),	3,617	99
Lycoming and Tioga,	18,057	80
Union, Centre, Snyder, Mifflin and Huntingdon, (Central Reservation),	116,311	114.6
 Total,	 443,592	 44.6

This land belongs absolutely to the Commonwealth, with practically no reservation of private rights except such as will be extinguished within a brief period. Every business consideration demands that it should be cared for. It must be guarded against forest fires, against malicious and lawless plundering, and it must be made to produce a crop of timber. Undesirable trees must be weeded out and only timber of desirable character be allowed to occupy the ground.

It is frequently supposed, and the supposition is often acted upon, that any man accustomed to live and work in the woods is competent to care for the forestry interests. It cannot be too strongly emphasized that as a rule the day laborer, who has hitherto wrought in a lumbering camp is, of all persons, the man most unfitted, by his previous education, for the work of forestry. The legitimate business of lumbering in this country has been to destroy and remove

timber, and I wish to add here that in this work the lumberman was taking the only course that was open to him, and that under the conditions then existing no fault whatever is to be found with him. On the other hand, the work of forestry is to restore and perpetuate the forests by methods which are wholly unknown to the lumberman, and which have had no existence in this country prior to the present forestry agitation.

The experience of every man who has taken an active and leading part in the restoration of our American forests is that we are required to produce and develop a wholly new class of men, and that these men must receive their training in American forests. We are not yet ready for the introduction of the highest scientific methods which are practiced in the forests of Europe. It is unfortunate that this is so, but we must accept the facts as they are and hope for the early coming of the time when forestry may reach its highest scientific development in our own country.

Clearly then, our first duty is to obtain competent, trained men to direct and do our forestry work. These persons should be educated to regard themselves as the representatives of a wholly new class of public employes. They should regard their calling, as it is regarded abroad, as an honorable profession, which is equally important to the State as is either branch of the military service of the Nation, and exactly the same high principles of truthfulness, honor and honesty which exist at West Point and Annapolis should be developed in those who are to care for the forestry interests of this Commonwealth.

It needs no explanation whatever, or argument, to convince any thoughtful person that a well-considered, unchangeable plan is required for the development of a crop which requires a half century or more to produce, and that a time-serving policy would not only be detrimental but absolutely fatal to the work of forest restoration.

The Commonwealth has wisely undertaken to train its common school teachers. It does not expect an immediate compensation in dollars and cents for the money so expended, but it does look forward and confidently expects that these teachers will train up a race of citizens whose worth and value to the Commonwealth will be greater than any pecuniary returns.

It is quite clear to those who have had the largest experience in dealing with these forestry problems that the State must undertake a similar work in training its foresters. These men should be selected from the applicants by a competitive examination, and only those having the best physical and mental development accepted. They should be educated at the expense of the State, under such obligations for faithfulness and continued service on their part as may

appear desirable. They should never be discharged except for cause, and should be promoted in the order of rank and efficiency. It is gratifying to say that Pennsylvania has already commenced work in this direction. Her Forestry Academy in Wiestling Hall, Mont Alto, has closed its first year auspiciously. There seems to be now nothing left for the State to do to produce such a class of foresters as I have mentioned above except to continue further along the lines upon which the school has started.

These foresters, educated at the expense of the State, would of course be supposed to enter into the service of the State. In the course of years, however, the number of foresters so trained would probably be in excess of those required for the care of the State lands. This would be no detriment to the State. The farm wood lot and the care of larger tracts of land owned by individuals would receive scientific care and attention in proportion as the means for rendering such service were furnished, and these foresters, unemployed by the State, would nevertheless render important service in such duty.

State forestry will no doubt be the main help of the Commonwealth for the purpose of maintaining the wood supply, equalizing the flow of water, and other such services as woodland generally is known to render, but every acre of land devoted to forest will be a public benefit, and private enterprise may thus be counted upon to supplement the forestry work of the State.

Attention may be called here to the fact that the forestry school now in operation exacts an honest day's work of its pupils. They are not only supposed to study but to labor, and no one who is too weak, or too indolent, to render such services is a suitable student, or likely to be long retained, in the Forest Academy. All of the work done in the nursery and most of the labor done upon the roads, in the improvement cuttings made upon State lands, in opening fire lanes, etc., has been done by these pupils.

It is quite within the limits of probability that a person who has never handled a pick, shovel, or an axe, may, in course of time, become able to direct and manage efficiently a body of men who are using these implements. It is quite clear, however, that he will more certainly win the respect and obedience of the men who labor under his direction if they realize at once that he is practically familiar with and accustomed to the use of such tools. We, therefore, make no apology for the statement that every young man who enters the Forest Academy is, during certain portions of his study in that institution, obliged to do a full day's work under the direction and supervision of a "Boss." It can be clearly shown that this pupilage does not in any way interfere with the self-respect of any worthy student.

It may be further remarked here that this State Forestry Academy is not designed to conflict in any way with higher courses of scientific instruction offered by more fully equipped educational establishments. Its object is to supply promptly a needed class of men for the State service and to furnish these men by the most direct methods.

It would be natural to expect that the South Mountain Forest Reservation, enjoying the advantages of the labors of so many young men, should soon become the model reservation of the State, and as a matter of fact, already many miles of fire lanes and forest roads and trails have been opened upon that reservation by the labors of these pupils, and I take great pleasure here in calling attention to the faithful service, and to the fine spirit of the students of the school.

I cannot forbear here from renewing the suggestion which has already been made by me, namely; that, as the students of this school are all supposed to own their own horses, and as they can at any time be made sworn officers of the State, it would indeed be a wise policy if they were placed under regular cavalry drill and armed by the State.

The reasons upon which I make this suggestion are, first, that if the experience of recent years has proved anything, it is that so long as there exists a necessity for, or a possibility of, State defence against internal or external foes, that the mounted riflemen will be a most important factor in the public service, and furthermore, it is well known today that time is required to produce such a soldier.

My second reason is, that of all the men within the State limits there is no class whose daily life would so well fit them for this service as those are fitted who live and work constantly in the woods, among the mountains, and who become the most fearless and skilful horsemen, and whose keen eyes and steady nerves afford the best physical condition for the development of an expert rifleman.

The third reason for making this suggestion is that the military training, and the necessary discipline accompanying it, would be a helpful means of developing gentlemanly carriage, proper deportment and self-respect among the students themselves. The students of the school already wear a distinctive uniform.

In the early history of the country the most urgent need of the Commonwealth was citizens, and it was a wise provision by which the citizens could secure a warrant for State land at the nominal sum of twenty-six cents per acre with all of its wealth of timber standing upon it. Such land, however, was not reckoned of value to the agriculturist because of the standing timber. As a matter of

fact the settler would have preferred to have it without the labor and cost of clearing it. Timber of the finest quality, which would today have been a fortune to the land owner, was cut down and burned simply in order to get rid of it.

Today the conditions have wholly changed, the State realizing, too late, that it would have been wiser to have retained several million acres of those public lands, is now reversing its policy and purchasing back again at a higher price, without the timber, the land which it once sold at a nominal price with the timber upon it. But the law authorizing an unrestricted warranting of the public land remains unrepealed, and it is still possible for the citizen to secure the remaining unwarranted public lands which the State possesses at the same nominal cost and then actually sell them back again to the Commonwealth at a price greatly in excess of that which was paid.

This policy is certainly unwise. In the first place the policy is not sound from a business point of view; in the second place it subjects the Forestry Reservation Commissioners to censure for doing the very thing which they were appointed to do. Unwise as the purchase may seem under such conditions, it can readily be shown that it would be still more unwise not to purchase the land, even at this excess of payment.

The presence of land owned by an individual and surrounded on all sides by land purchased by the State often becomes a menace to the latter. It is, therefore, suggested that it would be wise to enact that before a private individual, or corporation, could secure any tract of land by warrant, that his application for the same should be referred to the State Forestry Reservation Commission for a decision as to whether the State had not better retain it, and that if it was decided that the State should retain it, that no warrant upon the land should be granted.

It is needless to dilate upon the necessity which exists for the State to have all of the lands purchased by the Forestry Commission surveyed as promptly as possible. Unless this is done there may arise serious doubt, even on the part of the State officials, as to the best management of certain areas. A still more urgent reason for this survey exists in the fact that it will protect the State lands against depredation.

It is well known that where the Commonwealth possesses its largest land holdings there is a class properly designated as timber thieves. They are men who are not known to possess, or to pay tax, upon a single acre of woodland, and yet they are constantly engaged in the manufacture of railroad ties, and cutting hoop poles, firewood, or other woodland products.

In addition to these who are depredators knowingly, there are

many persons who own woodland lots, but who are uncertain as to the exact location of the boundary lines of their own property. In some instances these parties, through an honest error, cut beyond their own limits. There is, however, another class of land owners whose chief concern is to cut up to their boundary line at least, and they reckon the crime a small one if they cut on, within the line of their neighbor. If they happen to have transgressed they find ignorance a ready plea.

I desire particularly here to call attention to another class of transgressors upon the State lands who may, without any qualifications whatever, be called criminals. I refer now to those individuals who invade State lands in the autumn and cut down the young, growing chestnut trees simply for the purpose of obtaining the fruit. Cases of this kind are known to have occurred, especially in Clinton county, and upon lands for which no State Warden had been appointed. As a matter of fact, it is often extremely difficult to convict these criminals by any circumstantial evidence.

Such depredators reveal clearly the necessity for efficient wardens, or care-takers, upon all of the State's holdings. Unless the State means to protect its land it had better cease to buy it. The outcome of tolerating such depredations is to develop rapidly a growing criminal class in our woodland regions. Every hour that these crimes are tolerated will simply increase the difficulty of breaking up such pernicious practices.

The most important problem before the public today is the suppression of forest fires, both on public and private lands. All efforts at timber restoration will be more or less neutralized so long as the present existing condition continues. Bad as it is at present, however, there is great ground for hope and encouragement. It is but a few years since it was deemed, by the average citizen in this State, no crime to fire the forest. There are some uncivilized portions of the United States where this belief still exists and where, regularly, spring and fall, the woods are systematically fired; indeed there are some who honestly advocate that it would be wiser if there were a spring and autumn firing demanded here by law.

It is quite true, as these persons allege, that timber can be found growing where these fires constantly occur. An examination, however, of such regions will prove that the forests consist mainly of one or two species of the hardest trees and that the timber is usually sparse in quantity and bad in quality. Some of our most valuable trees would be absolutely exterminated if this were done. At present there is a growing realization of the fact that it is a crime to start a forest fire. This at least is a hopeful change in public sentiment and may be regarded as the promise of the time when forest fires

will be as effectually held in check here as they now are in Germany and France.

There exists, however, urgent need for continued educational efforts in order that the sentiment in favor of forestry protection may be sharpened and increased. Even under existing laws it is quite possible to diminish, materially, the frequency and severity of these annual conflagrations. In the spring of 1904, Dr. H. M. Longsdorf, of Cumberland county, was appointed warden for one of the worst fire infested districts of the State. By his active work and business methods that district was almost wholly exempt from fire during the past season.

I am not sure that it is the duty of the Forestry Department to enforce the fire laws of the State upon grounds belonging to private parties, or to corporations. Through the influence of the friends of forestry, laws have been enacted which seem to be amply sufficient for the protection of the individual land owners, and if they fail to demand the enforcement of the laws so enacted in their interest, it would appear as if they should bear the penalty themselves.

On the other hand there is no doubt that it is the duty of the Department of Forestry to bring to justice and punishment every one who creates a forest fire upon the State land. This has been done in a large number of instances, and the effect in the districts where these criminals have been convicted has been most salutary. There are, nevertheless, counties in this State where every obstacle seems to have been thrown in the way of the enforcement of the law. It is not for me to characterize the conduct of a court which fails to enforce needed, helpful, and constitutional legislation. It is respectfully suggested that it is the duty of the Forestry Department to oblige the constables of townships to suppress these forest fires upon State lands, and to see that they receive their legal compensation for so doing. A law approved on the 30th day of March, 1897, reads thus:

"Section 3. The fire wardens of each township throughout the Commonwealth shall, in the first week of each term of the court of quarter sessions of their respective counties, make returns to said court, under oath or affirmation, of all violations occurring within their respective townships, which may come or be brought to their notice, of any of the provisions of any law now enacted, or hereafter to be enacted, for the purpose of protecting forests from fire, and it shall be the special duty of the judge of said court to see these returns are faithfully made; and on failure of any fire warden to comply with this provision, or if it be found upon examination or inquiry by said court that any fire warden has either wilfully or negligently omitted to report all such violation occurring within his

township, or having failed to perform his duty as set forth in section one of this act, such fire warden or constable shall be deemed guilty of wilfully or negligently making a false return, or neglect of duty, and the court shall suspend him from office and direct the district attorney to indict and try him, and if found guilty, he shall be fined in a sum not exceeding fifty dollars, and undergo an imprisonment not exceeding three months, both or either, at the discretion of the court."

I would call particular attention to the fact that *it is a special duty of the judges to see that these returns are faithfully made.*

I firmly believe that in every case where constables of townships fail to do their duty in suppressing forest fires in public lands, that the Forestry Department should endeavor to bring them to punishment for failure to perform their duties, and where they have honestly rendered their services required by law in suppressing fire on State lands, and for which the county commissioners refuse to remunerate them according to law, that the case should be carried by the Department to court, and if the decision of the court is against the Department, that an appeal should be taken to a superior court. The present condition is intolerable.

On the State lands it is important that fire lanes should be cut as promptly as possible, and that these lanes should so cross each other that a fire, once started, could be confined more readily to limited areas. These fire lanes should be practically kept clear of underbrush. No better example of a fire lane can be found than that which has been cut through the woods over the ground beneath which the pipe lines conveying the oil are buried.

In the care of the State lands up to this time but few wardens have been appointed. There is a twofold reason for this apparent neglect of an obvious duty. In the first place it was difficult to obtain a suitable class of men for this work. There is no lack of candidates, but the absolute unfitness of many of these for the work was so apparent that it would have been nothing short of a crime to have appointed them.

In the second place the largest body of the State lands still remains unsurveyed for the reason that the external boundaries are not yet fixed, and that constant additions to these areas continue to be made. The appointment of a warden to care for lands which have not yet been properly outlined upon the ground would have been, in many instances, premature, and likely to have led to constant conflict. Another reason, and a still more important one, is that as the forestry movement is a new one and can only advance as rapidly as public sentiment allows it to move, that the Commission would have been severely censured for reckless extravagance

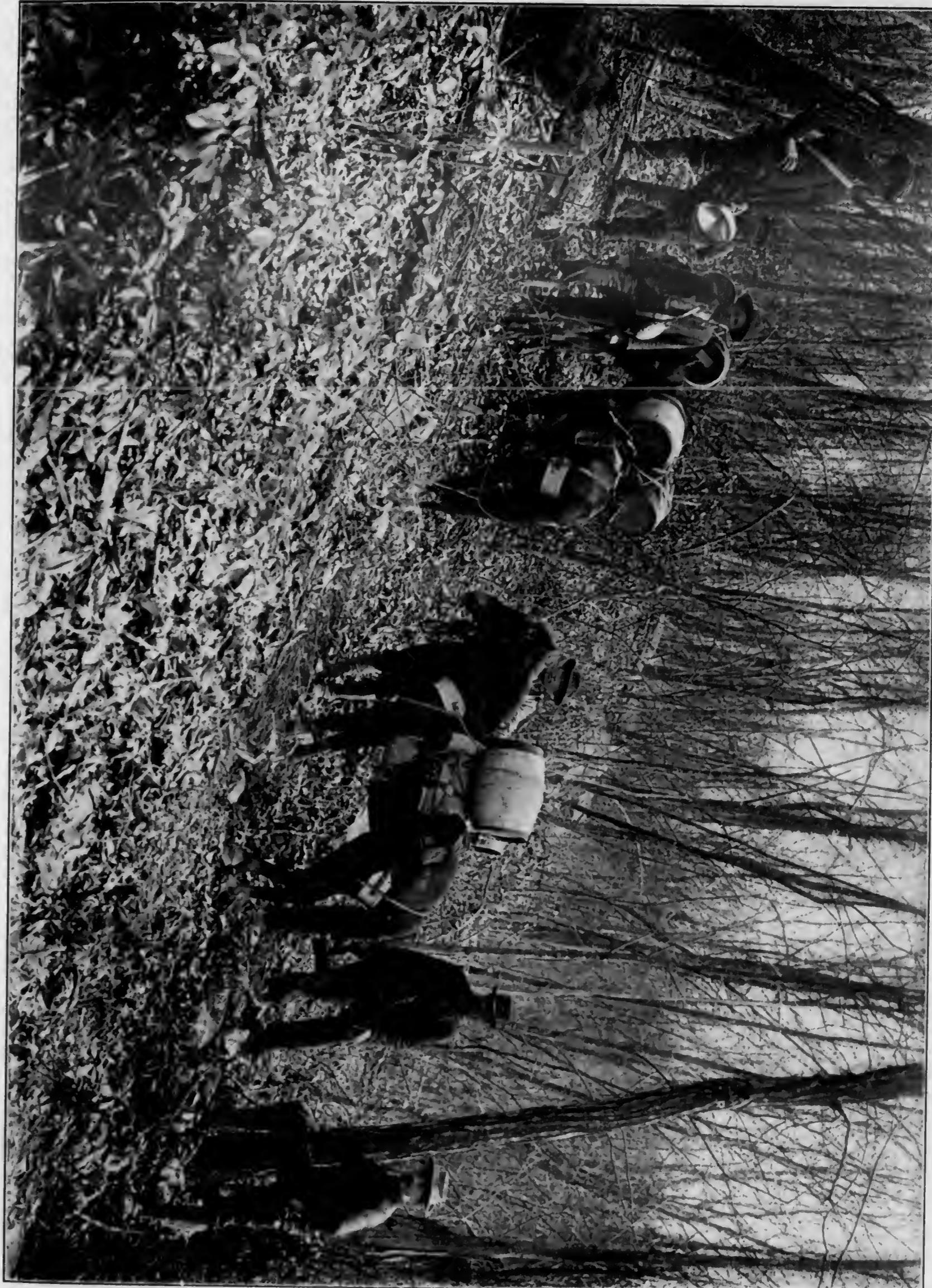


PLATE V. Pack Horses Carrying Water for "Back Firing" Against Advancing Forest Fire.

township, or having failed to perform his duty as set forth in section one of this act, such fire warden or constable shall be deemed guilty of wilfully or negligently making a false return, or neglect of duty, and the court shall suspend him from office and direct the district attorney to indict and try him, and if found guilty, he shall be fined in a sum not exceeding fifty dollars, and undergo an imprisonment not exceeding three months, both or either, at the discretion of the court."

I would call particular attention to the fact that *it is a special duty of the judges to see that these returns are faithfully made.*

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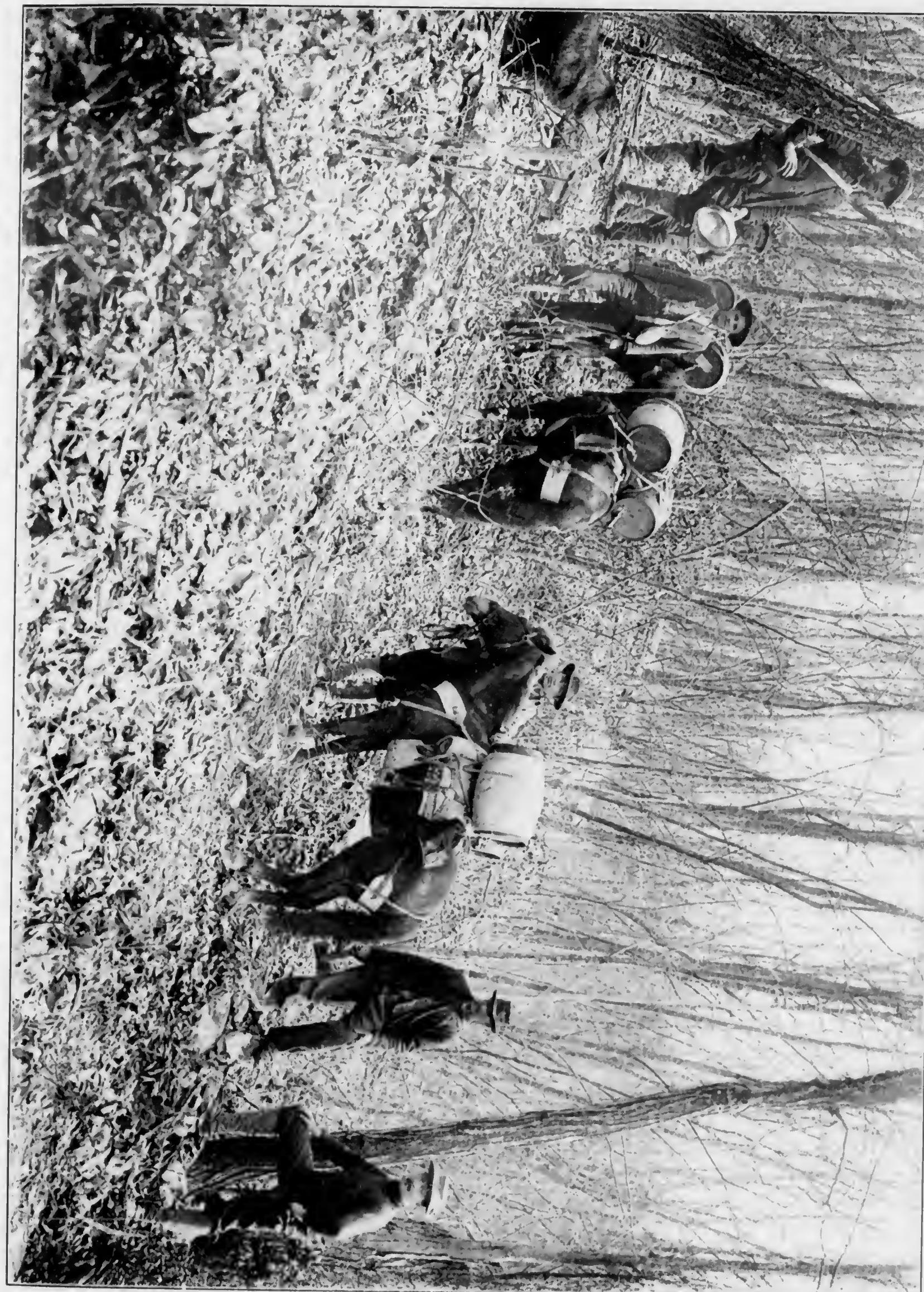


PLATE V. Pack Horses Carrying Water for "Back Firing" Against Advancing Forest Fire.

and waste of public funds by appointing even a few of the many wardens whose position were most clearly indicated. To have exceeded the limits imposed by public sentiment might have led to a serious check to the forestry work. It is unfortunate that such conditions should prevail, but we can only accept the facts as we find them, and utilize the forces that are favorable to the work.

I am of the opinion that there should be, however, for every five thousand (5,000) acres of State land, one competent mounted warden appointed, and that he should live permanently upon the land assigned to his care, and that the State should claim and require from him all of his time. That it should be his duty to protect the State lands against depredations and forest fires, and to assist the Game and Fish wardens, and constables in the performance of their duties. For the service of such a warden employed throughout the year, the sum of \$50.00 per month would be an ample compensation, unless he were a trained forester, capable of rendering professional service, as such, to the State.

From the fifteenth of March until the fifteenth of June, in regions which were especially liable to destruction by forest fires, these wardens should have the authority to employ, temporarily, one or more assistants to prevent fires from acquiring a start. It usually costs as much to suppress a forest fire as it does to prevent it. In the former case you lose the timber, in the other you save it. This same authority should be given to the wardens for the months of October and November.

At present there is no fixed standard of payment, and no fixed area assigned to our forest wardens. There existed reasons, which it is not necessary here to detail, why this was unavoidable. It appears, however, that the time is ripe for a complete, radical change in the matter, and I cannot too strongly urge that it should be made at once, and that no warden should, under any consideration whatever, be retained in the service of the State unless it can be shown that he renders a faithful, conscientious, and an effective service. We cannot too soon discharge any warden after it has become apparent that he does not have a personal, honest interest in the work.

In addition to these wardens, there should, in my judgment, be appointed a superintendent over every five wardens. These superintendents should be men skilled in forestry, capable of conducting business transactions and of directing the necessary work in the region assigned to them. It is possible to obtain such men for \$100.00 a month. In addition to their salary, they should be obliged to be constantly upon, or in the immediate vicinity of their ground, and a suitable mount should be supplied by the State for such officers.

The basis upon which the Forestry Commission is moving is that

the State must have, eventually, at least one million acres of land. It is to be hoped to acquire this during the present administration.

If the recommendations here made should go into effect, it would mean the appointment of two hundred wardens. This would require for their salaries the sum of \$120,000. In addition to the salaries of the wardens there would be required \$48,000 for the services of the superintendents. This means an expenditure of \$168,000 annually for the care of the State lands. It is well to face this problem squarely at the outset. The State has entered upon a problem which President Roosevelt has wisely pronounced to be the most important question of internal government before the people today. It has entered upon it, not because it wished to do so, but simply because it was necessary for the continued prosperity of the people. Without it the fertility of our soil would diminish, the flow in the streams of our State become irregular, our wood-requiring industries would languish, and the balance of Nature, which it has required unknown centuries to produce, would be changed, to the infinite harm of our citizens.

We may wisely postpone the consideration of this subject, or we may foolishly refuse to provide the means which the forestry work requires, but we cannot change the laws of Nature or avert the disastrous consequences of our failure to obey them. I, therefore, urge, as earnestly as I can, that this work of properly caring for the ground which the State acquires be at once attended to, and that no short-sighted, parsimonious policy be allowed to interfere with the work which has been so well begun, a work which "helps every one, harms no one, and which pleases God."

It is never economy in the long run to neglect to provide for our national safety, because in its keeping rests the prosperity and safety of every individual. If the forestry work of the State is not to be properly done, it had better be abandoned at once, but if abandoned, disaster to the Commonwealth may be regarded as assured.

We think it worth while to expend a million or more dollars in decoration of the Capitol and ground upon which it stands. Is it wise to expend less upon the preservation and perpetuity of the Commonwealth for which the Capitol exists?

Thus far we have not considered forestry from the point of view of its financial returns to the State. Whatever else will happen, there never will come a time when the world can find a perfect substitute for wood. We may go further than this and say that we cannot think it possible, or probable, that the demand for wood will fail to increase as the centuries pass. Whilst in many lines of industry we are finding substitutes for wood, at the same time we continue to find and multiply new uses for it.

The basis of our national life, that upon which everything else immediately depends, is agriculture. Our population is increasing rapidly and making every possible allowance for the increase of yield in our acres, as we farm them better, the fact still remains that every acre of soil which will produce a better crop of cereal grains than of anything else, will ultimately be devoted to farming interests. This, of course, means that the production of timber will be limited to such portions of the State as cannot be farmed, and that in order to supply the timber which is necessary for our industries and our comfort, every acre of timber land must produce its largest crop of timber.

As the population increases, and as the timber of the country becomes scarcer, the price of the forest productions will eventually increase. This means that the State will receive a large financial return for every cent which it has invested, or will invest in timber production, if it conduct its operations upon a proper business basis.

It is not too much to say that over and above all of the climatic and agricultural advantages, growing out of forestry to the State, that there will be in the long run more than a return of interest and principal to the Commonwealth for the money which it devotes to forest preservation and restoration. It is an established fact also that the increase of financial return to the State, in forests which are properly managed, is always in excess of the difference between the money expended for good and for bad management.

In order that the State may realize these financial returns, two things are requisite. First, that the annual destruction of growing timber by forest fires should be prevented. There are certain districts in the State where this will be a slow process. There are certain other districts of the State reservation where protection of the growing timber is quite possible. For an example, in the purchases already made, the Commonwealth has come into possession of many abandoned farms. The largest proportion of these farms is ready at any time to be made into plantations of white pine. These old farms have now, or had, buildings upon them, and they are suitable locations upon which the warden of that district might reside, and where he could care for and protect the growing timber. A most encouraging start in the production of white pine seedlings has already been made at the nursery connected with the forestry school on the South Mountain Reservation.

There never will be a surplus of white pine in the world, nor will there ever come a time when the market for it will fail.

As a side issue it would perhaps be wise for the Legislature to consider the propriety of furnishing (under certain fixed conditions which would guarantee successful planting and growing, or at least

render it probable), to the land owners of the State, gratuitously, white pine seedlings. These can be raised at an almost nominal cost. There is not a portion of this Commonwealth in which white pine cannot be grown successfully, and there are but a few farm houses or barns whose comfort and often whose safety would not be increased by a wind screen of pines on the side most exposed to severe storms. On almost every farm there is an acre or two of ground where these seedlings might be profitably planted and prove to be a good investment; and what is true of white pine is, in a measure, and under certain conditions, true of every other valuable kind of timber-producing tree which grows within the limits of this State. The market value of our common black locust, in the near future, is already assured, and until our citizens learn how to produce these seedlings, themselves, it would probably be wise for the State to make this gratuitous offer.

I desire to invite attention to the following:

AN ACT

To encourage the preservation of forests by providing for a rebate of certain taxes levied thereon.

Section 1. Be it enacted, &c., That in consideration of the public benefit to be derived from the retention of forest or timber trees, the owner or owners of land in this Commonwealth, having on it forest or timber trees averaging not less than fifty trees to the acre, each of said trees to measure at least eight inches in diameter at a height of six feet above the surface of the ground, with no portion of the said land absolutely cleared of the said trees, shall, upon filing with the county treasurer of their respective counties and with the tax collectors of their respective townships or districts an affidavit made by said owner or owners, or by some one in his, her, or their behalf, setting forth the number of acres of timber land within the requirements of this act, be entitled to receive annually, during the period that said trees are maintained in good condition upon the said land, a rebate equal to eighty per centum of all taxes, local and county, annually assessed and paid upon said land, or so much of the eighty per centum as shall not exceed in all the sum of forty-five cents per acre, the said rebate to be deducted from the said taxes, pro rata, and received for by the respective tax collectors or county treasurers: Provided, however, That no one property owner shall be entitled to receive said rebate on more than fifty acres.

Section 2. All acts or parts of acts inconsistent herewith are hereby repealed.

Approved—The 11th day of April, A. D. 1901.

WILLIAM A. STONE.

This law is just and wise in all of its provisions. To admit that this law has not become as widely operative as it should have been is simply to admit an undeniable fact which requires an explanation. In some counties the rebate allowed by law has been grudgingly given; in others it has been wholly refused, even after all of the legal requirements had been observed. In other counties the statement has been officially made to the assessors that if certain parties demand the tax rebate for standing timber, that an increase of value should be placed upon the land to compensate for the tax reduction. It appears if this statement be substantiated, that there should be more legal redress. The law, I believe, declares that assessment shall have a certain fixed proportion to the value of the property assessed. If there is any deviation from this by the county officers, upon their own individual authority, it would appear as if it were official malfeasance, to which at least the attention of the court might be called.

In assisting to frame the law creating the Department of Forestry, the Hon. William A. Stone, then Governor of the Commonwealth, foreseeing that the Forestry Commission would be, of necessity, required to devote a very considerable portion of time and labor to this work, had inserted a clause allowing each Commissioner, in addition to his annual expenses, a salary of \$300 per year. I believed at the time that it was unnecessary. I have since become convinced that it was a wise provision, for the reason that there come times when it is necessary for the members of this Commission to leave their homes for a considerable period, at a financial loss to themselves, in order to attend to the work of the Commonwealth. The Commonwealth is neither disabled, poor, nor blind, and is therefore not a subject for charity. It exacts compensation in some shape for the service which it renders and it should therefore grant compensation for the service which it receives, and I therefore suggest that, in addition to the actual expense of travel on State duty, that the members of the Commission should receive a compensation of \$7.00 a day for the time actually expended in State work, provided that no Commissioner, except the President of the Board, should receive for his services, in addition to the necessary expense of travel, a sum greater than \$500.00 a year. This would enable the Commissioner to attend to his duties without great financial loss to himself, and yet the sum would be too small to make a place on the Commission worth seeking by those who had no other interest in the work than to draw the salary.

Pennsylvania, in the general condition of her forestry legislation, may be safely considered as well in advance of any other State in the Union. It is needless to say, however, that there is still

room for great advance in our forestry laws. Some of the changes have already been hinted at in this report.

There remains one direction in which our State may safely move along a line which has hitherto received scant recognition from the friends of forestry. I allude now to the use of the State Forestry Reservations as outing grounds and sanatoria for the citizens of the Commonwealth, and especially those whose limited means preclude the possibility of their seeking the more distant regions to which our "summering citizens" go. Every acre of land purchased by the Commonwealth as a part of this Forestry Reservation system has been paid for by the citizens of the Commonwealth; it therefore is absolutely theirs, theirs to be used for any purpose which they may seek or assign to it. It is nothing whatever to the purpose to assert that this land was purchased for the purpose of forest restoration and production. This is entirely true; but the public has not been slow to recognize the fact that it might properly be utilized for other most important purposes without in any way interfering with its uses for forestry.

The constantly increasing demands made for camping grounds upon the State officers, who have these lands in charge, cannot longer be ignored. These demands must either be granted under certain conditions or they must be wholly refused. We may gain something to guide us by the action of the forest authorities of New York, who allow camping parties in any portion of public lands of the State, provided that no permanent structures are erected. The citizens of that State may erect their tents for camping purposes upon any portion of its vast public domain. For the purpose of the sportsman this is all sufficient, and the example thus set is already practically followed by the forest authorities of our Commonwealth, as the following extracts from the forestry rules will show:

"7. No person will be permitted to erect a camp who has not accepted in writing the camping rules and received a camping permit.

"8. Every person receiving a camping permit must report to the Commissioner of Forestry, at Harrisburg, any violation of law, or of the rules for the government of the State Forestry Reservation lands coming under his observation.

"9. No permanent camp or other structure may be erected on the reservation.

"10. The pre-emption of any ground as a special camp site to the exclusion of others who may desire to camp near, and who have permission to camp on State lands, will not be permitted.

"11. All persons who desire to picnic upon the State Forestry Reservation lands, remaining for a less time than a day and not over



PLATE VI. Winter Scene. Down the Street, South Mountain Camp Sanatorium.

night, are not regarded as campers and will not be required to procure a camping permit, but will be governed in all other respects by these rules."

The fact that a permit is required to camp on the State grounds is practically no hindrance whatever, as any reputable citizen of the Commonwealth can obtain this permit by simply asking for it, and the only object of this requirement is in order to enable the authorities to know who is upon the ground; and this is what any private citizen would expect to know about persons who were upon his holdings.

There is, however, another class of citizens who have still stronger claims upon the liberality of the State. I refer now to those in failing health, and particularly to those who are threatened with tuberculosis. An invalid is always to a greater or less extent a tax. Even if he does not require help from his family or from the public, his earning capacity is, as a rule, reduced below that of his healthy, normal condition. In other words, invalidism is a loss to the Commonwealth. The more chronic it is, the more serious is the loss. The broad proposition, then, is true: that in order to avert this drain upon the productive energy of the State the Commonwealth is justified in doing what it may to diminish it.

It would certainly be a moderate estimate if I were to say that within the limits of Pennsylvania there are today five thousand of its citizens who are in need of rest, change of scene, and life amid healthy surroundings, and who, nevertheless, are so reduced in circumstances that they cannot seek these conditions in remote regions. It may be, indeed, that some of them are the bread winners for their families, but in the ordinary course of events most of them will soon cease to be such, and become charges upon those whom they are now endeavoring to support.

Furthermore, it is true that those of this number who are afflicted with tuberculosis may become public scourges, because their disease is one which may readily be transmitted from one individual to another. They walk our public thoroughfares; they swarm the slums and back alleys of our cities; they ride in our public conveyances; they are everywhere about us. They cannot be ignored; they should not be ostracized; they are brethren, human beings requiring our sympathy and our aid, for in most instances their disease is their misfortune and comes from no fault of theirs.

Common prudence demands their separation from those to whom they might communicate the disease; common humanity demands that we assist them so far as in us lies; common sense dictates that we grant them the use, under proper restrictions, of the State Forestry Reservations; because, first, they are the part owners of these



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lands, and second, because in going upon the reservation they cease to be propagators of the disease, and third, because their restoration to health is practically as certain there as it would be in any known part of the United States. This is not a wholly new experiment, as the following will show:

AN ACT

Making an appropriation for the erection and fitting of a sanatorium, and for the maintenance thereof on the State Forestry Reservation at Mont Alto, in Franklin or Adams counties, and authorizing the Commissioner of Forestry to make and enforce rules and regulations governing the same.

Section 1. Be it enacted, &c., That immediately after the passage of this act, the Commissioner of Forestry shall select a suitable site for the erection of a sanatorium for poor consumptives, within the bounds of the State Forestry Reservation, located near Mont Alto, in Franklin county. He shall have authority to select and decide upon a design for said sanatorium, and the material out of which it shall be constructed, and shall have full power to make contracts for its construction, but he shall make no contracts in excess of the appropriation herein named; the total cost of the said sanatorium, and its maintenance for the two fiscal years beginning June first, one thousand nine hundred and three, shall not exceed the sum of eight thousand dollars.

Section 2. For the purpose of carrying out the provisions of this act the sum of eight thousand dollars is hereby specifically appropriated out of any moneys in the State Treasury not otherwise appropriated; the said appropriation to be paid by the State Treasurer upon warrants drawn by the Auditor General, from time to time as the work progresses, upon specifically itemized vouchers, approved by the Commissioner of Forestry and the Governor.

Section 3. That after completion of said sanatorium, the same shall be under the control and management of the Commissioner of Forestry, who is hereby empowered to take control of said sanatorium and make and enforce such rules and regulations, in relation thereto and the use thereof, as in his judgment shall be deemed best and proper.

Approved—The 15th day of May, A. D. 1903.

SAML. W. PENNYPACKER.

By authority of this act a camp sanatorium has been successfully opened near Mont Alto, in the South Mountain Forestry Reservation.

Since June 1, 1903, there have been seventy-one inmates in this camp. Of this number there have been discharged, or are now ready to be discharged, or soon will be ready to be discharged, enough patients to aggregate sixty-six per cent. of the entire number, in such condition that they may be regarded as cured of tuberculosis. By the term cured I mean that these patients are now so nearly restored to their normal condition that they have ceased to be a danger to the public and can follow some healthful out-door vocation with almost no probability of the disease again appearing. On the contrary, it is supposed that the vast majority of those who are discharged as cured will continue to improve until there shall be no apparent signs of tuberculosis about them. It is not to be expected, however, that if after these patients have been discharged as cured they should return again to the conditions under which tuberculosis originally developed, that it will fail to re-appear, and if it should so re-appear, it cannot be logically regarded as a failure on the part of the sanatorium work, for like causes may always be expected to produce like results. An appropriation from the Legislature should be requested this winter to increase the efficiency of, and to enlarge the facilities for continuing the work at Mont Alto.

It does not appear, however, that the State should confine its efforts in suppression of tuberculosis to the work so well commenced at White Haven and at Mont Alto. The State land is to be found now, or soon will be, it is hoped, in every portion of our great Commonwealth. White Haven is situated in the northeastern portion of the Commonwealth; Mont Alto is situated in the southern central part, but there remains the whole of the western half of the State which is entirely unprovided for, and it is not likely that any reservation will be created in a portion of the State which is unfitted for sanatorium purposes which we are now considering, because the land which would naturally fall into our forest reservation is high, dry and healthful as a rule.

I would, therefore, respectfully submit that the Forestry Commission be, by law, empowered to set apart upon the State Reservations suitable areas of one hundred acres each, upon which those who are in search of health might be, under certain restrictions, allowed to go and erect permanent cabins or cottages in which to remain so long as the physician in charge considered their presence necessary for themselves or desirable for the camp, and that these cabins or cottages should be built in accordance with fixed plans and placed so as to conform to the arrangements adopted for the camp, and that when those who erected those buildings should be dismissed from the camp, that the said buildings were to become the property of the Commonwealth, and the builders thereof should have no further rights in them whatever.

The object of this last restriction may require an explanation. In the first place it would prevent the outlay of unnecessary expense upon the buildings, which would tend to make them desirable as permanent homes for the inmates. In the second place, the delivery of these cabins to the Commonwealth, by those who had erected them, would be a return to the State for the benefits which the inmates of the camp might be supposed to have received, and thus in time a sufficient number of buildings would be erected without cost to the Commonwealth to accommodate a very considerable portion of our population who might be in need of such abodes. It is quite within the limits of possibility to erect a building of this kind sufficiently large for two individuals to pass a winter in, comfortably and safely, for sixty dollars. The only expense to the Commonwealth for such camps would be that of a physician, dispensary and an overseer; the patients being expected to care for themselves, and keep the camp in a safe and sanatory condition.

It needs but a moment's consideration to realize that such isolation of the patients would reduce to a minimum the danger of ever communicating the disease to other persons, and would at the same time place them in communities by themselves, where they could be supervised and where their surroundings would be of a character most likely to lead to a return to health. And it may be regarded as fairly probable that this plan offers the cheapest solution, in part, of a great problem which is pressing upon us, and the consideration of which cannot long be delayed.

In conclusion, I wish here to offer my sincere thanks to all the officers and citizens of the State who have in any way assisted or encouraged me in my labors during the eleven years of my official service.

REPORT OF THE STATE FORESTER.

GEORGE H. WIRT.

It is very true that the greater part of the preliminary work on a forest reservation is of such a nature that at the end of one year it is difficult to note much advance over the work done in the preceding year. We are still almost at the beginning of preliminary work, and it is necessary for us to make haste slowly. To do this one must accept the conditions as they are and the results that follow, until, with a gradual change, larger and better results can and must be expected.

For the year 1903 the Forester may seem to have very little to report owing to the above, and, in addition, to a very small force of regularly employed men. But during 1904, with a larger force of men available, a real appreciable amount of work has been accomplished.

The old Mont Alto estate is now undergoing a systematic improvement and forestry work proper is being rapidly advanced. Above all, there is a better understanding of local conditions and needs which gives one an insight into the future, an idea of the work that must be done, the questions which must be met, and the methods to be followed. For these reasons this report will be in two parts. The first part will deal with the work that has been done during the years 1903 and 1904 and the results; and the second will deal with the needs of the immediate future, not only on this reservation, but also on the other reservations in general.

Part I.

It is nothing more than proper that, before an enumeration of the work done, some explanation be made relative to the force of men available and their relative ability. First, it must be understood that it was the idea to have those regularly appointed do the greater part of the work on the reservation, and in fact what forestry work has been done was done by them, as well as a large part of the work of clearing away old buildings, rubbish, etc., and a number of the repairs and changes made in and around what is now the Forest Academy. The year of 1903 began with an Assistant Forester and

two student-assistants whom the Forester could use for accomplishing his work. In April of that year another student-assistant came. These men were willing enough to work; but the student-assistants were young and not accustomed to hard work. Indeed, they were hardly strong enough to do a man's work. In September, 1903, ten young men reported for duty. These constituted the first class in the Forest Academy. On the first of April, 1904, the Assistant Forester and one student left the school. In September of 1904 seven new students reported at the academy, becoming the second class, and making in all twenty men. Most of these are young men who knew very little about work before coming here, and there are at present only a few who can do the work of an ordinary laboring man. They are here as students; consequently they do not work as many hours as a laboring man would, not averaging more than five hours a day through the whole year. When these matters are considered the work that has been done does not seem small to those who realize what some of the work necessitates; to others it is useless to explain.

Improvement Cuttings, Etc.

In the fall of 1902 thinnings were begun in several small stands of white pine near the South Mountain Camp Sanatorium. As soon in 1903 as the weather permitted this work was continued until about two acres were put into good condition. Not only was the stand thinned, but the remaining trees were pruned to a height of from twenty to thirty feet. Two car loads of pulp wood and about twenty cords of branch wood were obtained from this operation.

In addition to the two car loads of pulp wood, as above, and about 125 telephone poles, used in the erection of telephone lines on the reservation, about six hundred cords of fire wood were removed from the reservation during the year. Requests for fire wood were received constantly, and early in the year an arrangement was made for the sale of dead wood. Persons who purchased wood were asked to sign the following agreement:

"In return for the privilege granted to me by the Department of Forestry, in allowing me to obtain wood at fifty (50) cents per cord, from State land, I hereby promise:

"First. To cut only dead wood unless otherwise directed.

"Second. To have wood, before removed, in such shape that it may be measured and the cords estimated.

"Third. To pay for all wood in advance of removal.

"Fourth. To notify the superintendent, or his agent, at least twenty-four (24) hours before beginning work of cutting or of removal.

"Fifth. Never to fire the woods, and just so far as in my power to aid in keeping fires out of the woods."

PLATE VII. Reservation Forest. Before Improvement Cutting. South Mountain Reservation.



There is a very large amount of dead and worthless wood on the reservation that is better out of the forest than in it, for many reasons. It is policy to dispose of this with least cost and with as large a revenue as is possible. At first, objections were raised as to the base of measurement, the general desire being that a certain sum be charged for a one-horse load. This, of course, would be unsatisfactory because of the irregularity in the amount hauled. Later, it was stated that the price was too high. At this price, until the wood is chopped, hauled to market, and split for the stove, it costs the user about \$2.00 a cord, where green cord wood, delivered, costs \$3.00. Such being the case, it is readily seen to be comparatively cheap wood. However, the good-will of the people is one of the things most desired. If it is thought the wood is costing too much and no one is allowed to take green wood, it is not likely that fires will be created, so that dead wood can be had for little or nothing. It is not at all necessary that the wood be cut into cord length and ranked, but it must be measured, either on piles or on the wagons, and paid for before removal. There is then no question as to the money. The sale of wood kept two men busy most of their time; but along with this duty they were able to guard a considerable area of the reservation. The promise in regard to fire, no doubt, did some good in most cases. The fact that each man had to put his name on paper below such a promise made it more effectual than if simply taken orally. In this connection, it is safe to say that if the forestry work in this region has done nothing else for the good of the community, it has accomplished one result, which is of much importance. It is a fact that absolutely refusing to give wood away and protecting the reservation from theft has forced a number of men to work out for themselves an honest living.

During 1904 three more carloads of pulp wood and nearly thirty cords of branch wood were cut from the pine grove's near the Sanatorium. At the foot of Pine Mountain an improvement cutting was begun and nearly one hundred acres have been cut over during the year. Over two hundred cords of first-class fire wood, two thousand feet board measure in logs, twenty-five telephone poles, two hundred fence posts and one hundred rails were taken out. Two-thirds of the fire wood has been sold to local customers alone, and there is still a demand. Two dollars per cord is the price paid for this wood, ranked along the road in the forest, and it is then hauled from one to five miles into the valley. The cords are put up full measure and a reputation for "honest cords" is already established. The demand promises to hold out for some time and to such an extent that the wood will be needed faster than it can be cut. Up to this time, the wood was mixed as cut without making any grades out of it.

From now on it will be more satisfactory to grade it and fix the price accordingly.

The sale of dead wood has continued during the year at fifty cents per cord, about 885 cords having been removed. This method has also been adopted on the Caledonia part of the reservation and seems to be a success. On a tract of land near Pondtown, the dead wood was removed in this way during 1903. A fire occurred there in April, 1902, killing everything on the ground. Now there is a thick coppice growth of oak and chestnut from eight to twelve feet high and in good, thrifty condition. On adjoining land, where the trees were killed by the same fire, but were not removed, the sprouts are not so thrifty nor do they cover the ground with so dense a growth.

Plantations.

On one of the spring Arbor Days of 1903 eight hundred two-year old white pines were planted in what is known as the Monahan Field. At that time the ground was still cold and wet, so no more were put in. About the first of May eight hundred more were planted. This filled up the enclosure made in 1902, when five thousand two-year old white pines were planted. This plantation is doing well. On an average over ninety per cent. of the seedlings planted grew successfully.

In the spring of 1904 a small area within this plantation was cleaned of weeds in order to get a good photograph of the seedlings. It was noticed at the end of the season that those still surrounded by high weeds did as well, if not better, than those from which the weeds were removed, and that the average growth during the year 1904 was eight inches, while that of 1903 was only five inches. In the spring of 1904 two thousand two-year old western catalpas were bought and planted on an area within the sanatorium enclosure. One thousand were planted ten feet apart each way and one thousand were planted with white pine two years old in alternate rows five feet apart, the catalpas being ten feet in the rows and the white pines being five feet in the rows. One thousand white pines were planted pure. These seedlings are in the same plantation and subject to the same conditions and the plantation itself was the first of a series that is being planned for experiment and observation. In the fall of 1904 about one-half acre was planted with western and eastern catalpas in alternate holes four feet apart each way. The eastern catalpa were two years old, once transplanted. The western were raised in our own nursery, but were only one year old. Another half-acre was planted with western catalpa and b'ack locust, each one year old, and raised from seed in our own nursery. These

plantations will be carefully watched and measured and handled in various ways in order to test, thoroughly, the possibilities of the different species. Other experiments will follow this coming spring.

Fires.

In April of 1903 one of the worst fires for some years occurred in this neighborhood. The fire came at a time when everything was perfectly dry in the woods, and during an extremely high wind. Day after day and night after night it was fought, but with no avail. There were several reasons why it could not be stopped sooner. The first was a lack of system in fighting. It is only right that the alacrity with which the local inhabitants responded to the call for fighters and the fearlessness with which they fought be recorded and acknowledged here. Many of the older men have fought fires year after year from boyhood and know how to do it well. When the furnaces were running it was not unusual for almost the whole force to go to the forest fire. There were plenty of men and it did not take them long to surround a fire. They would begin at one end of the fire line, and, not far away from it, start their back fire, a large number raking clear a path through the woods, several firing, and a number scattered along the line to keep it from "jumping the path." In this way they could go very rapidly and even gain on the front of a fire that was driven by the wind. Different conditions now exist. Men are not so easily had and it is barely possible to put a force of twenty-five men in line. Under the old system such a small number makes little headway in catching a "header" going faster than a man can run, or, even when it is going more slowly. Not infrequently, after a day's or a night's firing, just about the time the men think they have reached the worst point and expect to follow an old road, they arrive on the spot to find the fire ahead of them, on the other side, and all their past work for nothing. It is disheartening to say the least. The thing that must be learned, and the thing that is most difficult to get the older men to see, is that every man of the small force must be in front of the running fire, at the danger point, until it is cut off. Then they should separate, one part following down one side line and the remainder following the other side. In this way the raging fire is stopped at once and the slow burning fire is fought leisurely. Another cause of poor success is not from lack of roads, but because the roads have grown almost shut. The men have no base from which to work. Again it occurs that just about the time the fire is conquered the men are completely tired out, and either lie down to rest or go home for something to eat, with no one near to take their places. The fire

starts up again and in a few hours is on its road of destruction as fierce as before.

Altogether about 10,000 acres were burned over, of which at least eight thousand acres were reservation land. The expense for the extinguishment of these fires was nothing less than five hundred dollars. The actual loss incurred over the entire area could not be less than thirty thousand dollars, in addition to which there must be considered the indirect loss to soil, streams, birds and game.

In April of 1904 there was a small fire which burned over about four hundred acres. Fortunately a newly-opened fire lane led to a most advantageous point in front of the fire, allowing the force to get rapidly to the place of danger, and by quick action in starting a back fire, the fire was kept within a small area. At this fire the outfit or kegs and force pumps, as planned by Doctor Rothrock, Ex-Commissioner of Forestry, proved to be of immense help and a perfect success. In November there was one small fire covering possibly fifty acres and doing little damage. It occurred on a damp day and burned slowly. When it was discovered, toward evening, it was already dying out, but a force of men was called immediately and a half-hour's work, with brush, was enough to suppress it.

Nursery Work.

The nursery work of the past two years has been very encouraging. In the spring of 1903 the nursery was almost doubled in size and about twenty pounds of white pine seed, some eastern catalpa and two pounds of red spruce seed were sown. The nursery was kept clean of weeds and in good shape generally. Two large compost heaps were made for fertilizer, to be used in a year or two. In the fall a variety of seeds was planted, among which were white and red oak, ash, maple, horse-chestnut, chestnut, birch and others. An inventory of stock, at the end of the fall work, showed about 145,000 seedlings, as follows:

- 1,500 Three-year old white pine, transplants.
- 30,000 One-year old white pine seedlings, ready to be transplanted in the spring of 1904.
- 100,000 One-year old white pine seedlings, to remain in beds for another year.
- 10,000 Red spruce.
- 3,000 Catalpas (eastern).
- 500 White oaks.

Although the nursery work for 1903 was satisfactory, that of 1904 was more so. One of the older students of the Forest Academy was placed in charge and supervised the work during the entire year.



PLATE VIII. Reservation Forest. After Improvement Cutting. South Mountain Reservation.

He planted in the spring something less than twenty pounds of white pine seed, collected in this neighborhood in the fall of 1902; about one pound of yellow pine (*Pinus mitchii*); two pounds of Douglas fir (*Pseudotsuga Douglasii*); one-half pound of black locust, and six pounds of western catalpa, four pounds of which failed entirely to come up. These seeds did very well, but during the summer a number, in fact, most of the red spruce seedlings, were killed by a fungus which seemed to persist in spite of constant working and of a coating of dry sand. Some of the white pines also damped off, which will account for a lower estimate at the close of the season.

During the summer an attempt was made to transplant western catalpa in the most unfavorable part of the year. On some of the hottest days of July, seedlings, in their first season's growth, were rudely pulled from the seed beds and transplanted. These seedlings all grew in spite of their hardships. By fall they were only about one-half as high as those left in seed beds, but all had good roots and a short-thick, well-barked stem. All of the western catalpa seedlings seemed to be as liable to attack from caterpillars as those of the eastern variety, no fewer than ten different kinds being found upon the seedlings. The catalpa worm, common on eastern catalpa trees, proved to be the most destructive. Bordeaux mixture sprayed over them several times during the growing season was sufficient to destroy the caterpillars and prevent any damage.

The inventory at the end of the fall work was as follows:

Name of Seedlings.	Seeds planted.	Height.	Number.
Red Oak (<i>Quercus rubra</i>),	Fall of 1903	12 inches	20
Chestnut Oak (<i>Quercus prinus</i>),	Fall of 1903	10 inches	650
White Oak (<i>Quercus alba</i>),	Fall of 1902	6 inches	420
Red Ash (<i>Fraxinus pubescens</i>),	Fall of 1903	14 inches	5,350
Common Horse Chestnut (<i>Aesculus hippocastanum</i>),	Fall of 1903	9 inches	390
Locust (<i>Robinia Pseudacacia</i>),	Spring of 1904	25 inches	510
Chestnut (<i>Castanea sativa</i> , var. <i>Americana</i>),	Fall of 1903	12 inches	745
Yellow Pine (<i>Pinus mitchii</i>),	Spring of 1904	1½ inches	1,500
Douglas Fir (<i>Pseudotsuga Douglasii</i>),	Spring of 1904	2½ inches	5,575
Red Spruce (<i>Picea rubra</i>),	Spring of 1903	½ inch	3,000
Eastern Catalpa (<i>Catalpa bignonioides</i>), not transplanted,	Spring of 1903	30 inches	485
Eastern Catalpa, transplanted,	Spring of 1903	46 inches	420
Western Catalpa (<i>Catalpa speciosa</i>), transplanted,	Spring of 1904	10 inches	4,720
Western Catalpa, not transplanted,	Spring of 1904	30 inches	17,000
White Pine (<i>Pinus strobus</i>),	Fall of 1902	3 to 5 inches	2,400
White Pine,	Spring of 1903	3 inches	1,500
White Pine,	Spring of 1903	5 inches	71,400
White Pine,	Spring of 1904	2 inches	75,000
Total,			191,085

Of these, about 90,000 will remain in the nursery another year, leaving about 100,000 to be planted in plantation this coming year. These are "heeled in" over winter and will be ready for transportation as soon as needed. Three pounds of yellow poplar seed and one bushel of black walnuts were planted. The remainder of the beds unused were dug up for the frost to act upon. Compost, lime and manure were mixed with the soil. Twenty pounds of white pine seed, one bushel of walnuts and a large quantity of locust seed were gathered, for planting in the spring of 1905.

Roads.

The first work of the year 1903 along this line was laying out a trail two feet wide at a seven per cent. grade. This trail was almost completed, but had to be abandoned for the time being because of other work. It is about two miles long and will avoid the steep walk or ride up the main road, which leads to the Sanatorium from Mont Alto. The road was in a bad condition, and at best is steep, some places the grade being as high as thirty per cent. and perhaps more. After the establishment of the Sanatorium it was seen that this road had to be in good condition in order to facilitate getting back and forth to the town and railway station. The work was placed in charge of the superintendent of the reservation and for a little over five hundred dollars he made, for one mile and a quarter, one of the best roads in the county out of one that was regarded as the "worst pull" in the whole county. People who frequently use this road have made the statement that from two hundred to five hundred pounds more can now be hauled up the hill on one load.

During the year about twenty miles of old roads have been opened up and cleared of brush. On one road, about six miles in length, not only the road itself, but about four feet on each side of the road was cleared of small and worthless growth and the best trees trimmed. These roads will make effectual fire lanes for the future, and as far as possible will be worked into the road system of the reservation.

In the spring of 1904 work was continued on the road from Mont Alto to the Sanatorium. Eight-tenths of a mile more was repaired, extending from the Monahan field to the "Camp." On account of having to quarry all the stone used in the bed of the road, and of increased expense for hauling, this part of the road cost more than the mile and a quarter built last year. The total expense was about seven hundred and fifty dollars. This road has stood the trial of a year's rains and travel, and as yet shows no signs of needing repairs. It is a good example of road building in the mountains and proves

that it is not necessary for supervisors to pay \$2,500 per mile for making good roads.

As stated above, the grade up the mountain on this road is excessive and several routes have been surveyed roughly to determine where an easy grade to the top of the mountain can be cut. The best route is to follow Brandon's Hollow to the White Rock Road and then turn to the right on the flat and meet the main road at the Monahan field. Such a road is a necessity, so in connection with the improvement cutting made at the foot of Pine Mountain, the new road was begun and extended a third of a mile to the end of the improvement work. There was no road by which the wood could be removed without considerable sledding and the new road simplified the matter; but the ultimate aim is to push this road up the mountain as soon as possible. The grade is mostly three per cent. and no where over five per cent. This piece was built entirely by the students from the academy, the value of the labor being estimated at about \$575.00.

Survey.

In October, 1903, the county surveyor began the outside lines of the State lands, and in November, 1904, finished the boundary lines of the Mont Alto estate and adjacent lands purchased by the State. There remain only a few small interior tracts to be cut out. Occasionally difficulties have been met in the form of local attraction, inaccuracy in drafts, and at times the removal of corners.

For use on the reservation there has been purchased a surveyor's compass and a transit. The survey of roads was begun and on a tract of about fifteen hundred acres, enclosed by two main roads and the boundary line of the estate, some measurements and data for a working plan have been taken.

Forest Academy.

The last Legislature passed an act providing for practical instruction in forestry on the Mont Alto Reservation. In accordance with this act, ten young men were appointed and reported for duty on the first of September, 1903. Each student signed a contract, the most important clause of which was that he would apply himself diligently to such studies as might be assigned to him and would labor faithfully and earnestly upon the forest reservations at whatever work he might be set to do. The student was paid for his services thirty dollars per month and in addition received his horse feed free of charge. These boys came from various parts of the State. They varied in age and mental and physical attainments, but under most circumstances each one showed a perfect willingness to answer any call that was given him. From the time they came, almost until

the Christmas vacation, there was more than enough to keep the whole force busy in the field. There was considerable work in the nursery. They cut open the old roads for fire lanes, helped on the survey line, and at innumerable small jobs that had to be done on or about the reservation. It was the intention that half their time should be spent in study and instruction, but the outside work was pressing in many instances, the weather favored outdoor work, and there was a desire to give the young men a taste of continuous hard work.

Several attempts were made to give the students definite time for instruction, but other work would interfere, and it was not until the third week in December that a program could be arranged and carried out. Previous to that time they received instruction only on about six rainy days and what was given in connection with their work. The program which was finally adopted is as follows:

8:00 to 8:50 A. M.	Second year, forestry and B arithmetic.
8:50 to 9:30 A. M.	Business law.
9:30 to 10:20 A. M.	First year, forestry and history of commerce.
11:30 to 11:50 A. M.	A arithmetic.
1:00 to 2:20 P. M.	B algebra.
2:20 to 3:00 P. M.	Political geography.
3:00 to 3:50 A	algebra.
4:30 to 5:30	Tree botany.

In September text-books were obtained and every evening the students were required to be in their rooms at work from seven o'clock to nine forty-five. Saturday mornings were usually spent in excursions into various sections of the forest, either for botanical study or the collection of seeds, and following each excursion an essay was written on what was studied or seen. Later in the fall, after most of the students obtained ponies, cavalry drill was instituted. Occasionally infantry drill was substituted. The program was followed more or less closely until the last week in March, 1904. Outside work then began. The nursery had to be put in shape, then the improvement cutting was carried on, and during July and August the new road in Brandon's Hollow was built. As director of work in the woods, a man who has worked in the forest for a living and who is a splendid overseer, was obtained. The instructors of the winter were two in addition to the Forester.

After the new class of boys came in September, 1904, a new program was adopted. Classes recite every morning, and every afternoon there is work outside to do. The first-year class has been doing the nursery work; the second-year men have been making roads

and improvement cuttings. These additional students were appointed after a mental and physical examination and with the purpose of giving them a three-years' course, provided the school is supported as it should be. This course corresponds with the course given at other schools where practice figures as largely as theory and is one that will fit a hard-working young man for any position which the State may have for him in forestry work. The plan of studying and working every day, regularly, has given good results and will, no doubt, be adopted permanently.

In the fall of 1903 a uniform was adopted, but it is already out of date and needs to be revised.

Summary.

The year 1903 may be said to have been a year of beginnings and the year of 1904 has seen those beginnings gradually unfold, giving great promise for the future. The survey, which is the foundation of forest management, has been successfully finished. Of next importance was the first work on the road system. One of the principles of forest finance is to obtain early revenues, and although the Mont Alto estate has been in the possession of the State less than three years, not an inconsiderable revenue has been taken from the forest in the last two years. The importance and future work of the Forest Academy cannot be estimated, for it is right to suppose that upon it will depend the trend and efficiency of forestal work in this State before many years.

Part II.

What follows is, in many cases, of a very general nature, and applies to other reservations as well as to the South Mountain Reservation.

Completion of Survey.

No effective protection can be given any property before the boundaries of that property are established and known. Especially is this so in regard to forest land. When lines are not well marked, there is always a temptation to encroach just a little on the other man's land and to remove wood or timber, if it is the kind desired. When such is the case and the offender is to be brought to justice, it is necessary to delay matters, sometimes considerably, until a survey is made and absolute title to land proved. The uncertainty in regard to lines often leads to much unpleasantness for those who are in charge, making matters disagreeable both for the wardens and neighbors, perhaps for years to come. Nor can the best management be carried on without a survey, for one does not know what land and

growth is to be planned for, and no divisions or compartments can be made. Very often growth along the border should be dealt with first. In a word, as the foundation of forestry work is the map, the survey should be hastened as rapidly as possible.

After the boundaries come the roads, streams and contours. The State already has a contour map of the South Mountain region which will no doubt be of assistance to the Forester; but it is incomplete and in such condition will never be satisfactory to those who have to work with it or to those who will have to depend upon it for reports. Maps like those used by the Bureau of Forestry at Washington, in New York State, and at Biltmore, as bases for forest management, cost from fifty-five to eight-five dollars per square mile. The State has large forest areas for which maps are needed now or will be needed before they can be made. Some action ought to be taken in this direction at once. Those in charge of the survey of the State, which is being made in connection with the Geological Survey at Washington, might thus bring about the survey of the State's own land immediately.

It is hard to obtain a large tract of woodland that is not dotted here and there with small interior tracts. They are a constant source of trouble and especially before a survey, for very often their boundaries are not given on any paper. The owners themselves seldom know their lines, and it is not unusual to overstep the bounds. There is a constant excuse for trespass. When it comes to planning roads and for other reasons these interior tracts cause more expense than five times their value. This condition exists on each reservation and there are two things that should be done: Locate the tracts by well-established marks at once, and then as rapidly as possible, obtain possession of them at whatever cost.

In this connection ought to be considered the question of permanent demarkation for lines and corners. Obviously whatever is used must be lasting and of such a nature as not to be easily removed. In the South Mountain region a limestone set on end is the usual mark for a land corner. In the forest any corner mark should be at least two feet out of the ground. A substantial stone about eight inches square and four or five feet long might perhaps be the best for the purpose. On the top of the stone could be cut lines indicating the angle made and perhaps even giving the direction. The manner of putting the stone into the ground is a consideration. If cemented it is not likely to be removed without considerable work. Iron posts of various patterns have been used also. A very simple method is to have railroad iron welded into a T, burying the cross-bar about four feet under ground. Between corners smaller stones or irons should be set at regular intervals. In some instances, as on the

Delaware Reservation, nothing would be more practicable than to build a trail or road along the boundary. Another method that could be adopted in many cases is that of planting trees, such as white oak or hickory, at regular distances on the line.

Roads.

When once a map is made a working plan can be made. But in the absence of either there is still a great deal of work to do in the way of improvement cuttings. The promptness and profit with which this work can be done depends upon the rapidity with which the roads are developed or improved. Nearly all the wood that is removed in this way is of small value, consequently cannot stand much expense for bringing to market. This work should be completed as soon as possible, for it is not until the worthless stuff is removed that the forest can do its best. At least fifteen hundred acres of the Mont Alto estate should be improved each year. This will mean, on an average, the necessity of rebuilding three miles of good twelve-foot dirt roads and the repair of about fifteen miles of minor roads. Finally, at the end of fifteen years, the estate will be under fairly good forestry conditions and in thirty years, with the completed road system, will yield a revenue on all moneys invested equal to that on any other investment in which the State is interested. Within reservation bounds the Department of Forestry should have entire control of all roads, so as not to be hindered by local influence. For road work then each reservation should have a stone crusher and steam roller. The road system will afford the best possible protection from fire.

Sale of Products.

With the work of improvement cutting comes the question of supplying the market with the material removed from the forest. There is usually no trouble to dispose of wood that can be worked up into a few staple products, as for instance, railway ties, trolley ties, fence posts, pulp wood, and a limited amount of fire wood. However, it occurs that there is usually much more wood that is good for nothing but fire wood than the market demands. The question the Forester must meet is how to get rid of such wood and at least cover expenses. The first thing to be considered is a decrease in the cost of transportation, for this will make it possible to supply more than a local market. The first efficient help in this direction is good roads. Another is to allow the wood to dry out before removal, lessening the weight to be removed. Another is that of changing the wood into a form of product which will create a new demand, or that, by reason of the change, will bring a price which will more than pay

for the cost of manufacture and transportation. For instance, if it cost forty-five cents to cut and rank a cord of wood, and two dollars to take it to market where it brings only two dollars and fifty cents, we make five cents per cord. By an investment of six hundred dollars an engine and saw can be taken at will into the woods and made to produce, by sawing the wood into short lengths, a product which brings four dollars in the market with the following cost: Thirty cents per cord for chopping-poles and hauling to saw, and fifty cents per cord for sawing. With the same cost of transportation we have a gain of one dollar and twenty cents. Five hundred cords of wood yield more than enough to pay off the investment, and what is made after that is pure gain. In addition, the engine and saw are on hand for other uses. Reduce the cost of transportation by improving the roads and still more gain is made. Or, the forester can make charcoal, a light but valuable product. There is still one more way of disposing of small material, namely, to bring into the neighborhood of the reservation such industries as will utilize the stuff, as acid factories, extract mills, box factories, etc.

In this connection the Department of Forestry could do nothing better than obtain and have on file a list of establishments in the State using wood and their specifications. No man who has a product to sell can do a good business unless he is in touch with markets and demands, and for that reason each forester in charge of a reservation should have at hand information relating to the needs of the establishments in his neighborhood and their scale of prices; and, at times, even of those in other parts of the State. At a glance he could determine what product is most desirable and work accordingly.

Nurseries.

On all of the reservations there will always be the necessity of resorting to more or less planting in the forest, and for that reason plants will always be in demand. This condition necessitates the establishment of nurseries wherever practicable. This work should not be delayed any longer than it takes to prepare the location and to place a man in charge who will care for the young plants. Any ranger or superintendent could carry out the directions of the forester. It takes at least one year to get a nursery under way and two years more to raise a sufficient number of plants to begin plantation work. If a nursery is established on each reservation the coming year it is safe to figure on having at least one trained warden for each reservation until the work of planting can begin.

Within the South Mountain Reservation there are numerous old fields that must be planted up if they are to have an early forest

PLATE IX. The Forestry Nursery. South Mountain Reservation.



growth upon them. In addition to these there is a large area of forest land denuded and impoverished by frequent fires. Nature must receive aid in regeneration of such places if valuable wood or any good results are to follow. There is a nursery on this reservation now which will gradually supply enough material for this work, but there are other reasons why this nursery should be enlarged as rapidly as possible and made the central nursery station for the State work. The nursery is in an ideal location and can be extended without much trouble, a great deal of the available ground having been used recently as gardens. At a slight expense water can be piped directly to it, facilitating the matter of supplying moisture in dry seasons. By reason of the location of the Forest Academy a large nursery at Mont Alto is advisable on account of the opportunity for studying the propagation and growth of the economic trees of the State, and the larger the nursery the more experience each man can gain. The old fields near here should be devoted entirely to demonstration of different mixtures of tree growth, and this will require a variety of plants to be grown.

In this place it may be well to urge adoption of the policy of distributing seedlings among farmers under certain conditions. Under present conditions, nurserymen charge our people such prices that it is impossible for farmers to purchase stock enough to plant up their abandoned fields profitably. There are reasons why the prices should be where they are; but if the State wants private people to practice forestry it must do what it can to make such a movement possible. It would not be wise, on the other hand, to distribute the plants gratis and without instruction as to preparation of soil, planting and care of plantation, for then proper care of the plants might not be taken. If such a policy is adopted, the nursery at Mont Alto is the one which ought to have precedence.

Rangers.

As with the laws, numberless plans of work might be made, and yet without efficient men to execute them little good would result. It is no new song when protection is considered, still it must be repeated that protection is the first step which must be taken in the management of the reserves. It is little short of mismanagement if this question is not considered in all its phases and immediately and satisfactorily solved. Anything short of proper protection is a hindrance to the movement of forestry and a financial loss to the State.

One of the necessary factors in protection is the force of rangers; however, the other work they will have to do must not be lost sight of. Under present conditions it is impossible, anywhere in this

State, for one man to guard efficiently more than five thousand acres of forest land. During fire seasons this force ought to be doubled in most cases. In some localities, as for instance on the Mont Alto estate, where small communities are scattered not only all along the borders, but also at frequent intervals within the tract, it is impossible for one ranger to watch more than three thousand acres. Future developments will demand more intense work, consequently more rangers; but that need not be thought of now. The present conditions must be met and the future will look after itself. On this estate of twenty thousand acres there are now one superintendent and four regularly appointed wardens or rangers. Under the most favorable circumstances this number would be sufficient; but under the conditions which exist, if the superintendent and forester are expected to do what is best for the State, we need two in addition to the four now employed.

These men must be strong, active and capable of directing any work that will come within their ranges. They must be fearless and law-abiding, for under existing laws each one is given the power to arrest without a warrant. They must be conscientious, for they are their own "bosses" most of the time. Their judgment must be quick and discriminating, for they will meet all kinds of pleas and disputes, and above all they ought to be temperate. Drunkenness, either on or off duty, should be a reasonable excuse for immediate dismissal. To the layman, the ranger appears to have little to do and need be any one who is good for nothing else. Just the opposite is the case. It is the best class of rangers which the State hopes to obtain from its Forest Academy.

An ordinary man can be had for an ordinary price. The men wanted for rangers are not ordinary men and their work is not ordinary work; it is strenuous, and they ought to be treated accordingly. They are obliged to live on State land, inside the bounds of their ranges. This will frequently mean isolation from community life, religious and school opportunities. It is not unreasonable for them to ask for a good road communicating with the outside world, and above all a telephone. Aside from its ordinary usefulness to the ranger and his family, the telephone is one of the most efficient helps in time of fire. All rangers' stations should be connected by telephone with the managing office of the reserve. In all cases a horse is a necessary part of a ranger's outfit, and better work can be done when a horse is available. Last but not least, a comfortable house should be provided. Some of the prettiest cottages in the forests of Germany are those furnished by the Government to the wardens.

The initial salary of rangers ought, by all means, to be uniform throughout the State, increasing with term of service and efficiency

up to a maximum limit. This salary should be based upon the work that is to be done, upon the requirements for the position, and the conditions to be lived under. Good salaries must be offered if good men are wanted. It is poor policy to get the man for the lowest price. The salary should also cover expense of feeding a horse, and there is no reason why any variation should be made in this item. As a rule it costs as much to keep a horse in the woods in one place in this State as in another.

The position of superintendent is one which may exist for a number of years, but while the position is in vogue, the superintendent should be considered as the chief ranger of a reservation and as such has important work. He is necessarily an assistant to the Forester and from the nature of the work being done, the Forester being the source of all plans for the reservation, in the future both rangers and superintendent should report to the Forester and receive orders only through him. In several instances misunderstandings have arisen from the lack of some system in regard to the matter. A manual setting forth the purposes of the reservation, duties of officers and the broad principles of forestry should be prepared in the near future in order to place the forestry force on a definite footing where they know exactly what to do and what to expect.

As valuable aids in the matter of protection from fire, we cannot urge too strongly that telephones be at each ranger's station. The value of good roads will be appreciated in a few years and no objections to building them instead of fire lanes, so-called, will be in evidence. Where it is not possible to increase the force of rangers during fire season, and even when it may be possible to do so, a valuable aid in protection is the observation tower. With a system of from one to four of these towers, located on the highest points of a reservation, the least puff of smoke would be noticed, and in less than ten minutes headquarters could be informed of the location and size of the fire and how many men are needed to fight it. One of these towers can be built for fifty dollars, the price of one man for two months' work and after being built could be used for years. The Mont Alto Division of this reservation needs two such towers.

Expenses, Returns and Accounts.

In the foregoing suggestions nearly every one presupposes the expenditure of money. It is apparently a requisition for a vast sum of money to be spent upon the forest. Most people will say forestry is nothing but an expense and a waste of money. Let us ask the question if what is suggested is practicable or reasonable. The experience of other nations shows that it is. It is safe to say that under the present conservative policy of expenditure it were pos-

sible to make use of millions of dollars in the course of a few years and yet get no good of it in the end. There is no better example of a conservative policy than that of our roads. Millions have been wasted and still millions can be spent before good roads will be had. In a diseased body, can tissue be built up when the waste is greater than the repair? Every one answers "No"; and yet food is being taken all the time. It is necessary first to stop the disease and then get rid of it. Who would show his ignorance by making the statement that Chicago was unwise to expend a vast sum to clear up the debris after her large fire and then invest her money in building a larger and grander city? Yet she might have chosen to expend small sums at long intervals and never have reached half the size she was before. A fire company can never suppress a fire so long as the fire can overcome the effect of a small stream of water being played upon it. But the minute the stream of water is increased to such an extent that the fire is no longer able to drive it to steam, then an effect is produced. The condition of the forestry movement is exactly analogous to these instances. The destruction and waste in the forests exceed the growth or we would not need forestry. This fact must be met and conscientiously considered. Forestry in this State, or in any other State, will never prove a success until it is thoroughly realized that it is a business proposition and that the money necessary to push it through is not an expense, but an investment. An example of what is meant can be found in a statement of financial results in the State forests of Saxony, Germany:

Year.	Per Acre Per Year of Total Forest Area.		
	Total Income.	Expense.	Net Income.
1817-1826,	\$1 75	\$0 80	\$0 95
1847-1853,	2 56	1 02	1 54
1884-1893,	6 66	2 29	4 37

At our stage of the work, when there is nothing definite as to what will be done one year from the next, it is impossible to place a limit upon the expenses which must be made unless that limit is so far above the actual needs that it does not count in the end. The Department must develop the reserves as rapidly as possible to accomplish its purpose and to limit it to a definite amount each year will only frustrate the object for which it was established.

It is the Forester who has to keep all the accounts and make report at end of each year, and it is a part of his business which is most interesting to him. He is the one who must know whether the forest is yielding any net return or whether it is still giving a negative result. Upon his financial calculations he bases his working plans. How can he do this if part of the bills and none of the income go

through his office? It is simply impossible for any forester to do good work under such circumstances. It cannot be urged too strongly that the forester is the directing officer of a reserve, and that all reports and moneys should pass through his office, so that he may keep an accurate record.

The Forest Academy.

The policy to be pursued in the future with reference to the Forest Academy will depend entirely upon the intention and purpose of such a school.

There is no doubt that the State is in need of men who can properly care for its reservations, and in need of them immediately. It is also right that she help to educate them for the special work which they are to do. The need of rangers is not questioned, but foresters are needed as well as rangers, and the latter without the former are of little value except for protection.

The Legislature could have done nothing better for forestry than the establishment of a special school for the education of rangers and foresters upon one of the State reservations. It might have provided for a chair of forestry in some well-established school, but such a course would never have accomplished the same valuable results that the present policy will. The State is in need of practical men rather than theorists, but some theory must be taught. Forestry is, primarily, as a study, the study of nature, and this can best be done under natural conditions rather than from text-books, and dried specimens. As a business it cannot be learned from books, but must be learned from practice and experience. There could be no better way, then, to train men both in theory and in practice than to place them where they must work and study at the same time.

The teaching force of any school cannot cover the entire field of instruction. There should be in addition a first-class reference library and a complete set of forestry books. Five hundred dollars for this purpose ought to be available at once. Another valuable means of instruction is the museum. A herbarium will be started this year and a collection of seeds is already under way. In this museum should be tools, wood-working implements, various parts of trees, woods, sections of trees, curiosities, etc. Above all it must not be a museum simply to be filled with the curious or to be used only for pleasure, but must be for instruction. An arboretum, also, will be started this coming spring, having in view the growing of all our native trees and as many exotics as will grow in this region.

In conclusion I desire to record my appreciation of the advice and help given by Mr. David Knepper, Superintendent of the Mont Alto Division of the South Mountain Reservation, in much of the work that has been accomplished.

THE SOUTH MOUNTAIN CAMP SANATORIUM.

REPORT BY A. M. ROTHROCK, M. D., Camp Physician.

The South Mountain Camp Sanatorium is located in the South Mountain range in Franklin county, Pennsylvania, in the heart of a State Forestry Reservation of fifty thousand (50,000) acres of land. Its nearest railroad station is the town of Mont Alto, which is four miles from the camp on the Waynesboro Branch of the Cumberland Valley Railroad.

The altitude of the camp above the sea is about sixteen hundred and fifty feet. The camp is situated on the eastern slope of the mountains which rise like a basin from three to four hundred feet around it; this basin being opened by mountain passes to the southwest and northeast and east. The temperature during the summer is seldom oppressive, the nights are then almost always comfortably cool. It is impossible not to recognize the invigorating character of the atmosphere. This is remarked upon by almost every one who comes during the summer months to the camp. In winter the temperature usually falls below that of the lower lands on either side, though it was frequently observed during our experience in the winter of 1903 and 1904 that the mercury was lower in the Cumberland Valley than at the camp. The minimum temperature during the past winter in camp was sixteen degrees below zero. It will be remembered, however, that the past was an unusually inclement winter.

The soil is rather more compact than is considered desirable; more sand and less clay would have been a decided advantage for the purpose of a sanatorium, though, as a matter of fact, no difficulties or camp troubles can thus far be traced to this cause. One distinct advantage that this camp has is that it is removed from all sources of atmospheric contamination. It may be said that the air which the camp inmates breathe is filtered through miles of foliage.

Furthermore, it is reckoned an advantage that there are no adverse influences surrounding the camp. Its isolation is such that no hostility or dread, on the part of others, is caused by the presence of so many consumptives.

There is an abundant water supply for all purposes in the camp, during the driest season. This water is piped directly from the foun-

tain head, where the water emerges from the ground and is beyond all possible chance of contamination from any sources whatever.

This camp was started in June, 1903. It was then a mere experiment; but has already passed beyond the experimental stage and become an assured success, so far as the object for which it was started is concerned. It is well-known that there are thousands of people in this Commonwealth suffering from tuberculosis in its earliest stages, who abandon hope of restoration to health because their means do not allow them to seek more distant locations which have an established reputation for the cure of this disease. As it is impossible for them to go there in search of health, this camp was opened with the object of bringing health to them, if possible, and thus to prove that out-door life in Pennsylvania is quite as likely to work a cure for consumption as living in the open air is in any other part of our country.

Furthermore, the fact being once established that tuberculosis can be cured in the mountains of Pennsylvania, effort will be made to cure the patients by the same method of treatment at or near their own homes. Indeed, it may be said that one of the most beneficial discoveries of recent years in this direction is that the cure of consumption by proper food and proper living is possible and probable in almost any district of this State.

It cannot be too strongly impressed upon those who apply for admission that we have no hospital or nurses on the ground. Our institution is a camp simply and solely. Every inmate is expected to care for himself or herself absolutely. Those who are too weak, or too indolent, or too proud to do so had better stay away. They will only come to grief, under present conditions, by coming to Mont Alto. The hospital stage, we hope, will come in the future, when the conditions under which the inmates live will not be so rigorous; but it has not arrived yet. At present every patient is expected to purchase his own food and prepare it; to bring his own bedding and care for it.

Furthermore, every patient is expected to keep his or her cabin neat, clean and fresh. No care-takers are allowed in the cottages or cabins of the inmates; there is no room for them in camp. All that the State furnishes is a good cabin, ten feet square, in which two men are housed; and for the women there are comfortable two-roomed cottages, twelve by eighteen feet in the interior, and each supposed to house two women, though under conditions where the inmates agree three inmates can be accommodated.

In addition to the shelter, above described, each cabin or cottage is furnished with two good wire beds, two chairs, wood stove, an oil stove and lantern. The inmates must bring their own cooking utensils and care for them.

There are now accommodations furnished by the State for thirty-five patients; in addition to this, by the generosity of the ladies of Phoenixville and Kennet Square, a cottage has been erected which will contain four patients.

The rules of the camp require:

First: That no patient shall go more than five miles from camp without permission.

Second: That when a patient leaves the camp, for more than twenty-four hours, the key of the cabin or cottage must be left with the superintendent in charge.

Third: That there must be no spitting upon the ground in the camp or in the neighborhood.

Fourth: No tobacco can be used in any form by the inmates, nor are they allowed to make any improper use of alcoholic liquors. Profane or indecent language will not be tolerated, and a proper observance of Sunday is expected and required.

Fifth: Winter and summer the inmates of the camp must sleep with their windows open. If they wish to sleep with closed windows they can find abundant opportunity for doing so at home.

Medical attendance is free and there is no charge whatever for anything the State furnishes in the camp. The necessary food can easily be obtained in camp; milk, butter and eggs are brought in daily, and fresh meats can be obtained whenever required. The minimum cost for food per week is about \$2.50; \$4.00 a week will furnish an abundant supply of everything necessary for camp living. Each cabin or cottage is allowed a small space of ground upon which to raise vegetables. In addition to the food supplied by the gardens, the light work which the care of the ground necessitates is, in most instances, a decided advantage to the patient. Abundant reading matter is furnished and there is a good croquet ground within the camp limits. There are many very attractive woodland walks in the region immediately adjacent to the camp.

Health must be worked for. There are many persons of whom it is true that they are literally "too lazy to live." One reason why better results, as a rule, are obtained in the treatment of disease in public institutions than at home is because the inmates are under control and obliged to observe rules and conditions upon which restoration to health depends. The authorities in charge of this camp have a personal interest in every inmate of the camp, and desire nothing so much as to be instrumental in helping them. It is for this reason that this is written so plainly. There must be no misunderstanding.

There are limitations to the power for good of the open air in the



PLATE X. Partial View of South Mountain Camp Sanatorium.

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PLATE X. Partial View of South Mountain Camp Sanatorium.

treatment of tuberculosis. There comes a period in the history of every fatal case in which it is cruelty to the patient to take him or her from home. It is believed that a majority of cases of incipient tuberculosis can be cured by open-air life combined with proper food and judicious medical treatment.

When a consumptive patient suffers from severe hemorrhages, from night sweats, and has become much emaciated, we do not advise his leaving home, and we will not knowingly accept a patient of this kind in the camp.

The greatest existing need of this camp is that the State should furnish the funds for boarding the patients. We hope that this will be done by the next Legislature. Beyond doubt the percentage of good results would be vastly increased if this were done.

No one except a citizen of Pennsylvania can be accepted as an inmate of this camp.

All applicants must be protected against small-pox before they can be admitted to camp.

The appropriation made by the last Legislature was for the purpose of determining whether or not the South Mountain region afforded a suitable location for the out-door cure of tuberculosis. This question may now be regarded as absolutely settled in the affirmative and probably no more suitable location for this purpose could be found on the Atlantic slope.

It is well that this fact should be fully recognized now because the people have fully adopted the idea that this disease must be arrested in this State.

Apart from all ideas of expediency it is a well-recognized principle of modern civilization that those who are too ill to care for themselves, by honest labor, must, in some way or other, be cared for by their fellow-citizens. We cannot allow a man to starve to death in our midst; neither can we allow him to perish by cold.

Then, since this responsibility is upon us, it is from every point of view unwise to delay in the exercise of our public charity until the sufferer is beyond all hope of cure and all that we can do is to smooth his pathway toward the grave. It were wiser far and cheaper to provide for him in the earlier stages of the disease, while there yet existed a chance for his recovery, and a restoration to the ranks of our healthful and productive citizens.

There is also another reason which appeals to our instinct of self-preservation. It can no longer be doubted that tuberculosis is a contagious disease. It is true it is not contagious, in as marked a degree, as small-pox, but it can nevertheless be communicated by one person to another; and any disease which can be so communicated it is in the power of man to prevent.

Its cause is a veritable, living, demonstrable germ, which, when planted in a suitable body, produces the disease. This fact is established beyond all doubt and no case of consumption exists which is not due to a previously existing consumptive germ. We know the conditions under which these consumptive germs thrive and we recognize also the conditions which destroy them. No more productive cause of the dissemination of tuberculosis in a community can be found than an ignorant or careless person who is himself suffering from the disease. Whenever he walks through one of our crowded thoroughfares and expectorates upon the sidewalk he creates the possibility of introducing tuberculosis into a previously healthy family. It is noteworthy in this connection that those who are most likely thus to disseminate the disease belong to a class whose ignorance and improvident habits make them sooner or later charges upon the community. The dark, crowded alleys of our cities are hot beds of the disease.

These people should be prevented from endangering the lives of their fellow-citizens. There is absolutely no known method by which this can be done except to isolate them and place them where careful supervision and kind care will prevent their becoming a source of danger to others. We should remember in this connection that there is a possible danger of a host of consumptives at large, absolutely diminishing the energy and effective power of a nation and thus destroying the fountain head from which all our prosperity comes.

There exists, therefore, no need of further explanation as to why the coming Legislature should grant a liberal appropriation which will change the camp into a thoroughly-equipped consumptive home where the indigent consumptives of this district may come in the earliest stages of the disease and be maintained until they are cured and cease to be a source of danger to the community.

Thus far they have provided and prepared their own food. In doing so many of them have been obliged to work at times when the successful treatment of their cases demanded that they should rest, and in others the desire for food has been destroyed by the labor of preparing it.

Encouraging as our success has been under existing circumstances, we have great reason to believe that it would have been much greater under more suitable conditions.

First of all larger accommodations are necessary. The present utmost capacity of the camp is thirty-six patients. It should at once be increased to seventy-five, and therefore more cottages are necessary. The plain, rough board cabins have done their work and have done it well; but in appearance they are discreditable to a great Commonwealth like this, especially when it is considered that for

the sum of three hundred dollars a neat, comfortable cottage, capable of accommodating two persons, can be erected.

From our experience here we are led to believe that the more nearly the cottage system is adhered to the better will be the results. We are absolutely opposed to the idea of massing these patients, for the convenience or economy of administration, under one roof.

To meet the requirements of this increase of the camp a kitchen and dining-hall would be necessary. It is also of very great importance that bathrooms should be provided, as the mere effect of bathing upon the patients, apart from the fact of personal cleanliness, is admitted by all competent physicians to be most beneficial. We are most fortunate, indeed, in this connection in possessing an abundant supply of most delightful and pure mountain water, which is piped directly from the springs in the side of the mountain into the camp, and is therefore beyond the possibility of any contamination whatever. An improved system of sewerage is absolutely necessary. This is required not so much for the safety of the camp as it is to remove, wholly, all possibility of the camp ever becoming a source of danger to those outside of its limits. It is absolutely certain that up to this time it never has been a source of danger. We wish to be equally sure that it never will be. Indeed it seems to us, individually, to be possible to destroy by heat anything and everything which comes from the camp that could in any way injure those outside of it. We wish to be most explicit on this point.

Public institutions with their large facilities for the accumulation of practical knowledge should be bound to disseminate it for the public. A well-appointed laboratory with a competent microscopist should be upon these grounds, not only to aid in the correct diagnosis and prognosis of the cases, but also to assist the physicians of this neighborhood in the diagnosis and prevention of contagious diseases by means which cannot be found outside of a well-appointed laboratory. The increase in cost of this addition, in comparison with the good which it would accomplish, would be so small as hardly to merit consideration.

There should also be, in addition to the matron, two good graduate nurses and an orderly. A stenographer and typewriter would be of great assistance in maintaining the records of the camp in a proper manner. It is usually possible to secure a suitable person, for a very small compensation, from among the inmates of the camp.

During the year of 1904 just ended there have been treated in this camp fifty-nine patients; about sixty-six per cent. of whom have been either cured or are fairly started on their road toward recovery. There have been twelve deaths; but the greater part of these who have died were so ill when they came that nothing could have been

done for them anywhere, and they have gone home again to spend what remained to them of life with their own families. Five of the deaths were not due to pulmonary consumption; two being from cardiac diseases, another from Bright's disease, one from meningitis, while the fifth was a case of tuberculosis of both lungs and bowels in an infant, practically moribund when sent here, and who lived but a few days after reaching camp.

We have with us now in camp twenty-one patients, all of whom are better than when they came and in some of whom the results have thus far been remarkably good.

A REVIEW OF FOREST FIRE LEGISLATION IN PENNSYLVANIA.

BY I. C. WILLIAMS, ESQ., Deputy Commissioner of Forestry.

The Province of Pennsylvania and subsequently the Commonwealth of Pennsylvania have been engaged for a period of over two hundred and twenty-five years in an effort to subdue the forest fire evil. The problem has not yet reached a solution.

When King Charles II of England, by letters patent in 1664, granted to his royal brother James, Duke of York, all of the New Netherland district, which by him was claimed to include the whole of the South (Delaware) River country and the colonies below, it became necessary to formulate a code of laws for the government thereof. These laws were promulgated at Hempstead, Long Island, the same year, and were subsequently, in September, 1676, upon petition of the magistrates, extended by Governor Sir Edmund Andros to the Delaware River provinces.

Among the Duke of York's laws thus promulgated and extended is probably the first forest fire law enacted for Pennsylvania; and then enacted not for the saving of the forest, but for the protection of corn grounds and enclosures from conflagrations started within the forest. This portion of his code is as follows:

"If any Person whatsoever shall kindle any fire in the woods or Grounds lying in Common, or in his own Grounds so as the same shall runne into any Corne Grounds or Enclosures of his Neighbour, he shall be Lyable to pay all Damage; of whatsoever Sort, and half so much more for a fine; or if not able to pay the Court shall Adjudge the Person guilty of Corporal punishment not exceeding tweenty Stripes, or do Service to Expiate the Crime."

In 1682 the grant of Pennsylvania was made to William Penn. At a meeting of the Provincial Assembly, held at Philadelphia, March 10, 1683, there was promulgated the following law relating to forest fires:

"Chap. XCIII. Be it &c., That Whosoever shall presume to sett on fire, any Woods, Lands, or Marshes, in this Province or territories thereof, before the first day of the first moneth yearly; They shall yearly make good all the Damages that shall thereby happen to any of the inhabitants thereof."

This law was subsequently, in 1693, abrogated by the reigning sovereigns of England, William and Mary, but was re-enacted the same year.

The next act of legislation bearing upon the subject is the act of the Provincial Assembly passed November 27, 1700. This statute was considered by the Queen in Council February 7, 1705-6, and not being acted upon, became a law in accordance with the provisions of the Charter to the Proprietary. The text of the act in full is as follows:

"An act against unseasonable firing of woods."

"For the prevention of dangers and damages that may ensue upon firing of woods at unseasonable times of the year:

"Be it enacted by the Proprietary and Governor, by and with the advice and consent of the freemen of this Province and Territories in General Assembly met, and by the authority of the same, That whosoever shall presume to set on fire any woods, lands or marshes in this province or territories, before the first day of the First month yearly, or after the first day of the Third month, shall make good all damages that shall thereby happen to any of the inhabitants thereof."

It will be seen that the firing of the woods at seasonable times, viz., during March and April of each year, was looked upon as a matter of course, something that was to be expected, and probably, from long practice, regarded as necessary in the work of clearing and settlement.

That the practice of burning the forests soon became pernicious and resulted in the destruction of fences, crops and buildings in communities which were being rapidly settled may be believed, because on March 27, 1712-13, an amendment to this act was passed, giving these damages and this destruction of property as the reason for its passage. The text of the amending section is as follows:

"And be it further enacted, That if any person or persons do at any time hereafter set on fire any woods, lands, marshes or cripes though within the time limited by a law of this province entitled 'An act against unseasonable firing the woods,' within one mile of any fences or buildings, without giving notice to the possessor of such improvements at least twenty-four hours before he do so, he or they shall pay all damages that shall thereby happen to any such buildings or fences."

The next act dealing with the forest fire question was passed March 29, 1735. This law distinctly shows a marked change in sentiment with respect to the expediency of setting such fires. Up to this time firing the forest was not looked upon as an offense pun-

ishable criminally, except in the Duke of York's first statute. Previous legislation was directed toward the recovery of compensatory damages. The act of 1735 contains a penal provision, but this was applicable to servants and slaves only. We see here the distinction preserved to this time between the land owner who was supposed to set fires for beneficial reasons and without malice, and similar acts of servants and slaves, who being non-owners, were presumed to act maliciously. The act of 1735 is an interesting piece of legislation and is as follows:

"An act to prevent the damages which may happen by firing of woods."

"Whereas by an act of the general assembly of this province passed in the twelfth year of the reign of King William the Third it is enacted that whosoever shall presume to set on fire any woods, lands or marshes in this province or territories before the first day of the first month yearly or after the first day of the third month shall make good all damages that shall thereby happen to any of the inhabitants thereof. And whereas it hath on experience been found that the setting the woods on fire at any time hath proved rather hurtful than beneficial to this province and great losses have happened by occasion of such fires:

"For the prevention thereof:

"Be it enacted by Patrick Gordon, Esquire, Lieutenant-Governor with the King's royal approbation under the Honorable John Penn, Thomas Penn and Richard Penn, Esquires, true and absolute Proprietors of the Province of Pennsylvania and of the counties of Newcastle, Kent and Sussex on Delaware, by and with the advice and consent of the representatives of the freemen of the said Province in General Assembly met, and by the authority of the same, That the act of assembly hereinbefore recited and every clause and article therein be and is hereby repealed to all intents, constructions and purposes whatsoever.

"And be it further enacted by the authority aforesaid, That whosoever shall presume at any time or times hereafter to set on fire or cause to be set on fire any woods, land or marshes whatsoever within this province, so as thereby to occasion any loss, damage or injury to any other person or persons, every such person or persons so offending shall and are hereby declared liable to make satisfaction for the same in any action or actions on the case to be brought by the party or parties grieved in the court of common pleas in the county where the offense was committed.

"Provided always, and be it further enacted by the authority aforesaid, That where the party injured shall not demand above forty shillings for his loss or damage, it shall and may be lawful to and for such person or persons to apply to any justice of the peace of the county where the offense is committed, who is hereby empowered and required by warrant under his hand and seal to cause the party offending to be brought before him or some other

justice of the peace of the same county, and if upon examination it shall appear to such justice by the testimony of one or more credible witnesses that the defendant is guilty of the charge exhibited against him, then the said justice shall issue forth his warrant to two or more substantial freeholders of the neighborhood, thereby commanding them in the presence of the defendant (if he will be present) to view the place or thing damaged or inquire into the loss sustained by the plaintiff, and to certify to the said justice upon their oath or affirmation what damage in their judgment the plaintiff hath sustained by occasion of the premises; and that upon return of such certificate to the said justice he is hereby empowered to grant execution for the recovery of the said damages, together with such costs of prosecution as is usual in the recovery of debts under forty shillings.

"Provided also, That no costs of suits shall be paid to any plaintiff in any suit to be brought for any matter or thing in this act mentioned if the jury who shall try the cause do not assess above forty shillings damages, any law, custom or usage to the contrary in anywise notwithstanding.

"Provided also, That where any offense shall be committed against the tenor of this act by any servant, negro or slave without the direction of his, her or their master or mistress respectively, and such offender be thereof duly convicted by the oath or affirmation of one credible witness before any justice of the peace of the respective counties, such offender or offenders, unless his or her master or mistress will pay the damages sustained with costs of suit, shall be whipped with any number of stripes not exceeding twenty-one on his or her bare back at the direction of the justice before whom the party shall be convicted and further shall be committed to the workhouse of the county where the offense is committed, there to remain until the costs of prosecution shall be paid."

This law recognized no "seasonable" time for setting the forest on fire. It continued unchanged for sixty years. The independence of the colonies had been secured, the national government had been successfully organized, and the promise of uninterrupted industrial success was before the minds of the people. The reduction of the forest land to agricultural purposes was gradually being accomplished. The evil of wilful and negligent firing of the forests was becoming more apparent and more burdensome. Therefore, further to deal with the problem and mould the law to meet the changed conditions, the act of April 18, 1794, was passed, and the probabilities are that the second and third sections of this act are still in force. This act is as follows:

"An act to prevent the damages which may happen by firing of woods.

"Whereas, it has been represented that numbers of persons are in the custom of setting fire to the woods for different purposes, thereby producing an extensive conflagration, injurious to the soil,

destructive to the timber, and the infant improvements within the State: Therefore

"Section I. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That whoever shall at any time hereafter wilfully set on fire, or cause to be set on fire, any woods, lands or marshes whatsoever, within this Commonwealth, so as thereby to occasion any loss, damage, or injury to any other person or persons, every such person or persons, so offending, and being thereof legally convicted by the oath or affirmation of one or more witnesses, in the county court of quarter sessions where the offense is committed, shall pay a fine not exceeding fifty dollars, and not less than twenty dollars, the one-half of such fine to be paid to the informer, and the other half to the overseer of the poor of the township where the offense is committed, for the use of the poor in the said township.

"Section II. And be it further enacted by the authority aforesaid, That where any person or persons so offending as thereby to occasion any loss, damage, or injury to any other person or persons, every such person or persons so offending, shall be and hereby are declared liable to make satisfaction for the same, in any action or actions on the case, to be brought by the party or parties grieved, in the court of common pleas of the county in which the offense was committed.

"Section III. And be it further enacted by the authority aforesaid, That where any party is injured, and shall not demand above fifty dollars for his loss or damage, it shall any may be lawful to and for such person or persons to apply to any justice of the peace of the county where the offense is committed, who is hereby empowered and required, by warrant under his hand and seal, to cause the party offending to be brought before him or some other justice of the peace of the same county; and if, upon examination, it shall appear to the justice, by the testimony of one or more credible witness or witnesses, that the defendant is guilty of the charge exhibited against him, then the said justice shall issue his warrant to two or more free-holders of the neighborhood, thereby commanding them, in the presence of the defendant, if he will be present, to view the place or thing damaged, or inquire into the loss sustained by the plaintiff, and to certify to the said justice, upon their oath or affirmation, what damage, in their judgment, the plaintiff hath sustained by the occasion of the premises; and upon the return of such certificate to the said justice, he is hereby empowered to grant execution for the recovery of the said damages, together with the costs of prosecution, as is usual in the recovery of debts under ten pounds: Provided, That if any person or persons shall apprehend him, her, or themselves aggrieved by the determination of any justice of the peace, in consequence of this act, he, she, or they shall have a right to appeal from the judgment of the said justice to the next court of common pleas of the proper county.

"Section IV. And be it further enacted by the authority aforesaid, That where any offense shall be committed against the tenor of this act, by any white or black servant, without the direction of his, her, or their master or mistress, respectively, and such

offenders be thereof duly convicted, by the oath or affirmation of one credible witness, such offender or offenders, unless his or her master or mistress will pay the damages sustained, with costs of suit, shall be committed to the gaol of the county, there to be kept to hard labour for three months, and from thence until the cost of prosecution be paid.

"Section V. And be it further enacted by the authority aforesaid, That the act, entitled 'An act to prevent the damages that may happen by firing of woods,' passed the twenty-ninth day of March, one thousand seven hundred and thirty-five, is hereby repealed and made null and void."

Herein the criminal aspect of starting forest fires was further emphasized. What was formerly a crime only when committed by a servant or a slave now became so without distinction of person.

The act of March 29, 1824, was passed to prevent the destruction of woods and timber land by unlawful cutting as well as by fire. The first three sections of this law relate wholly to unlawful cutting, and the penalties to be applied therefor. The title to the act and the fourth section are as follows:

"An act to prevent the destruction of timber, and supplementary to the act entitled, 'An act to prevent the damages which may happen by firing woods,' passed eighteenth of April, seventeen hundred and ninety-four."

* * * * *

"Section 4. And be it further enacted by the authority aforesaid, That whosoever shall wilfully set on fire, or cause to be set on fire, any woods, lands or marshes, whatsoever, within this commonwealth, every such offender or offenders, being thereof legally convicted by the oath or affirmation of one or more witnesses, in the county court of quarter sessions of the peace, where such offense has been committed, shall pay a fine not exceeding five hundred dollars, one-fourth to the informer, and the residue to the overseers or directors of the poor of the township or county, as the case may be, where such offense has been committed, for the use of the poor of such township or county; and shall moreover undergo an imprisonment at hard labor, in the jail of the proper county, for any term not exceeding one year."

The fifth section of this act repealed directly the first and fourth sections of the act of April 18, 1794, *supra*.

When the codification of the criminal laws of the Commonwealth was undertaken in the year 1860, the subject of the malicious firing of forests and woodlands was comprehended in the eighth division, relating to offenses against real property. Section 140 of the act of March 31, 1860, commonly called the "Criminal Code," reduces the penalty fixed by the act of 1824, from five hundred dollars to one hundred dollars, leaving the term of imprisonment at twelve

months, as in the former act. This law, however, does not cover the case of negligently allowing the escape of fire from one's own lands to the lands of another. While this offense could no doubt have been comprehended under the general law of negligence in an action for damages, yet subsequent legislation made this a misdemeanor and fixed a penalty therefor.

Until the year 1867 no special laws relating to this subject had been enacted; but at this session was passed the act of March 26, 1867, fixing penalties for setting forest fires in the counties of Clearfield, Fulton and Elk. It also extended the statute of limitations so that prosecutions might be brought within six years.

This is the first statute which offers a reward as such, for the apprehension and conviction of the offender. It directs the county commissioners to pay to the prosecutor in every such case the sum of fifty dollars and to the district attorney who secure the conviction the sum of twenty dollars.

Following the act of 1867 was another special act approved the 9th day of April, 1869, relating only to Union county. By the act of June 2, 1870, the provisions of this law were extended to the counties of Schuylkill, Lehigh, Berks, Lycoming, Centre, Snyder and Luzerne, from which Lycoming was subsequently excepted by act of May 19, 1871. The penalties imposed are fines ranging from fifty to five hundred dollars and imprisonment from one month to twelve months, within the discretion of the court. It continues the idea of reward contained in the special act of 1867 by providing for the payment to the informer of one-half of the fine imposed.

The preamble to this act of 1869 is interesting from the fact that it offers as a reason for the passage of the act some of the ideas which the forestry administration of the State has been urging upon the people from the very inception of its work. The reports of the Division of Forestry up to 1897 amply prove this statement. The preamble is as follows:

"Whereas, There being certain mountain and other wild lands in the county of Union which are fired from year to year, thereby destroying the young timber and causing the land to be worthless for the purpose of timber: And whereas, Should such young timber not be destroyed it would add to the value of the land, in the course of twenty years, from fifty to one hundred dollars per acre, thus increasing the wealth of the county thousands of dollars, therefore, &c."

The legislative assembly of 1879, in considering the matter of forest fires, followed that of ten years earlier in writing into the general statutory law of the State the provision for paying a reward for the arrest and conviction of such offenders. By the act of 11th

June, 1879, the penalty of one hundred dollars fixed by the act of 1860 was raised to three hundred dollars, with a term of imprisonment as formerly. The county commissioners were therein directed to pay to the prosecutor, after conviction of the defendant, the sum of fifty dollars as a reward.

This continued to be the state of the law until the passage of the more comprehensive act of June 1, 1887, providing for the encouragement of forest culture and imposing penalties for the injury and destruction of forests. In addition to the offenses defined in former laws there are added here those of carrying over or into any forest any lighted candle, lamp, or other fire without having the same inclosed in a lantern or other closed vessel; the discharging of fireworks on forest land or among the trees thereon; and carelessly or wilfully starting fires on one's own land so as to communicate fire to such forest or timber lands belonging to others. The penalty was inadequately fixed at fifty dollars for each offense, but was increased to one hundred dollars by an amendment approved May 14, 1891. In case of the refusal or inability to pay a fine, the defendant is to be committed to the county prison for a period of one day for each dollar of penalty imposed.

This act contains an innovation in forestry law, and one withal that is wholly commendable, being in line with the determination of later legislatures to have small causes finally disposed of in the justice's office. It gives to justices of the peace the power of summary conviction, saving to the defendant the right of appeal to the court of quarter sessions when the fine imposed is over five dollars.

Every one who understands the situation knows that the fire menace in the forests is the great drawback to a wholly successful forest policy in this State. Among all the States, Pennsylvania is yielded the prize for a business-like forest administration, and with a policy for the future well outlined elsewhere in this volume. Relating to the forest fire problem we seem to have a plethora of laws, and yet this problem is unsolved. An act, wise and far-reaching in its conception, is that of March 30, 1897, and if rigidly applied and adhered to would to a degree heretofore unknown prevent the wholesale burning and destruction of valuable forests. This is the act making constables of townships ex-officio fire wardens, giving them authority to summon help for extinguishing fires in their respective townships, providing for the payment of those so engaged and dividing the cost thereof between the county and the State. It likewise requires constables to make to the courts quarterly returns of violations of the forest fire laws, providing penalties for failure to do so, and making it the "*special duty of the judge of said court to see these returns are faithfully made.*" This act is more honored in

the breach than in the observance. The constables refuse to extinguish fires because the commissioners refuse to pay them. It is un-American to be compelled to perform labor without just compensation, except as a punishment for crime. The commissioners refuse to pay because they catch at the straw of unconstitutionality and stubbornly adhere thereto, notwithstanding that to this time the logic and weight of the argument is overwhelmingly on the side of entire constitutionality. Nothing more is necessary on this point at this time than the opinion of Judge Dunham in *Gunder v. Wyoming County*, 12 D. R. 78; 26 C. C. 598; printed in full in the Report of this Department for 1901-2, at page 30; and in addition thereto the opinion of President Judge Rice in *Baker v. Warren County*, 11 Sup. Ct. 170. Then again this Department has knowledge of only one county in the State where the constables are regularly required to make the returns demanded by section three of the act. There may be others, but the fact is not known.

If this law is worth anything and can be made to serve a useful purpose, why not enforce it? If it is worth nothing and is useless, repeal it, the quicker the better, and let us have something to the point that will meet the emergency. The next step would probably be a regular system of State fire wardens, as in other States. But are the people ready for this? Is it possible that they cannot trust their own local officers with the enforcement of so salutary a law? Forest fires in Pennsylvania must be controlled and prevented sometime, either now or in the future. It would be vastly cheaper to do it now. County commissioners in this State are too prone to erect themselves into little *de facto* supreme courts and declare unconstitutional laws enacted for the protection of their own citizens, because the enforcement thereof would mean the taking of a dollar from the county treasury. Claimants in these cases are most frequently of limited means, without ability to carry on an expensive lawsuit, and are thus wholly repressed and disheartened.

It is a question whether the five hundred dollar limit of losses to be paid by any one county in one year is a wise provision. If the whole fire loss of a county were to be divided between the county and the State, would we not find here the very means for cutting these losses to a minimum? It is true the losses at first might be hard upon the county treasury, but that would be the signal for putting the commissioners and the citizens of that county so on the alert that they would see that no more serious conflagrations occur. In other words, the whole fire problem would be solved, and by the counties themselves.

The act of March 22, 1899, is practically a repetition or reduplication of the act of March 30, 1897, so far as it relates to making the

constables ex-officio fire wardens. It, however, extends to borough constables and gives them the power to arrest without warrant, the same authority with which they are invested by the act of 29th April, 1897.

The act of April 29, 1897, last cited, authorizes constables and other peace officers to arrest on view without warrants persons detected in the act of trespassing upon forest or timber lands under such circumstances as to warrant the suspicion that there has been committed or is about to be committed some offense against the laws for the protection of such lands.

As was well said by the former Commissioner of Forestry, it is better to prevent fires from starting than to extinguish them after they have begun. That this fact has been patent to the Legislature for a period of more than thirty years is evidenced by an act approved June 2, 1870, entitled "An act to protect timber lands from fire," the preamble to which is as follows:

"Whereas, It is important to the people of the State that timber land should be protected from fire, which, owing to malicious conduct and carelessness of individuals, is causing vast havoc to the young growing timber, especially upon our mountains, therefore, &c."

The trained detective on guard will do more real good in preventing fires than many men summoned to extinguish them after once started. The above act of 1870 calling for the appointment of such detectives was improved and its scope enlarged by the amendment thereto approved July 15, 1897. The amendment fixes the penalty for the refusal of county commissioners to appoint detectives, it divides the expense of maintaining detectives between the county and the State, and fixes a limit of \$500 to the expense to be incurred on this account by a county in any one year.

The purposes of the act of 1870 were further enlarged by the act of May 2, 1901, which provides that where county commissioners fail or refuse to appoint detectives to ferret out and bring to punishment those who cause the burning of timber lands, the Commissioner of Forestry may make such appointments on request. When the Commissioner makes such appointments and convictions are obtained thereby, the county wherein such fires and convictions occurred may be deprived of State aid for inefficient county detectives appointed for the same purpose.

The cause of forestry in Pennsylvania received an impetus in the creation of a Department of Forestry by the act of February 25, 1901. The raising of the forestry work to be a co-ordinate branch of the State government has lent to it a solidity and dignity which it might otherwise not have attained so early. That portion of the Department act relating to forest fires is section two, referring only

to the kindling of fires upon the reservations. It imposes a penalty of from \$100 to \$500 with costs; and in default of payment of both, an imprisonment until both are paid.

To provide for a more thorough protection of forest lands and give more effectiveness to the work of the employes of the Department of Forestry, the Legislature, by act of March 11, 1903, conferred upon them the same power given to constables by the act of April 29, 1897; that is, after taking the oath required of constables, to arrest on view and without warrant all persons detected trespassing upon forest or timber land under such circumstances as to warrant the reasonable suspicion that such persons have committed, are committing, or are about to commit some offense against the laws for the protection of such lands, or some infraction of the rules and regulations made for the government of the reservations. This gives power and large discretion, but not more than the circumstances surrounding such offenses usually demand. It is so easy to start a fire, so easy to make rapid retreat, so difficult to prove the crime after the offender has left the locality, that every obstacle should and of right ought to be removed from the exercise of all reasonable measures necessary to detect and bring the guilty to punishment.

The solution of the forest fire problem is, in all probability, nearer at this time than it ever has been before. The record of the year 1904 is a decreased destruction by fire. Better protection is being given to timber lands than heretofore. A united sentiment on the part of the people is beginning to demand an honest enforcement of protective measures which will protect. County officers are slowly awakening to the fact that supineness on their part will not much longer be tolerated by those who place them in office. Like large bodies, all real reforms move slowly; but that they move is what lends hope and encouragement for the future.

The laws for the protection of forests from fire, as they are now constituted, are numerous and various. That we have a sufficient number of laws is true. That they need to be better enforced is also true. A complete recasting and combining of the forest protective laws is probably a necessity and would be a convenience, besides eliminating conflicts of phraseology and penal provisions. Much of the present legislation is experimental. The Legislature was dealing with what to it was a new subject. The test of use has now been applied and the weak and strong features have been made apparent. It simply remains to crystallize experience. With the expression of a hope that the time is now ripe for that process, the above is commended to the respectful consideration of intelligent and thinking Pennsylvanians.

A RATIONAL METHOD FOR THE CULTIVATION OF THE
WILLOW (*SALIX*).

BY PAUL E. ARNOLD.

Willow culture is not of recent origin. It dates back as far almost as history itself. As early as 400 B. C. Theophrastus, who lived about that time on Sappho's Isle of Lesbos, Greece, recommended the almond-leaved willow for basket weaving and the water willow, having the best, lightest, and, at the same time, strongest and toughest wood, as particularly adapted for the weaving of warriors' shields.

Although the culture of the willow is very old and certain members of the numerous family "*Salix*" are to be found everywhere, in forest and field, on the steep and almost barren hillside and in the fertile valley, in garden and vineyard, on the banks of brooks and creeks as well as on the shores of the sea, yet a cultural treatment of this valuable plant has heretofore been given but small consideration. Neither has forestry, in whose domain this species belongs, cared more about the willow than the botanical study absolutely demanded, nor has agriculture paid it due attention until about thirty years ago.

The general and most profitable use finds the willow in weaving, in wicker work of all kinds and it is the purpose of this article to illustrate briefly how the willow has to be cultivated and treated for the above purpose.

1. Is there any demand for the osiers (willow)?

Before taking up the culture of a plant unknown to him, unknown at least as far as its market value is concerned, the righteously careful farmer asks himself this question. Up to date he has been satisfied with the willows provided by nature, those that happened to grow on his farm, along the creek, or, perhaps, he has planted one or two stalks for his own use; but now all at once he is approached with the proposition of stocking entire stretches of land with the willow, dedicating them entirely to osier culture. He notices the propaganda started all around him for the general introduction of this new idea, which to him is neither agriculture nor

forestry, and, careful as he is, he fears over-production, having never realized the enormous demand for osier willows nor having ever known that thousands and thousands of dollars annually wander into the pockets of foreigners, who are smart enough to supply the American basket industry with the material, a thing he might have done himself years and years ago.

To give a slight idea of the enormous demand for willow rods of the finer and finest qualities, I call attention to the one great center of wicker industry in and around Lichtenfels, Province Oberfranken, Bavaria, Germany. The beautiful and highly artistic products of the clever Lichtenfels basket weavers find their way to every part of the globe. They are to be found in madam's boudoir in Paris, in milady's chamber in London, in the glittering and extravagant houses of sultans and oriental grandees, in the odd little huts, hidden between Norway's mountains and fjordes, in Italian palaces, Spanish castles, and in the homes of our well-to-do Americans.

According to the latest reports of the Nuernberg Board of Commerce, the export of basket and wicker ware to America alone during the first three months of 1902 amounted to 305,000 Marks (about \$73,000). In all Germany, the wicker industry at present gives employment to somewhat close to 80,000 people. The greater part of the peeled willows used in the manufacture of the finer goods is of either French or North German origin.

I have made inquiries of merchants, manufacturers and shippers of merchandise, to find out whether merchandise, which, up to this time, generally, has been packed and forwarded in solid wooden boxes, could not be forwarded at a substantial saving in freight rates in willow baskets especially constructed for this purpose, and, according to the nature of the goods to be forwarded, woven either coarse or fine, and I have been informed that this has already been practiced to a large extent, and that the only reason why it is not generally adopted is that there is a scarcity of baskets, of weaving material. I am convinced that the demand for osier willows and the new uses the willow will be put to will keep pace with the extension of osier culture, even if the culture should experience a boom such as it has never known before. Already we see a great number of articles made of willows, which we have not met in former years.

Stylish traveling automobile and lunch baskets, wicker furniture of every kind and description, made of whole or split willow rods, carriage, and even automobile bodies, are to be seen, as dainty, light and comfortable as they can possibly be made, and who knows what new schemes with the willow weaves our inventive manufacturers may not surprise us with in the future. Moreover, with

the increase of commercial intercourse grows the need of a cheap, durable, light packing material, and this the willow essentially makes. Tough, elastic, and light in weight, it makes boxes and baskets that conform to the shape of the commodity to be shipped. Willow is not only lighter in weight than packing box wood, but is more durable because of its elasticity and toughness.

In speaking of the demand for willows, the willow market, we furthermore have to consider that the increase and keeping of a willow plantation is not unlimited.

There is, therefore, no reason to fear an abundance of osier willows exceeding the demand, flooding the market and reducing the value of the production. If American agriculture intends to conquer this market, especially if it aims to crowd out the foreign willows, it is not only necessary that we enlarge our willow plantations considerably, that the best and most serviceable species of willows be planted and treated more carefully, but the willow grower must bring his product peeled, not raw, to the market, then there will be no end to the demand.

2. Is the willow an aquatic plant exclusively?

The occurrence of willows in humid regions, their apparent prosperity in the direct neighborhood of flowing water, have given cause to the general opinion that the willow is an aquatic plant. Where meadows thoroughly swampy give but a poor harvest of grass, one has sometimes thought to improve the ground by planting willows. But the sad and sorry aspect of such property with its moss and brown reed grass certainly is not improved by the starving stumps, neither is the ground; and as to the expected improvement of the fertility of the soil, it generally does not compensate for the space given up to the willow.

On the contrary, the roots, withered in the depth, show plainly that the continuous humidity and the sour humus originating therefrom, hurt the willow as much as every other cultivated plant. It is a well-established fact that the best varieties of willow cultivated in Germany are found growing wild in vineyards, hedges, borderlands, and mountains, and that they require for growth no more moisture than do other aboreous plants. Every basket maker knows that willows grown, for example, in vineyards, are much better fitted for planting than those produced close to the water or in swamps.

The willow grown in this constant humidity is thick, narrow, rough and brittle, while the same species grown on dry soil distinguishes itself through softness, pliability and tenacity.

It is true the willow requires a certain degree of humidity, but

with proper preparation of the soil it finds this moisture in sufficient quantity in the sub-soil, provided it is planted in ground where the roots may spread out freely in every direction. With this point in view and depending on observations which I had the opportunity to make during my studies and travels in Bavaria and the Pfalz, I once risked to start a willow plantation on poor dry sandstone, in the Ore Mountain, Saxony. I have obtained rods from ten to twelve feet in height. The willow can stand a greater degree of moisture in the soil than nature demands and this is one of the many advantages; and it does not, by unproductivity, always punish mistakes made in that direction.

Whoever takes an interest in osier culture, whoever wants to obtain the best results with a willow plantation, has to consider that, although the willow cannot dispense with a certain degree of moisture, it is not an aquatic plant exclusively, and it prospers most on moderately dry but deep soil. In every case, however, growth will be deficient in saturated, stagnant soil.

3. The next question to answer is what claims upon soil, climate, and localization the willow makes?

The kind of soil has a distinctly recognizable influence, not only upon the thriftiness of the willow, but upon the quality and whole outward form of the rods. Marks of this influence are detected in the growth, in the more or less strong inclination in the rod for branching out, and even in the color of the bark. It is a general rule that the willow refuses to grow on no soil except that impregnated with stagnant moisture. Even soils of pure sand, provided they have some cohesiveness, stand the test; and heavy, clayey as well as moist, cold mud soils, after drainage, have proved favorable to willow cultivation. It is thus evident that the willow makes small claims upon the soil with a deep understratum of cohesive, moist sand, less in a soil of dry loose sand, peat-bog, gravel, a stony mountain slope, and least in a clay soil largely mixed with oxide of iron. Poor limestone soils are less salutary for willows than a ground containing little lime. Phosphoric acid is a very important ingredient although potash is the material essential to a thriving condition of a willow plantation. These three substances have been identified in relatively large quantities in the ashes of willow wood chemically treated by Professor Schroeder of the Forest Academy at Tharandt.

As for climate, the willow may be said to thrive in almost any climate, but single varieties make particular demands upon it. The willow cultivator has to take into consideration not only the earlier or later unfolding of vegetation in a country, but also the earlier or later rising of sap in the particular variety of willow. If vege-

tation starts early and the fatal spring frosts appear, great harm by freezing is done to the tender shoots that have just come out.

The grower should take precaution against this by his choice of locality. The willow is friendly to sunlight and can endure no shade above or near it. Fruit trees, forest trees, and high buildings are a ruin to the willow plantation. In respect to local position, the willow planter should be particularly conscientious in his choice.

4. What varieties of willow are recommended for new plantations, having regard for the kind of soil and purpose of use?

Hardly any other genus of plants has so many sub-species as the Salix, the study of which is rendered unusually difficult because of the great number of varieties, of hybrids, and of striking transformations. One hundred and sixty species and varieties are given in Anderson's "De Candolle prodromus systematis regni vegetabilis," Vol. 16, Paris, 1868. These varieties are scattered the world over. Germany has from forty to forty-five, well defined. To me it seems better from the agricultural side not to meddle with too many varieties, but to narrow to a few tried sorts and plant these with great care. France has not planted so many varieties as Germany, and yet she has carried on willow culture and the basket industry for a century with such acknowledged expertness that she is famous in this branch of industry and dominates the market.

The French grower recognizes and plants only the trustworthy kinds, *Salix amygdalina*, *Salix viminalis* and *Salix alba*, and only these in their superior varieties. *Salix amygdalina*, L. (*italica nigra* variety) is especially adapted to dry soil and *Salix viminalis* L. and *alba* to moist soil. These three varieties suffice for the farmer who intends to engage in the improved culture of willows.

5. Improper Willow Cultures.

These, it should be understood, have had their soil thoroughly cultivated before planting. The plants have been placed so deep down in the ground that their heads do not project a particle above the surface and only rods grow upward, forming at the time of the annual felling a field of regular close growing willows that is very much like a hemp field.

Since the roots of the willow strive to spread out in the ground on all sides, seeking food and the necessary moisture in the lower strata, therefore a looseness of soil that descends well is required. The vigor of the roots of the willow is the best guide in this matter. It is a good thing to bring the under soil to the top to protect the plants from the encroachment of weeds at the earliest period of unfolding. Hoeing much below the ground level, however, would

do more harm than good to the delicate little roots that are spreading out near the surface. Older growers, especially the French, were led by these reasons to see the necessity of trench-ploughing the ground selected for the willow plantation, and the immediately perceptible, really noble results of this procedure established the utility, nay, the indispensability of a preliminary preparation of the soil. Trench-plowing not only loosens the soil to the desired depth, not only staves off weeds for a longer time, but it brings down to the lower strata the layer of vegetable mould always forming at the surface because of the fall of leaves and manuring, and which gives rich nourishment to the lower roots. The question naturally arising is, how deep, for the good of upper and under ground parts should one trench-plow? Experience has shown that one and a half feet deep gives the desired result, although on plantations where, soon after trenching is begun, sand appears that is light and fine enough for use as blotting-sand, it is well not to plow deeper than about fifteen inches.

The next question is how to trench-plow?

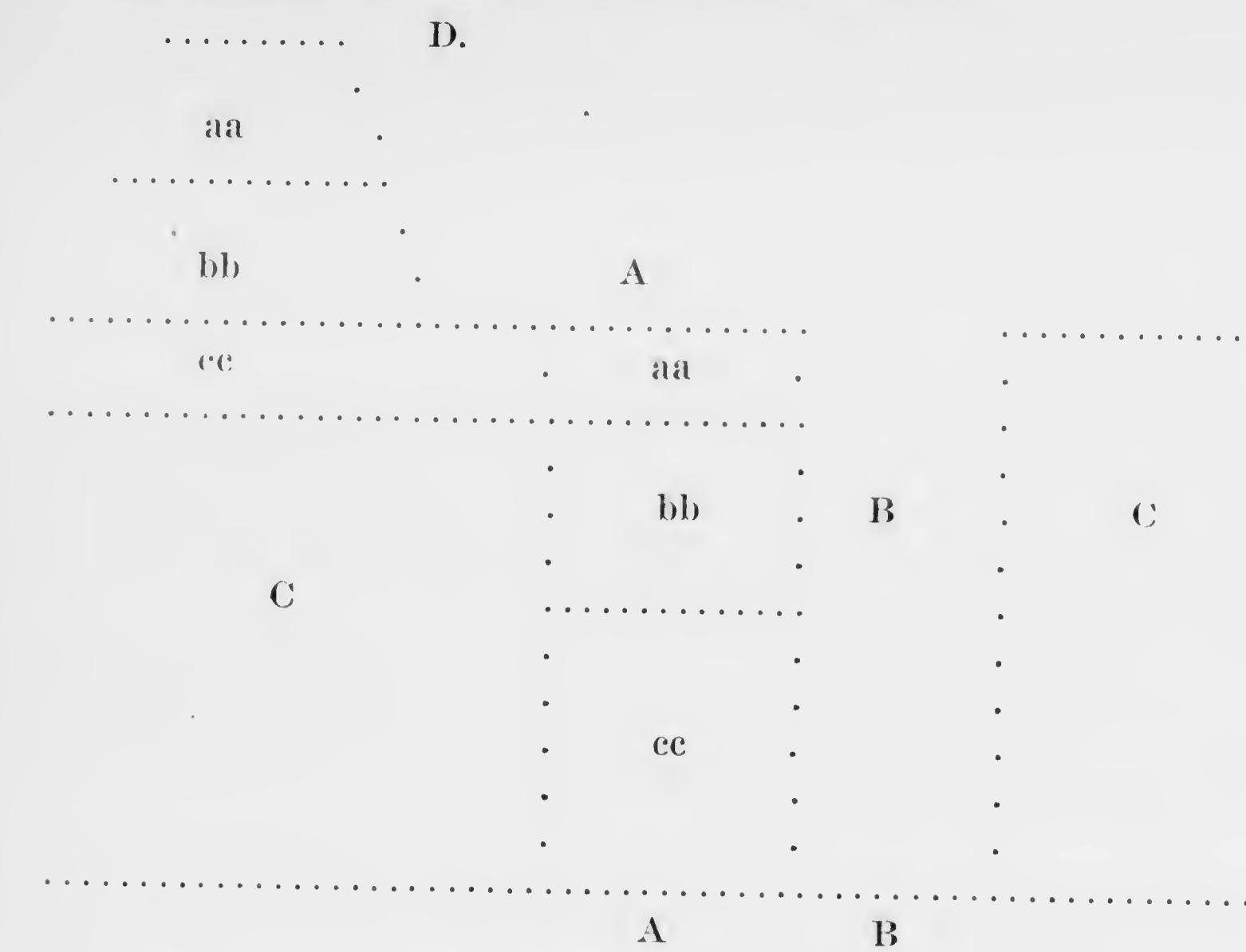
If the selected place requires the digging of ditches or platband cultivation, this work should precede trench-plowing in order that the soil dug out and thrown on the parterre may be turned up along with the trench-plowed soil.

If the ground is not level, it should be made so before anything else is done, and this for two reasons: first, water collects and remains in the hollows, a condition which would ruin willows planted there; second, were trench-plowing to precede leveling, the soil on the elevations would be loosened and carried away and willows planted there could not grow for lack of the loose soil they require. The good upper soil dug away from the elevations is set aside and used later when they are plowed. If it were thrown into the hollows, there would be an excess of rich soil, while on the hills there would be a deficiency.

Trench-plowing, as has been said, cannot begin until a perhaps uneven ground has been leveled and until every possible ditch has been dug, whether it be constructed for drainage, irrigation, or parterres, and until the displaced ground has been evenly distributed over the surface.

Trench-plowing begins with the throwing out of a ditch at one end of the field or border plot, about twenty-five inches wide and twenty inches deep. The displaced ground is thrown backwards. When this is done, a new strip also twenty-five inches wide is measured off by means of a line. This is cut down along the string to the depth of a spade and the entire sloped wall is thrown into the bottom of the ditch. Now follows a second lighter cutting, and lastly

the crumblings are shovelled out and thrown on top. In this way the first ditch is filled up and a new one of the same depth is formed, which is refilled by the same process as was the first.



Plan of Trench-ploughing.

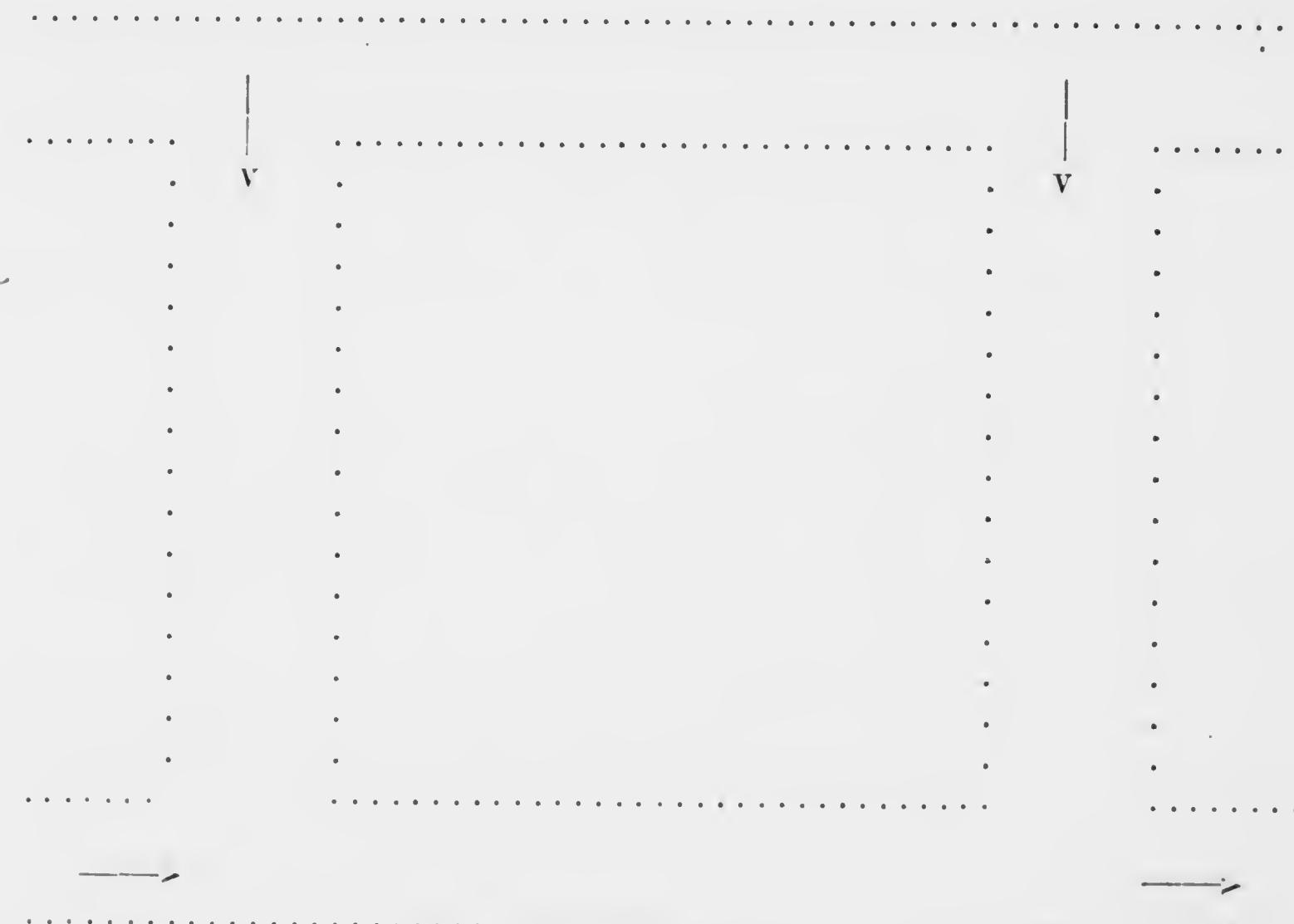
A, first ditch, refilled with soil displaced from the second ditch C; lowest layer cc is vegetable mould from C; middle layer bb is the second cutting-out, and top layer aa the final shovelful of C; B is firm soil; D is displaced ground of A that was thrown backward.

The whole field or border plat is gone over, the last ditch being filled with the original contents of the first ditch, which were thrown backward.

The next matter for the willow cultivator to consider is the season at which he should trench-plough. This would evidently be before winter. The choice of the late fall, the months of October and November, promises best success. This gives the turf in the subsoil time to rot and the soil to settle. The winter frost has made it brittle and it has crumbled to its utmost, so that it is accessible to the little roots which are very tender at first. By early winter or late autumn the farmer has had time to know whether his willow field requires anything else to be done, whether it should be drained by the construction of ditches, whether it can be irrigated to advantage, and how such water can be introduced in the most practical way.

As above expressly emphasized, the willow is no exclusive water plant in the sense that it is most thrifty in a very wet soil. It even dies in a certain superfluity of water.

A condition of moderate moisture suits it best. Too wet an area must be drained, therefore, and the best method for this is by open trenches, covered pipes being, to my mind, not suitable for willow culture on account of the many roots. If there can be a complete draining off of water, it is well, but there are cases such as stretches of low-lying, flat country and marshy and peaty ground where trenches only help. For such parterre or border bed cultivation is recommended. As can be seen in the figure below, parterre plan, on the side of the field where the greatest rush of water is supposed to be, is dug along its whole length the collecting or main trench out of which at measured distance are conducted cross-trenches, through which means parterres or border-beds are formed, the contents of the trenches serving to form the elevated plats.



Ground Plan of a Parterre.

On the side opposite that of the collecting trench a reservoir for irrigation or current drain is constructed. The width of the plat-bands, therefore, the length of the distance between the cross-trenches, is determined by the quality of the soil. Should this be solid and clayey the trenches should be ranged more closely together than if it were loose soil. The success of cultivation with parterres

depends essentially upon the breadth and depth of the trenches which should be so deep that the impermeable layer can yield water. The breadth of the trenches depends upon a necessarily exact bank. The result of the interconnection of parterre cultivation with a system of drain-ditches is that even if there is no complete outlet of water, at least the worst of the moisture is drained from the raised border-beds. The water standing in the trenches has another advantage. It protects the willow from night-frosts by attracting frost and drawing it away from the plants.

From what has been said it is clear that preparation of the soil for willow culture is not unimportant.

6. What part of the willow is suited for slips, and how are slips prepared?

Chiefly slips are chosen for the raising of cultivated willows and these are generally the thickest as well as the thinnest rods grown a year before. All the rods within twenty inches of the very top of the plant can be utilized for this purpose, and should be shortened by an oblique cut to the length of twelve inches. These pieces are variously called slips, shoots, cuttings and sprigs. They expel a mass of roots throughout their entire length not at the buds, but on as much of the bark as is covered with soil. The longer, therefore, the slip is within suitable standard limit of length the more roots start from it and the richer the nourishment of the young plant. If the length exceeds that prescribed as much of the slip perishes down in the moist subsoil as was in excess. On the other hand, if it is too short, the slip must wither up, especially in continuous dry weather, for it is only superficially set in the ground. With the length given above good results are sure. It is recommended that when possible the full-length rods be procured and the cuttings therefrom into proper slip-lengths be made directly before planting. In this way you may know whether the desired species has been furnished, and the percentage of failures will be lower if the cuttings have not been made so long before. One should take care to make the cut close above a healthy bud which, sitting uppermost at the surface, can germinate, with no cone above it first to dry up and later to decay. For cutting slips any good, sharp pocket-knife will be suitable.

7. What is the correct season for planting, and how is this work done?

The spring is the planting time for willows and as early as the weather permits. The ground should be sufficiently dry for walking upon and planting. Late planting should be avoided when pos-

sible, as it causes a small yield. The ground evened off and trench-plowed before winter is now brittle, disintegrated and sufficiently set. If trenches are present, one looks first to see if over winter their partitions have crumbled away and fallen in, and if so these should be repaired. Then pulverize with the hoe the crumblings of soil lying on top of the ground and put the whole plot in a garden-like condition.

A planting line has been previously prepared on which are marked off the distances at which the setting out will be done. The string has first been marked off with a colored pencil every five or ten inches according as one has decided to plant. Next a little piece of colored (red) worsted is tied wherever there is a pencil mark. The line is untwisted a little, the worsted slipped through and knotted. This work is not so troublesome as might seem and requires about one hour's time. One's pains are richly repaid by time saved in planting and by the beautiful regularity of the willow field.

To get the best results slips must be planted close. A width of ten by twenty inches, ten inches apart in the row and twenty inches between rows, gives success. There is no question but that the closer the planting, the taller, more slender and more nearly branch less will be the rods that come up. The possibility of working a willow plantation comfortably, that is, of keeping it free from weeds, and the probability that too many boarders at one table will soon put an end to successful growth will be discussed, for they must be considered and exactly weighed before the planting itself takes place.

The measured off planting line is fastened at one end of the plot and is stretched taut and straight in the direction that the rows are to extend. The cut slips are bound together in bundles of one hundred with the buds or eyes looking all in the same direction.

Holding one of these bundles in the left hand, plant a slip in the ground, close to the point on the string marked with red worsted, pressing it down in an oblique direction and so fully into the ground that not a vestige projects above the surface. Care should be taken not to put a slip in upside down. The bud must point upwards. Strong reasons command that as long as the plantation lasts the parent-plant should remain in the ground as deep as possible. The farther it gets, in the course of time, towards the surface, the more exposed it is to the effects of air and of deposits of water, and the sooner it becomes cracked, hollow and sickly, followed quickly by death. In this respect is willow culture distinguished from the wild planting method. The former method would keep the parent-plant deep in the ground.

Now comes the matter of cutting. It is of great importance that the cut should be made close to the parent-plant, because in time

shorter or longer cones stand up, forming a top-piece that grows more and more out of the ground. From the very beginning, while planting, the parent plant should be assigned to its proper place, and no growth above ground encouraged. During the first year a slip will germinate only one sprout, which must grow out of the ground like an asparagus stalk. If in planting one inch or several inches of the slip stand out above ground, then there germinate, instead of one strong, slender, branchless rod, two or three rods, which forming forks, ruin the shape of the future top and prematurely weaken the parent-plant. After this necessary digression, we go back again to planting. The first row has been planted at equal distances. One takes now two extra pieces of wood, cut for this purpose, twenty inches long, and measures this distance on the still unplanted area at lower and upper ends of the field and at right angles to the line measure, the little wooden measures are then stuck in the ground upright, the line fastened to them and pulled taut as before. In this way the desired distance of twenty inches between rows is obtained. The work of planting according to the markings on the line as above described is repeated. There is one more thing to think of in planting, and that is keeping the varieties pure. I do not mean by this merely the procuring of superior tested osiers. That would be a matter, of course, deserving attention; but I mean that in case several varieties are to be set out in the same field they should not be planted promiscuously, but carefully separated according to species.

8. Care of the willow plantation.

Weeds are extremely harmful to the willow plantation. When they get the upper hand in a deeply and closely planted field they soon prove fatal to it. Assiduous weeding is necessary and hoeing the soil flat. Beside the advantage of destroying the weeds, hoeing furthers the growth of rods by facilitating the entrance of air and moisture and also, in connection with the later copious ground shade, by bringing about that condition of cultivated soil called top dressing. This is indispensable for willows as it is for other agricultural plants. The most harmful weeds are those bred by root shoots. The wild bind-weed (*Convolvulus sepium*) is one of the most troublesome. To prevent this dangerous enemy from coming up the under parts of the willows must be examined every month and the roots to which bind-weeds are attached should be drawn or dug out. Sometimes replanting is made necessary. Gaps occur in every osier plantation. They must be filled up as soon as possible, since grass, the inveterate evil of the willow plantation, grows in them. Re-planting may be done in the fall or spring. Whole vigorous roots of the

respective species and not slips are used for this purpose and are stuck down deep in the soil. Young willow plantations require complete protection from grazing cattle and find it in hedge-fences.

9. What is the proper time for cutting, and how are the rods cut and preserved?

The harvesting of the rods begins whenever the rising of the sap ceases, whenever, therefore, the wood is fully ripe. The outward evidence of this condition is the complete bareness of the rod from top to bottom, every leaf having dropped off. In all cases it is well and safe not to remove the rods before December, nor after January. In the spring they are artificially brought into sap again.

Generally speaking, if the production of wickers is the chief end of the willow cultivation, the annual cut must be the guiding law, only one-year-old branchless rods will serve as material for finer wicker-work. Hence rods must be cut every year. The way the cut is made is by no means a matter of indifference. It has, indeed, the greatest influence upon the growth of the willow. In other words, it controls the more or less great inclination of the rods to branch out. The cut crops the rod close to the parent-plant, so that during the next year only the lowest buds succeed in unfolding. Not a slanting cut is made, but one at right angles to the stem.

Years ago when I was looking more closely into the rational methods of cultivation in Oberfranken, Germany, willow growers advised me never to cut except very deep. One said to me, you can never cut too deep, but you can easily cut too high. Any existing troubles, be they never so small, are likewise removable. Even in case your willow rods are useless as wickers, they can be sold for poles.

Having been cut, the rods are sorted. The branchless are kept strictly apart from the branched and are bound into bundles of two hundred, provided with a label giving assortment number. On account of greater durability the label is preferably made of shingle-wood rather than paste board. The rods are brought home, and for fourteen days exposed to the open air; that is, they are put under an open shed or enclosed yard exposed to the air. After this time they are brought under cover to a room free from currents of air and sunlight, but not at all damp or close. Never lay them away in rolls of mud and straw nor cover them with sand. Cold does not hurt them.

As a rule never sell your willows on the stock. The plantation will, in a short time, be ruined by the erroneous cutting.

I already remarked that if willow culture is to become a more valuable industry commercially for agriculture, the rods must be

brought to the market in a peeled state. Some one may interpose here the objection that they cannot be peeled in winter, but this is overcome by the fact that the sap can be made to rise in the rods by artificial means. There are in use two methods of peeling. The winter peeling process and the water peeling process. The winter peeling process is carried on in special rooms heated to the desired degree by stoves, or, preferably, by steam heat. Day and night a temperature of fifty degrees Fahrenheit is maintained. Semi-darkness should prevail and the rooms be of a good size. The rods in unbroken bundles are placed in troughs filled to a height of five inches with fresh water. The tops of the rods are often sprinkled with warm water. In a few days the bark can be removed with slight trouble. This method is employed less often than the water peeling process, which deserves the preference. April and May are the proper months for water peeling. The bundles of rods are struck on the ground until their lower ends are all even. After that they are placed in the open air, if it is warm enough, in about two and a half inches of water. Running water is most suitable. In this process, as in the other, bundles should not stand too close and the tops are sprinkled with warm water. When little green leaves have sprouted along the rods from bottom to top and a mass of roots has appeared at the foot, the rods must be peeled within the following eight days. The bundles should be opened before the peeling, to permit evaporation. In fine weather and bright sunshine the work of peeling progresses best, the peeled rods dry quickly, remain clean and take on a dazzling whiteness.

Peeling is not difficult and requires only a little practice to succeed. When it is done the willows (rods) are exposed to the open air to dry. They are spread out thinly, so that the air and sunshine can effect the drying and they do not lie on the bare grass, but upon something laid between. The more quickly the rods dry the more beautiful and white they keep. At night and during rain peeled willows must be brought under cover. When dry they are placed upright in an airy room that is free from dust and dirt and remain there a fortnight. At the end of this time they are ready for sale and are stored until then in the darkest possible dry place.

I again emphasize the fact that there is a greater demand for peeled than for green willows. Therefore, the work of peeling is paid for by the getting of a higher price, and every willow grower should submit to the trouble of peeling in his own interest. The cost of new willow plantations is great, but they are very remunerative enterprises. In the matter of their management and the income from them, many kinds of conditions are involved. With a moderate market, the returns from willows are not easily matched, either in amount or certainty, by those accruing from any other utilization

of the soil. It is clear that the full growth and other conditions of willow planting, the position in relation to sale and trade, not to mention the shrewdness and initiative energy of the grower, together with actual prices obtained, are all important influences upon the profits. These are small from the point of view of timber, but as a means of earning wages no other branch of wood production equals willow culture; but it requires great attention, special diligence, and strictness of management. The cost of property, preparing the field and planting should not exceed \$120 to the acre. To this must be added the cost of the slips, which is between twenty and twenty-five dollars to the acre. A well-managed willow plantation may yield a yearly net income of seventy-five to eighty dollars per acre, and will last from twenty to thirty years.

I will close with the discussion of another question of political economy. Although I do not think it advisable to carry on willow culture on an audaciously large scale upon such farming lands as can be utilized with success for other agricultural products, yet it is by this indisputably paying branch of industry safe and economically politic to raise the value of acres that have hitherto yielded to farming small or no profits. I am looking at the matter from the economic viewpoint. The main task of farming must always be the production of bread; in other words, the culture of such plants as supply mankind, either directly or indirectly, with sustenance. Neither bread nor any enjoyable fruit grows on the willow and no domestic animal can be nourished by it. The willow, even agriculturally cultivated, is nothing but a forest tree. As such its product, like our forest trees, has a high and important value for industrial purposes. Like the forest, indispensable to mankind, the willow has, in all cultivated soils, limits that must remain unalterable. The willow is only profitable if it stands on its own ground, and its ground is, as in the case of forests, that on which the cultivation of agricultural plants does not pay.

There are a few places in Pennsylvania where willows are grown for Philadelphia basket makers, as for instance at Edgely, near Trenton, on the road to Philadelphia; but there are many areas, bringing in little or no profits, which are very well adapted for willow culture if these lands are cultivated as above described.

To make such tracts capable of cultivation and utilizable is only right and worthy of every farmer's consideration.

TABULATED STATEMENT OF TIMBER CUT IN PENNSYLVANIA IN 1902.

Counties.	Number of acres cut over to be used for farmings purposes.	Number of acres cut over Number of feet for forming cut, white pine measure) board measures.	Number of cords of white pine measure) hemlock measure) board measures.	Number of cords of white pine measure) other woods cut, board measures.	Number of cords of wood cut. Number of cords of bark peeled.	Number of cords of pulp wood cut. Number of cords of wood used in manufacture of alcohol.	Number of cords of wood used in manufacture of acid.	Number of miles of roads of wood used.	Number of miles of roads of timber used.	Number of miles of roads of timber used.	Number of miles of roads of timber used.
Adams,	385	113	50,000	50,000	1,212,000	5,900	500	.....	.....	.....	8,572
Allegheny,	379	35	200,000	200,000	883,000	100	.....	.....	40	40	.....
Armstrong,	620	155	4,000,000	4,000,000	4,000,000	35	.....	.....	100	61,650	.....
Beaver,	185	18	220,000	220,000	2,923,000	40	870	.....	3	297,600	.....
Bedford,	1,731	111	599,000	338,000	262,500	1,640	10	.....	2,060	147,143	.....
Berks,	145	3	380,000	2,310,000	3,243,000	6,438	1,580	436	40	20,000	.....
Blair,	1,116	82	360,000	2,310,000	930,000	8,580	27,787	.....	.....	.....	.....
Bradford,	2,048	235	1,100,000	16,353,000	233,000	1,600	50	.....	.....	.....	.....
Bucks,	72	15	210	210	575,000	.....	.....	.....	188	1,205,400	.....
Butler,	4,735	510	706,000	45,527,000	20,431,021	5,805	17,741	4,325	.....	.....	.....
Cambria,	2,052	.....	1,057,000	24,136,000	299,000	.....	8,573	.....	.....	.....	.....
Cameron,	Carson,	20	20,000	20,000	389,000	.....	230	.....	5,070	279,800	.....
Centre,	4,432	1,057	3,441,000	12,290,000	1,976,000	14,575	3,710	937	607	1,564	240,000
Chester,	314	29	75,000	1,453,000	1,488,000	5,940	360	100	10	42,000	.....
Clarion,	1,453	290	5,812,000	6,390,000	3,724,000	500	1,885	.....	1,000	1,189	462,000
Clearfield,	5,252	500	7,752,654	74,664,628	6,573,694	.....	32,591	.....	.....	.....	888,572
Clinton,	6,225	50	6,967,055	17,480,651	3,320,754	2,493	13,007	1,335	.....	.....	.....
Columbia,	1,835	25	1,439,000	1,865,000	3,755,000	.....	846	.....	.....	.....	.....
Crawford,	812	76	132,000	1,894,000	3,120,000	1,420	642	.....	.....	.....	.....
Cumberland,	520	28	110,000	.....	556,000	1,850	.....	250	50	6	.....
Dauphin,	323	50	495,000	475,000	630,000	1,735	39	.....	.....	85	.....
Elk,	5,639	20	5,225,636	109,573,551	6,361,027	26,100	47,522	190	20,000	.....	.....
Erie,	132	42	98,315	526,834	1,168,818	850	103	106	.....	8,800	560,000
Fayette,	980	95	600	14,227,908	64,982,705	5,229,000	4,711,103	53,920	.....	96	200
Forest,	18,754	600	220,000	65,000	1,635,000	450	290	.....	.....	.....	.....
Franklin,	476	106	.....	.....	.....	.....	.....	.....	.....	.....	.....

Counties.	Number of acres cut over to be used for farmings purposes.	Number of cords of white pine measure) board measures.	Number of cords of white pine measure) other woods cut, board measures.	Number of cords of wood cut. Number of cords of bark peeled.	Number of cords of pulp wood cut. Number of cords of wood used in manufacture of alcohol.	Number of cords of wood used in manufacture of acid.	Number of cords of wood used.	Number of miles of roads of wood used.	Number of miles of roads of timber used.	Number of miles of roads of timber used.	Number of miles of roads of timber used.
Fulton,	620	65	725,000	.....	800,000	1,500	400	.....	.....	.....	.....
Green,	50	75	4,532,000	1,160,000	4,557,000	6,245	357	200	1,500	25,200	.....
Huntingdon,	6,152	365	9,126,000	13,427,000	13,818,000	300	6,847	250	.....	5,040	175,000
Indiana,	1,886	100	430,000	22,594,700	7,395,000	105,000	733,000	500	100	54	175,000
Juniata,	963	10	.....	.....	47,867	200	35	.....	.....	.....	.....
Lackawanna,	10	.....	.....	1,574,000	6,735	50	.....	.....	.....	.....	72,429
Lancaster,	608	128	.....	3,568,000	220,000	1,112	29	.....	.....	136	154,000
Lebanon,	120	120	.....	1,640,916	774	774	33	.....	.....	6	230,471
Lehigh,	150	8	.....	3,142,397	60	2,250	100	.....	.....	110	182,572
Luzerne,	1,566	255	1,824,222	6,236,668	14,776,456	908	32,098	838	20,000	2,350	.....
Lycoming,	5,750	385	4,433,393	66,469,632	6,800,000	34,650	9,616	100	.....	60	774,190
McKean,	1,961	85	140,000	9,652,000	490,000	70,000	1,551	75	304	517	14,000
Mercer,	1,360	.....	680,000	100,000	70,000	702	75	.....	.....	50	127,600
Mifflin,	848	.....	217,500	195,000	40,000	1,625	.....	126	.....	256	66,000
Monroe,	83	19	576,000	219,000	150,000	420,000	1,750	47	.....	2	31,372
Montour,	50	.....	200,600	250,000	500,000	3,510	436	300	100	2,934,250	.....
Northampton,	181	70	250,000	250,000	3,131,693	30,650	1,507	299	.....	235	1,320,000
Northumberland,	195	2,867	275,366	55,000	3,160,000	2,137	40,817	500	300	7	17,148
Perry,	1,076	22	1,076,250	265,000	1,378,000	1,190,500	1,750	296	500	2,304,250	1,960,290
Potter,	31,445	495	283,090	224,811,000	27,941,517	10,890	191,194	26,382	8,708	62	.....
Schuylkill,	2,552	53	453,000	200,000	1,888,560	523,095	65	35,807	100	286	.....
Snyder,	346	.....	301,329	119,500	12,811,885	38	873	38	.....	10	.....
Somerset,	1,873	238	168,516	1,683,870	66,333,000	2,471,200	130	288	.....	230	.....
Sullivan,	6,956	.....	80,000	3,100,000	2,128,000	6,886,188	2,025	26,306	40	2,885	.....
Susquehanna,	413	40	40,000	1,378,000	1,190,500	1,750	1,000	.....	100	500	.....
Tioga,	5,874	50	570,000	71,128,000	1,155,000	2,266,887	302,430	301,512	1,076	.....	.....
Union,	1,781	73	3,258,204	2,266,887	2,959,897	302,430	301,512	1,076	.....	328	1,320,000
Venango,	1,52										

TABULATED STATEMENT OF TIMBER CUT IN PENNSYLVANIA IN 1903.

Counties.	Number of acres cut over.	Number of acres cut over used for farming purposes.	Number of feet (board measure) white pine cut.	Number of feet (board measure) hemlock cut.	Number of feet (board measure) other woods cut.	Number of cords of bark peeled.	Number of cords of pulp wood cut.	Number of cords of wood used in the manufacture of alcohol.	Number of cords of wood cut.	Number of cords of cord wood cut.	Number of fleet (board measure) used for mine props.	Number of fleet (board measure) used for rail road ties.	Number of fleet (board measure) used for telegraph poles.	Number of feet (board measure) used for telegraph poles.
Adams,	127	24	50,000	40,000	240,274	40	200	1,090	250	76,380	76,380	300,300	132,000	25,000
Allegheny,	365	13	15,000	465,000	1,015,600	150	150	76,380	300,300	363,980	363,980	128,260	54,680	128,260
Armstrong,	627	72	46,206	46,206	2,828,421	142	142	149	149	2,817	2,817	2,385	396,000	675,000
Beaver,	299	50	.....	.....	1,975,000	.....	2,711	1,712	10	1,398	1,398	3,950	60,000	1,236,000
Bedford,	2,641	202	373,400	1,975,446	6,985,900	.....	2,711	1,712	10	526	526	808	218,400	218,400
Berks,	310	15	100,000	50,000	1,248,300	.....	1,398	1,712	1,712	.....	.....	1,134	1,134	146,696
Blair,	1,308	170	232,000	1,993,247	4,137,558	.....	555,000	555,000	526	34	34	87	87	87
Bradford,	1,000	124	2,694,500	1,393,000	652,000	.....	1,925,000	1,925,000	1,925,000	1,925,000	1,925,000	7,989	7,989	2,451,083
Bucks,	187	86	.....	.....	26,720,601	.....	15,239	7,989	15,239	3,500	3,500	113,425	113,425	113,425
Butler,	430	55	.....	.....	43,030,000	.....	21,663	3,500	21,663	2,352	2,352	11,226	8,383,830	5,400
Cambria,	9,031	315	196,000	38,700,247	220,000	.....	2,404,779	4,165,207	1,181	2,707	2,707	6,130	6,130	300,000
Cameron,	6,150	.....	660,000	250,000	220,000	.....	1,214,000	60	80	800	800	10,000	10,000	10,000
Carbon,	304	10	.....	2,875,564	2,404,779	.....	1,165,207	1,165,207	1,165,207	1,165,207	1,165,207	1,165,207	1,165,207	1,165,207
Centre,	7,380	197	.....	175,000	150,000	.....	1,214,000	1,214,000	1,214,000	1,214,000	1,214,000	2,707	2,707	2,707
Chester,	322	28	.....	841,206	21,919,857	150,000	2,870,564	2,870,564	2,870,564	2,870,564	2,870,564	50	50	50
Clarion,	737	94	.....	3,951,600	1,830,000	9,162,600	21,919,857	21,919,857	21,919,857	21,919,857	21,919,857	2,582	2,582	2,582
Clearfield,	3,319	.....	.....	5,820	11	1,830,000	9,162,600	9,162,600	9,162,600	9,162,600	9,162,600	4,180	4,180	4,180
Clinton,	5,820	.....	.....	796	120	\$50,000	1,035,000	1,035,000	1,035,000	1,035,000	1,035,000	405	405	405
Columbia,	796	120	.....	695	235	329,000	2,122,000	2,122,000	2,122,000	2,122,000	2,122,000	2,878,714	1,431	1,431
Crawford,	695	.....	.....	145	36	400	425,000	305,000	305,000	425,000	425,000	40	40	40
Cumberland,	145	.....	.....	400	25	400	425,000	305,000	305,000	425,000	425,000	30	30	30
Dauphin,	4,387	1,130	1,300,000	45,700,000	4,500,000	.....	1,332,000	1,332,000	1,332,000	1,332,000	1,332,000	22,300	22,300	22,300
Delaware,	287	110	9,599	728,436	1,741,279	.....	276	276	276	276	276	835	835	835
Elk,	3,067	886	14,059,055	70,166,327	8,322,310	.....	10,079,761	10,079,761	10,079,761	10,079,761	10,079,761	2,592,260	2,592,260	2,592,260
Erie,	7,737	100	.....	.....	.....	.....	32,317	32,317	32,317	32,317	32,317	166	166	166
Fayette, . . . . .	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	891,000	891,000	891,000
Forest, . . . . .	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	104,000	104,000	104,000

Franklin,	1,560	98	201,000	180,000	4,395,801	403	2,585	27,300
Fulton,	582	35	459,000	795,000	645	645	1,510	.....
Greene,	28	.....	.....	65,000	5,401,000	851	4,725	2,350
Huntingdon,	5,821	137	5,173,000	627,500	80	1,493	810	1,911,000
Indiana,	2,523	175	1,762,000	3,621,000	.....	2,376	130	1,134,600
Jefferson,	1,386	126	2,001,000	7,380,000	100	1,059,200	.....	551,460
Juniata,	612	70	680,000	123,000	.....	.....	1,126	13,200
Lackawanna, . . . . .	.....	.....	.....	.....	.....	300	.....	37,482
Lancaster,	443	29	5,500	18,000	.....	.....	4,810	10,860
Lawrence,	155	115	125,000	100,000	.....	1,725,000	87	.....
Lebanon,	2,116	15	.....	.....	.....	1,071,760	556,920	.....
Lehigh,	152	45	.....	.....	.....	1,075,000	1,538	146,652
Luzerne,	3,341	119	2,008,805	5,821,510	41	2,880	1,070	7,350,760
Lycoming,	2,740	658	1,684,456	8,788,680	.....	5,818	2,065	2,266,380
McKean,	3,733	575	.....	12,680,000	.....	6,890	49,005	262,080
Mercer,	305	70	.....	.....	.....	1,625,000	46,555	35,200
Mifflin,	365	.....	350,000	.....	.....	450,000	87	54,600
Monroe,	587	5	200,000	.....	.....	1,055,000	221	1,550,320
Montgomery,	70	25	.....	.....	.....	465,000	1,274	.....
Montour,	313	100	150,000	75,000	.....	2,000	1,750	1,201,200
Northumberland,	180	.....	30,000	.....	.....	841,223	1,683	190,652
Northampton,	1,459	.....	515,209	102,000	.....	1,605,425	180	28,777
Perry, . . . . .	.....	.....	.....	.....	.....	19,600	28,777	32,760
Philadelphia,	1,564	26	998,600	241,500	.....	226	25	644,200
Pike,	7,931	242	290,000	65,501,008	.....	22,845	24,501	27,833
Potter,	7,449	.....	615,140	143,066,000	.....	79,433	3,355	2,244,060
Schuylkill,	441	4	447,000	41,000	.....	512,500	.....	8,800
Snyder,	3,297	15	2,000	3,528,476	.....	10,933,150	30	344,000
Somerset,	2,462	38	42,000	12,697,887	.....	3,159,000	452	76,440
Sullivan,	362	180	4,000	944,147	.....	801,223	435	10,920
Susquehanna,	1,694	355	2,225,000	4,389,500	.....	7,979,702	1,900	3,598,140
Tioga,	1,162	12	1,789,354	1,168,019	.....	4,335,000	150	108,000
Union,	1,098	215	1,015,040	1,607,000	.....	4,235,000	.....	174,720
Venango,	5,078	25	8,513,659	40,722,005	.....	7,979,702	1,900	54,600
Warren,	177	86	.....	4,335,000	.....	1,917	2,716	14,696
Washington,	1,424	355	66,338	3,085,000	.....	3,149,413	1,7200	476,330
Wayne,	1,565	185	250,000	15,000	.....	2,151,543	61	1,064,800
Westmoreland,	3,407	638	1,697,500	9,904,000	.....	5,175,000	15	2,451,468
Wyoming,	532	96	3,000	20,000	.....	6,405	30	5,746,060
York, . . . . .	.....	.....	.....	2,556,130	.....	604	120	3,844,806
Totals,	125,981	9,337	64,566,691	568,097,571	280,375	28,225	226,749	9,098,743

TABULATED STATEMENT, BY COUNTIES, OF LOSSES FROM FOREST FIRES, FOR THE YEAR 1902.

Counties.	Number of acres burned over.	Number of feet (board measure) of logs burned.	Number of cords of pulp wood burned.	Number of cords of cord wood burned.	Number of mine props burned.	Number of railroad ties burned.	Number of feet (board measure) of sawed lumber burned.	Number of cords of bark burned.	Number of panels of fence burned.	Value of buildings burned.	Cost to individuals to extinguish fires.	Number of men employed by individuals.	Total loss by reason of forest fires.	
Armstrong,	139	.....	.....	.....	.....	.....	1,720	.....	.....	.....	.....	54	440
Beaver,	20	.....	.....	.....	.....	.....	50	.....	.....	.....	.....	10	100
Bedford,	797	1,000,000	.....	2,550	.....	500	2	2,230	.....	.....	.....	42	12
Berks,	81	.....	.....	.....	.....	100	30	50	.....	.....	.....	75	2,000
Blair,	432	.....	.....	.....	.....	220	440	440	.....	.....	.....	32	2,030
Bradford,	80	115,000	100,000	2,406	21,350	338	1,244	5,039	6	\$2,700	.....	25	2,580
Cambria,	14,404	3,210,000	100,000	.....	.....	.....	350	.....	1	200	15,050	64	78,903
Cameron,	12,450	3,050,000	100,000	2,406	21,350	338	1,244	5,039	6	\$2,700	4,001	564	794	
Carbon,	490	.....	.....	.....	.....	.....	350	.....	1	200	5,050	1	5
Centre,	2,539	2,000	.....	.....	.....	262	40	350	1,833	2	1,200	58	8
Clarion,	1,758	112,500	74,000	500	2,900	50	310	110	9,847	1	2,405	183	44	
Clearfield,	7,759	750,000	74,000	3,550	180,100	50	100	25	2,405	1	2,762	356	9,455	
Clinton,	2,012	25,000	2,000	300	600	4,000	20	8	40	165	1,050	2,037	16,325	
Columbia,	1,419	1,200	.....	.....	.....	.....	100	25	2,405	1	50	210	35,040
Crawford,	40	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	238	16,680
Cumberland,	3,430	1,000	.....	.....	.....	.....	30	.....	.....	.....	.....	15	1
Erie,	12,450	1,710,000	1,700	700	700	500	11,500	100	22	5,200	5,632	174	16,570	
Fayette,	1,320	.....	1,300	1,000	7,200	.....	1,144	.....	.....	.....	.....	237	77,650
Forest,	5,072	2,802,000	440	500	2,000	20	20	2,005	9	5,250	2,581	164	5,635	
Franklin,	480	.....	3,000	.....	140	.....	182	.....	914	.....	.....	277	37,400
Fulton,	800	.....	10,000	45,600	500	10	.....	950	.....	.....	63	28	4,380
Huntingdon,	2,755	10,000	125,000	1,060	1,060	.....	10	1,253	2	1,200	101	146	1,675
Indiana,	5,795	135,000	125,000	1,060	45,600	500	10	4,131	1	100	1,930	145	5,235	
	158,572	21,851,850	4,663,400	139,530	803,642	9,855	41,692	2,956	78,361	89	\$39,275	61,629	33,980

Jefferson,	1,552	11,000	\$1,000	225	3,800	25	10	5,840	25	320	455	185	40	13,695
Juniata,	1,606	.....	18,000	.....	.....	500	2	2,230	.....	50	138	71	96	1,740
Lackawanna,	130	.....	.....	.....	200	50	100	100	.....	.....	14	8	10	1,645
Lancaster,	40	.....	.....	.....	.....	50	.....	.....	.....	.....	.....	20	1	650
Lebanon,	51	.....	.....	.....	1,000	.....	25	.....	.....	.....	.....	30	1	280
Lehigh,	126	.....	.....	.....	1,000	.....	25	.....	.....	.....	77	20	4	1,975
Luzerne,	4,376	51,000	1,80,000	400	2,000	873	134	4	1,332	1	100	1,054	249	4,380
Lycoming,	10,801	4,118,000	1,80,000	65,000	4,435	10,300	600	6	8,540	5	3,675	320	65	75,560
McKean,	9,469	2,000	65,000	.....	.....	7	740	600	6	1,050	10	14,099	773	102
Mercer,	8	250	.....	.....	.....	50	.....	.....	.....	.....	63	30	5	205
Mifflin,	395	.....	.....	.....	.....	190	10	4,335	.....	.....	277	160	111	1,875
Monroe,	1,424	259,000	45,000	980	400	.....	190	10	4,335	.....	.....	36	1	300
Montour,	19	.....	.....	2,060	100	42	.....	.....	.....	.....	.....	15	14	716
Northampton,	586	.....	.....	500	400	370	1,530	.....	.....	.....	.....	141	86	1,200
Perry,	556	1,000	.....	.....	.....	25	100	1,310	1	100	1,054	249	43	9,360
Pike,	2,342	157,000	31,600	165,325	503,540	25	15,000	2,630	1	25	468	136	572	33,390
Potter,	6,540	4,005,000	1,300,000	.....	.....	5	600	535	6	2,190	402	72	25	106,446
Schuylkill,	9,225	23,900	2,390	1,060	1,800	646	10	570	1	400	470	429	34%	30,051
Snyder,	463	5,000	.....	276	200	10	636	.....	.....	.....	.....	10	8	780
Somerset,	4,732	2,000	23,000	390	54,000	4	5,316	3	1,625	721	469	69%	68,575	
Pike,	4,824	85,000	5,000	500	500	58	100	1,825	1	700	390	98	80	9,331
Sullivan,	3,292	239,000	1,200	5,200	1,50	1,688	48	1,538	1	700	1,820	256	59%	31,425
Susquehanna,	4,948	45,000	.....	2,300	.....	92	330	2	.....	.....	428	106	34%	10,235
Tioga,	250	.....	.....	.....	.....	13	228	10	10	10	10	1	1,140	1,140
Union,	4,427	169,000	58,500	1,880	9	436	13	5,855	13	8,050	2,057	228	90	42,507
Wayne,	4,520	75,000	7,600	5,400	.....	12	700	2	25	2,920	593	879	93	9,885
Westmoreland,	4,564	60,000	1,100	7,800	23,000	60	10	25	2,920	1	50	55	60	13,310
Wyoming,	75	21,000	500	.....	.....	10	820	1	50	.....	55	60	10	350
Totals,	158,572	21,851,850	4,663,400	139,530	803,642	9,855	41,692	2,956	78,361	89	\$39,275	61,629	620,573

WHAT CAUSED THE FOREST FIRES.

Railroads,	220	Accidents and lightning	9

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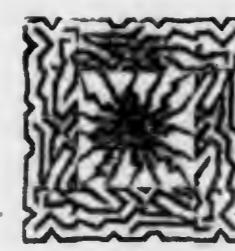
TABULATED STATEMENT, BY COUNTIES, OF LOSSES FROM FOREST FIRES, FOR THE YEAR 1903.

Counties.	Number of acres burned over.	Number of feet (board measure) of logs burned.	Number of feet (board measure) of sawed lumber burned.	Number of railroad ties burned.	Number of mine props burned.	Number of cords of pulp wood burned.	Number of cords of cord wood burned.	Number of panels of fence burned.	Number of buildings burned.	Value of buildings burned.	Cost to individuals to extinguish fires.	Number of men employed by individuals.	Number of days employed.	Total loss by reason of forest fires.
Adams,	99	6	.....	.....	.....	75	.....	.....	.....	.....	.....	.....	.....	\$406 00
Allegheny, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6 00
Armstrong, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beaver,	129	16	350	800	25	45	200	200	200	104 00	36 00	14 25	11	6
Bedford,	322	4	.....	.....	.....	.....	120	120	120	24	3 00	3 00	2	1
Berks,	1,059	80,000	400,000	400,000	4	24	2,430	3	2,430	121 25	78	4 1/2	2	2 1/2
Blair,	1,000	4,500,000	.....	.....	25	.....	1,000	1,000	1,000	300 00	300 00	50	4	4 1/2
Bucks,	2,760	603	100	100	25	12	420	420	420	236 40	46	236 40	46	10 1/2
Cambria,	80,000	50,000	200	200	200	200	200	200	200	36 72	23	36 72	23	1 1/2
Cameron,	1,000	4,500,000	100	100	100	100	100	100	100	40 00	40 00	40 00	40 00	2,200 00
Carbon,	2,760	815	75	75	75	50,000	50,000	50,000	50,000	1,673	4	1,673	4	300 00
Centre,	603	603	205	205	205	205	205	205	205	160	160	160	160	300 00
Chester,	75	75	270	270	270	270	270	270	270	31 50	31 50	31 50	31 50	300 00
Clarion,	205	205	312	312	312	312	312	312	312	350	350	350	350	300 00
Clearfield,	270	270	32	32	32	32	32	32	32	180	180	180	180	300 00
Clinton,	312	4,388	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,032	1,032	1,032	1,032	300 00
Columbia,	32	70	250	250	250	250	250	250	250	50	50	50	50	300 00
Crawford,	4,388	70	300	300	300	300	300	300	300	150	150	150	150	300 00
Cumberland,	70	70	250	250	250	250	250	250	250	1,060	1,060	1,060	1,060	300 00
Dauphin,	350	350	378	378	378	378	378	378	378	521	521	521	521	300 00
Elk,	470	470	50,000	50,000	50,000	50,000	50,000	50,000	50,000	200	200	200	200	300 00
Fayette,	1,678	1,678	100	100	100	100	100	100	100	200	200	200	200	300 00
Franklin,	8	8	8	8	8	8	8	49 80	49 80	49 80	49 80	1,146 00

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WHAT CAUSED THE FOREST FIRES.	
Railroads,	1
Incendiary,	1
Burning brush,	4
Hunters and fishermen,	84
Sawmills,	—
Dinkeys and log trains,	270
Carelessness,	—
Children and picnics,	79
Tramps,	25
Woodcutters, etc.,	22
Unknown,	15
Total,	5
	7



(106)

END OF YEAR