

NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY

JOSEPH HYDE PRATT, State Geologist

ECONOMIC PAPER No. 25

PROCEEDINGS
OF
SECOND ANNUAL CONVENTION
OF THE
NORTH CAROLINA FORESTRY ASSOCIATION
HELD AT
RALEIGH, NORTH CAROLINA

February 21, 1912

COMPILED BY
J. S. HOLMES, Forester

FOREST FIRES IN NORTH CAROLINA
DURING 1911

By J. S. HOLMES

SUGGESTED FORESTRY LEGISLATION



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LETTER OF TRANSMITTAL

CHAPEL HILL, N. C., May 1, 1912.

To His Excellency, HON. W. W. KITCHIN,
Governor of North Carolina.

SIR:—A great gain has been made during the past year in forestry work in North Carolina by the organization of the North Carolina Forestry Association. As the North Carolina Geological and Economic Survey was instrumental in organizing this Association and as the Association is working in very close coöperation with the Survey, the proceedings of the Association are in part the record of forestry work of the Survey. For this reason I recommend that the proceedings of the annual convention of the North Carolina Forestry Association, which was held at Raleigh, February 21, 1912, be published as Economic Paper No. 25 of the publications of the North Carolina Geological and Economic Survey. I am including in this same Economic Paper a report on the Forest Fires in North Carolina During 1911, and also some Suggested Forestry Legislation for North Carolina.

Yours respectfully,

JOSEPH HYDE PRATT,
State Geologist.

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PROCEEDINGS OF THE SECOND ANNUAL CONVENTION

OF THE

North Carolina Forestry Association

HELD IN

Raleigh, N. C., Wednesday, February 21, 1912

PROCEEDINGS OF THE CONVENTION

MORNING SESSION.

The Convention was called to order in the Hall of the House of Representatives at 10:45 a. m., by the President, Dr. D. H. Hill. After the opening prayer, which was offered by the Reverend A. D. Wilcox, of the Central Methodist Church, President Hill introduced Governor W. W. Kitchin, who welcomed the delegates and visitors to Raleigh and to the Convention. The Governor's address was in part as follows:

ADDRESS OF WELCOME BY GOVERNOR W. W. KITCHIN.

While not congratulating you on the vast numbers present, I am glad to see so many here, representing such a varied citizenship. The accomplishment of your purpose does not depend on numbers, but on the enthusiasm and interest of those present and upon the literature which will go out from this meeting and this Association, and which will no doubt be read by thousands.

I am very much interested in the question of forest protection, but I realize that it is hard to get many people interested who have small forest holdings. This Association gives the opportunity to all citizens to join in the forestry movement. The net results will be beyond calculation.

If there is any land blessed by nature more than another, it is the Coastal Plain region of North Carolina. People wonder why longleaf pine will not reproduce itself on the cut-over forest lands of this region as the old field pine does. There is just one reason, and that is the hog. Hogs dig down in the loose, sandy soil and devour the succulent roots of the longleaf pine, whereas the roots of the shortleaf pine, being smaller and fibrous, escape destruction. In counties where hogs are kept from the forest you find young longleaf pines, showing that these pines under favorable conditions will reproduce themselves as well as the old field pine. I am not advocating a hog or stock law, as this is a local question for each community to solve. I am not in favor of killing all the hogs, either.

In the mountains of this State, where the forests are chiefly hardwoods, the underbrush and young growth, if allowed to grow up, will prevent floods and washing of the land as effectively as the old uncut forests.

This question of forestry must be brought home to the average man. Large holders are, of course, intensely interested; but the average man of North

Carolina has not the habit of saving; and the owners of the small forests ordinarily do not look far enough into the future to properly preserve their forests.

The forests of Germany and France and other European countries pay handsome incomes to the owners, whether state, municipal, or private, and the same conditions will prevail in this country. A Maine timberland owner told me a short time ago that he was cutting his timber under the direction of a trained forester, that he was cutting a large amount each year, but in spite of this the value of the land was steadily going up and the yield increasing.

I am in hearty sympathy with this work. We must not expect perfect laws all at once, but let us get a start and soon we will have an educated people who will adopt improved forestry methods. The earth was given not to one generation, but to all generations, and no man should think he has a right to destroy all the forests from the land in this generation, and then leave the next without timber, when by proper methods all generations can enjoy profits from the forests. A man has only temporary control of land; when he dies he leaves it to some other one. Because of this temporary ownership, because this land is being held in trust for generations to come, we have no right to destroy its future value and usefulness, whether it is farm land or forest land.

I gladly welcome you, and trust your deliberations will be productive of great good.

The President, Dr. D. H. Hill, made a short reply to the Governor's address of welcome and then delivered his annual address, in which he outlined the objects of the Association and strongly urged a campaign of publicity, both through the local papers of the State and by meetings gotten up by the various officials and members of the Association.

WHAT CAN WE DO TO PREVENT FOREST WASTE?

BY D. H. HILL, PRESIDENT NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

Nations, like individuals and like corporations, have three ways of adding to their wealth:

First, by making more saleable products and making them at reduced cost and marketing them to better advantage.

Second, by utilizing hitherto waste products.

Third, by a wise management of the resources with which nature has endowed them.

In our country many forces are at work to increase the national output at lowered cost. Especially is this true of farm products. The agricultural colleges and experiment stations, the national and State departments of agriculture, the farm papers, and farmers' organizations, like the Farmers' Union and Soil Fertility Leagues, are bending every effort to make the soil reward man's industry by a richer return and to reduce both the money and the labor cost. Technical schools, too, are sending forth equipped engineers, industrial clubs are standardizing manufacturing plants, and in many cases

coöperation between owners and employees is lowering the cost of all kinds of wares. Marketing is also being more closely studied than before in our country, and coöperative marketing is succeeding in many localities.

All the batteries of science are being turned against waste in manufacture. The millions of dollars made each year in Germany since their skilled and enterprising chemists turned coal tar waste into dyes for the world is a signal example. The woodworks now find utilization for almost every scrap. Pine stumps are changing into turpentine bottles. Corn stalks serve multifarious purposes, and on every hand there is war waged against loss of by-products.

In the third case, namely, waste in natural products, the crusade is only fairly beginning. Taking men as the highest natural product, there is the war against the waste from preventable diseases like smallpox, consumption, hookworm, yellow fever, cholera, etc. This war, which is both humanitarian and economic, is enlisting more volunteers each year. Then veterinary science is striving for preventives against sick waste in the lower animals. The apparent success of cholera serum, the assured possibility of the eradication of cattle ticks, the tuberculin tests for cattle—these are evidences of practical activity in directions needed. The entomologists and the biologists are moving mightily to prevent sick waste in trees and crops. In mining natural products strides towards saving ores have been made. In the Kimberly diamond mines, for example, waste has been reduced to a negligible quantity. However, in the great question we are considering today, forestry, waste still looms prodigiously.

As all the speakers today want to be heard, not for much speaking, but for brief speaking, I want to present this thought: What can our Association do to prevent forestry waste?

First, we can try to change the American's attitude towards a tree. This is a hard task, but only hard tasks are entertaining. Of course we all recall the attitude of our early settlers toward the tree and remember the reason for that position. To them the trees were a twofold evil. They, in the first place, furnished a lurking place for their enemies—Indians and wild animals—and in the second place they kept the industrious ploughman from making a crop or even a road. Hence a tree, like an ugly woman or a peevish man, had few friends. The slogan of these settlers was, not "Swat the fly"; it was, "Swat the tree." Then as population increased, lumber of course became valuable and there was new reason for swatting the tree. Unfortunately, therefore, our attitude towards the tree became fixed and we are still swatting alike the giant oak and the pickaninny pine sapling.

We must needs try to unfix this attitude and create a new slogan, "Save the tree." Save it, first, for its economic value; save it, second, for its salutary influence in conserving rainfall, and preventing erosion; save it, third, for its perennial beauty. We can aid in teaching in our homes, in our schools, in our colleges that our forests are too imperial a resource to be ruthlessly squandered. We can help in raising up wardens to protect them and foresters to reproduce them.

Second, we can aid in the passage of a national law to prevent the importation of insect-infested and diseased plants. We have the unenviable status of being the only great nation that has no quarantine regulations against the importation of diseased plants. So careless are we in respect to diseased

plant stock that France, Germany, Switzerland, Holland, Austria-Hungary, and Turkey absolutely prohibit the entry into their borders of American nursery stock. If we may believe the United States Bureau of Entomology, "A properly enforced quarantine inspection law in the past would have excluded many, if not most, of the foreign insect enemies which are now levying an enormous annual tax on the products of the farms and orchards and forests of our country." According to Marlatt fully fifty per cent of the important injurious pests in this country are of foreign origin and have been imported into the United States through what it would be hardly too strong to condemn as indifferent stupidity. Among these pests are the codling moth, so destructive to our apple trees, the Hessian fly, the asparagus beetle, the hop plant louse, the cabbage worm, the wheat plant louse, the croton bug, the Angoumois grain moth, the horn fly of cattle, the boll weevil, the San José scale, the gypsy and brown tail moths that are destroying New England's forests, the Argentine ant in New Orleans, and the alfalfa leaf weevil in Utah.

Failure to prevent the importation of these pests costs almost untold sums in trying to control the diseases occasioned by them. It is estimated, again using the reports of the Bureau of Entomology, that the cost of spraying apple trees to prevent the codling moth is sixteen million dollars a year; the San José scale costs about ten millions a year in prevention alone. The New England States are now appropriating upwards of a million dollars a year to save their trees from the gypsy and brown tail moths.

In the third place, we can help by urging a State law to prevent the wasting of our forests by fire. It is certainly time that fire ceased to be the lazy man's lawn mower, the 'possum hunter's plaything, and the rabbit chaser's method of driving his game. We punish a man who destroys by fire our wealth in houses, barns, hay ricks or cattle, but we deem it a venial matter for a man to destroy our wealth in trees and plants. With absolute impunity a man may carelessly start and leave a fire that will rage for days and do damage almost beyond belief. If our Association could do no other thing than secure an acceptable law to prevent this destruction, it would certainly have justified its existence.

In the fourth place, let us remember that as a people, the newspaper is largely educating us; let us go to the papers. We can start a forest preservation publicity campaign by writing short articles for our local papers or by getting these papers to copy valuable articles from technical journals or bulletins. We must do this persistently and systematically. As soon as people thoroughly understand the waste now going on, understand how easily this could be remedied, understand how easily a forest can be reset to trees, understand what an increment in wealth such resetting would be, these things will all be done. The thing needed now is to get these facts into the minds of tenants, landowners, lumbermen, sawmill men, and all others who deal directly or indirectly with trees. Whenever a forest fire occurs in the neighborhood of one of our members, let that member get an accurate estimate of the loss caused by the fire and publish it in every paper in the county. If the figures are accurate, comment will be unnecessary.

These, then, are some of the things that our infant organization can attempt. If we give time and thought to these ends, we shall accomplish much.

The reading of the minutes of the last meeting was dispensed with, and the Secretary then read his annual report, which follows:

SECRETARY'S REPORT

BY J. S. HOLMES, FORESTER, NORTH CAROLINA GEOLOGICAL AND
ECONOMIC SURVEY.

Since the organization of the North Carolina Forestry Association a year ago, much has been done by it to lay a foundation on which can be built a more general and intelligent appreciation of North Carolina's forest wealth and of the necessity for protecting it.

A large amount of correspondence has been carried on in the effort to secure a vice-president in every Senatorial District of the State. This finally resulted in the acceptance of this position by prominent men in thirty-four out of the thirty-nine districts. The other five districts have so far no representatives in our Association, but suitable men will be selected as soon as possible.

A meeting of the Executive Committee was called for September 21st last, the vice-presidents also being invited to attend. At this meeting a constitution, which will be submitted to this meeting for final adoption, was approved. The work of the Association for the winter was discussed, and two or three special lines of work were decided upon. Realizing the value of information in regard to the number of forest fires occurring in the State and the annual damage done by them, it was determined that this Association cooperate with the North Carolina Geological and Economic Survey in the collection of these figures in order if possible to increase their scope and reliability. In conformity with this decision, your Secretary sent out a request to all the vice-presidents, asking them to submit a list of men, one or more from each township in the several counties of their districts, who would be likely to answer questions about the damage done by forest fires during the past year.

Preparing such a list means considerable work, but nine of the vice-presidents submitted lists covering twenty-four counties. Questions were subsequently sent one man in each township on these lists, and the full returns from these counties seem to thoroughly justify this work. I hope that another year a similar list can be had from every district in the State.*

As one of the objects of this Association is to promote the protection of the forests of the State from destructive insects, at the suggestion of the Association, two of its vice-presidents called meetings in their own districts last fall for the purpose of inaugurating a campaign to control the ravages of the Southern pine beetle, which have been so destructive to the second growth pine forests of the southern Piedmont counties. The vice-president of the Twenty-fifth District, Mr. W. S. Lee, called a meeting to be held in Charlotte on November 25th last. This resulted in the organization of the Mecklenburg Pine Beetle Association, which I understand has been doing splendid work during the present winter in the control of this insect. Mr. A. C. Stroup, vice-president of the Thirty-second District, called a meeting for December the 5th in Gastonia, and this meeting organized itself into the Gaston Forestry Association, the primary object of which was to stop the

*The report on Forest Fires in North Carolina during 1911 is published as a second part of this Economic Paper.

ravages of the pine beetle in that county, but the association intends also to support other forestry measures which will be of benefit to the county. Whether these two associations are in direct affiliation with our State Association or not, we will take pride in coöperating with them in every way possible and will look upon them as our own children. I sincerely trust that the representatives from these two counties who may be with us, will give this meeting some idea of this work which is being carried on in them.

Of course, all this work could not have been carried on without the thorough support and coöperation of the North Carolina Geological and Economic Survey. The Survey looks upon this as the work for which it was organized and created by the Legislature, and so is very glad indeed to coöperate with the Forestry Association in every way that it can.

And here let me express the sincere thanks of the Secretary and of the Executive Committee to those vice-presidents who have coöperated so cheerfully and heartily in the duties that have been demanded of them. If the Association had a vice-president in every district who did as much as those who are taking a real interest in the work, the Association could make itself felt in a very short time in every corner of the State, and the object of this meeting, which is to arouse the people to the necessity of electing Representatives in our next General Assembly who will be interested in the matter of forest protection, could be attained.

I do not know whether or not it comes within the scope of a Secretary's report to call the attention of this meeting to certain pressing questions which the Association might take up in the near future, but, with the permission of the President, I am going to briefly outline a few ideas which I hope will be discussed at this meeting and some definite action taken. At the last meeting of the Association the principal topic of discussion was a proposed forestry law which had then been introduced before the General Assembly. This law was considerably changed by the committee appointed by this Association to draft a law, and was subsequently modified so that its passage at the last session of the Legislature might, if possible, be secured. Unfortunately, neither this bill nor any other general forestry bill was passed. The Association should bend every effort the coming year to impress upon the people and upon the candidates for the Legislature the pressing importance of passing some good forestry law during the next session of the Legislature. Our President has just outlined a plan of campaign looking to this end.

Forest Protective Associations furnish a plan for the protection of the forests from fire which can be operated by the owners themselves until the State assumes this duty. Such associations seem to me especially suited to certain areas of our mountain forests. Effective Forest Protective Associations have been organized in some of the Northwestern and Northern States, and Mr. W. B. Greeley, Assistant Forester of the United States, in an address to the Hardwood Manufacturers' Association, recently strongly recommended them as one of the best means of protecting mountain forests. In this connection Mr. Greeley says:

"Aside from action by the State governments, however, coats must be taken off and good gray matter expended in hard work on the protection of the individual timbered property. In this work, the experience of some of the Northern and Western timber owners as to the value of coöperation

should be of real value. One of the hardest problems confronted in protecting the individual tract of timber is the excessive cost per acre when this work is attempted on a small scale by each owner acting independently. In certain of the Northwestern States with which I am familiar, this phase of the question has been very effectively met by the consolidation of interests for the purposes of fire protection. This is done through the organization of timber protective associations which handle the work of fire patrol, construction of telephone lines and other necessary improvements, and the actual fighting of fire, jointly for all their members. Some of these associations, representing from 200,000 to 300,000 acres, headed by an executive committee and chief warden and meeting expenses by a pro rata assessment per acre, have developed the most efficient protection of timberland on a larger scale than any I have seen in any portion of the country, under any organization, public or private. Large areas of coniferous timber in the Northwest, where the character of the forest and the unfailing annual drought make the fire risk far greater than in the hardwood belt, are now being protected efficiently through such agencies at a cost in ordinary seasons of two or three cents an acre. It is my judgment that you will find the solution of your protection problem in this principle of coöperation with your neighbor and the pooling of common interests for this specific purpose."

I would like to call the attention of those who are personally interested in fire protection to the whole of Mr. Greeley's speech, which advocates fire protection as the most practical and most pressing need of timberland owners at the present time. It seems to me to point very clearly to the fact that even private or coöperative fire protection is profitable, and the matter is certainly worthy of careful consideration. If this Association could engineer the organization of such a protective association in western North Carolina, its existence would be amply justified though it did nothing else.

During the last session of the General Assembly, Governor Kitchin sent a special message to the Legislature, calling the attention of the representatives to the second section of the Weeks bill, just then passed by Congress and signed by the President. This section promised any State which should have a definite appropriation and a State system of fire protection, financial aid and assistance up to the amount of money appropriated by such State. It was the hope of the Governor that the North Carolina Legislature would pass such a law as would enable us to take advantage of this coöperative offer of the Federal Government. We have with us today Mr. J. G. Peters, of the United States Forest Service, who is in charge of the coöperative work of the Government under this bill, and he will explain this plan, which is now in operation in six or eight different States. After we have heard Mr. Peters, I think this Association should take some steps to endorse the work of the Government and try to get the State to take steps to secure its share of the appropriation and take advantage of this offer of assistance.

I have already outlined what has been done by the Association in the attempted control of the Southern pine beetle, but I want to add a word as to the future work along these lines. Reports from Cleveland and Union counties indicate that the pine beetle is as destructive in those counties as in Gaston and Mecklenburg, and I trust that local associations may be formed in these counties also for the organization of control work.

The question of forestry education in the colleges and schools of the State

is of very pressing importance, and I think the Association should endeavor to have this phase of education introduced and extended. I understand from our President that elementary forestry is being taught in the College of Agriculture and Mechanic Arts in Raleigh; with this exception, there is, so far as I am aware, no forestry education carried on in the State. The trustees of the State University have, I believe, decided to have some kind of instruction along these lines introduced into that institution as soon as sufficient funds may be provided by the Legislature. The women's clubs have had much influence in starting this phase of education, and I would respectfully suggest that they take up the matter of introducing forestry into the public schools and make it their chief forestry work for the ensuing year. I think the women of the State are probably more interested in the education of the children than they are in the passage of certain laws which the men are working for, and such a division of labor among the members and supporters of this Association might accomplish large results.

There is another way in which the women of the State can assist very materially in the movement to formulate a settled and permanent forest policy for North Carolina, and that is by securing the universal observance of Arbor Day. An Arbor Day was first advocated by the Honorable Sterling Morton over thirty years ago, and his own State of Nebraska was the first to adopt it. Since that time the observance of Arbor Day has become more or less general throughout the country; nevertheless, while Arbor Day exercises have been held sporadically in some of the schools of this State for a number of years, so far the efforts to make this a State custom have failed. Two or three years ago an Arbor Day Bulletin was prepared, to be published by the State Board of Education, but neither it nor the State Geological and Economic Survey, which prepared the bulletin, has received enough encouragement from the people of the State to justify them in publishing it. If all the school children of the State could take part once a year in some Arbor Day exercises, they might imbibe a certain knowledge of the value of our trees, both commercial and æsthetic, which would lead them to further study of the question and train them to look upon the forests as something to value and conserve, rather than to abuse and destroy, as, unfortunately, their fathers had been taught to regard them. I have no doubt that the women's clubs in the different towns could induce at least a local observance of Arbor Day, as they are doing this year in my own town, and, in so doing they would very soon pave the way for State observance of this day.

My final suggestion for work for the Association is concerned with a new and very pressing duty which devolves upon all North Carolinians who are in any way interested in the forests of the State, namely, the laying of thorough plans for immediate and vigorous attack upon the chestnut bark disease as soon as it invades this State. I had invited Dr. Haven Metcalf, the Chief Pathologist of the United States Bureau of Plant Industry, to attend this meeting and lay the matter before you. But, owing to a previous and more important engagement for all members of his staff engaged in this work, neither he nor any of his assistants were able to attend, so that I am going to take it upon myself to outline in a short paper the nature of this menace and suggest action that may be taken by this Association to provide against it. Suffice it to say here that when the time comes, prompt and effective action must be taken, and this Association should lay its plans so that it will know exactly what to do and how to do it.

And now, to recapitulate briefly: What are the forestry questions most prominent at this time which the Association can assist in solving?

(1) The question of fire protection is uppermost in the minds of most of us, and we should make a special effort the coming summer to bring this to the attention of the voters, and especially to the attention of the prospective candidates for the Legislature, with the hope of getting an Assembly favorable to forestry legislation.

(2) This must be done, and some kind of legislation passed before the second question can be taken up, which is, the coöperation of the State with the Federal Government in fire protection on the headwaters of streams, as will be explained by Mr. Peters.

(3) Wherever the pine is being destroyed by the pine beetle, the Association should make a special effort to found local associations in the counties affected, and then coöperate with them in every way possible.

(4) The Association should encourage and advocate the teaching of forestry in the colleges and public schools of the State, and should endeavor to make the observance of Arbor Day universal.

(5) The Association should take up in earnest the question of the chestnut bark disease, and bend every effort to keep it out of the State and then, should it get into the State, to combat its spread.

Finally, all these measures could be pushed forward most successfully if we had the coöperation of the State Legislature, so that small State appropriations might be made for the purposes of controlling forest fires, of coöperating with the United States in fire prevention, of coöperating with counties in the fight against the pine bark beetle, and of coöperating with the United States in the protection of our forests from the chestnut blight disease.

Motion was made and passed that the Secretary's report stand approved.

Mr. Holmes then read a paper on "The Chestnut Bark Disease."

THE CHESTNUT BARK DISEASE WHICH THREATENS NORTH CAROLINA.

BY J. S. HOLMES, FORESTER, NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY.

Just four years ago Mr. Haven Metcalf, of the United States Bureau of Plant Industry, in a brief circular* wrote, "The bark disease of the chestnut caused by the fungus *Diaporthe parasitica* (Murrill), has spread rapidly from Long Island, where it was first observed, and is now reported from Connecticut, Massachusetts, Vermont, New York as far north as Poughkeepsie, New Jersey, Pennsylvania, and possibly Delaware. It is no exaggeration to say that it is at present the most threatening forest tree disease in America. Unless something now unforeseen occurs to check its spread, the complete destruction of the chestnut orchards and forests of the country, or at least of the Atlantic States, is only a question of a few years' time."

Since that time two or three circulars have been issued on the subject by the United States Bureau of Plant Industry as well as numerous articles and

*"The Immunity of the Japanese Chestnut to the Bark Disease," by Haven Metcalf, Bul. 121, Pt. vi., Bureau of Plant Industry.

bulletins by the different States. This disease has now spread into Virginia and West Virginia, and seriously threatens the forests of this State. Mr. Metcalf writes, in answer to my letter asking him to be present at this meeting:

"I regret very much that it is impossible for me to come myself, or send you a man for the meeting of your Association, as it seems necessary to have every one at Harrisburg who has any knowledge of the disease. I regret very much being unable to be present myself, as there is a good deal to be said on the subject of the chestnut bark disease, and I have little doubt that it will reach North Carolina by another year."

The meeting at Harrisburg to which Mr. Metcalf refers, has been called by the Governor of Pennsylvania to consider ways and means for combating this disease, which has now spread over the larger part of that State. Invitations were sent out to interested people all over the Atlantic States, and three of the men whom I had hoped to have at this meeting have had to decline on account of attending the meeting at Harrisburg yesterday and today.

At a recent meeting of the foresters from the Eastern States in New York, at which the writer and many prominent railroad men were present, the whole time of the meeting was taken up with a discussion of ways and means to dispose of the enormous amount of dead chestnut in the southern New England and North Atlantic States which has been killed by this disease.

Not only were reduced rates on the railroads advocated for dead chestnut wood, so that immediate cutting of the infected timber could proceed without serious loss, but the erection of new plants for the utilization of this dead chestnut wood through the most seriously affected regions of New England, New York, and Pennsylvania was strongly urged.

Last year the State of Pennsylvania appropriated \$275,000 "for the investigation and scientific study of this problem, and, more specifically, to ascertain the exact extent of the blight, and to devise ways and means through which it might, if possible, be stamped out."

The Pennsylvania Chestnut Blight Commission, which has been appointed to carry out these provisions, is carefully studying the disease and at the same time taking strenuous measures to prevent its further spread. They are asking neighboring States who are threatened with this pest to coöperate with them in every way possible.

The chestnut timber of North Carolina means more to the farmers, the timberland owners, and the manufacturers of the western part of the State than any other tree. According to an estimate made by the North Carolina Geological and Economic Survey in coöperation with the United States Forest Service, there are slightly over three million acres of forest land in North Carolina now growing a larger or smaller proportion of chestnut timber. On this area, mixed with many other species, there was a stand in 1909-'10 of approximately 3,380 million feet board measure of chestnut timber. In addition to this there was at least one and one-half million cords of chestnut cordwood that could not be converted into lumber. Putting the low stumpage value of one dollar per thousand or fifty cents per cord on this timber, we have a present value for the chestnut timber in North Carolina of at least four million dollars.

The cutting, marketing and manufacturing of this timber will mean at least forty million dollars to the citizens of this State, and there can be no

doubt but that an annual income of at least one million dollars could be permanently secured from the chestnut timber alone, were these mountain forests managed in a conservative way. Chestnut is the tree best adapted to all situations in our mountains, and is the tree that comes soonest to financial maturity, while its use for lumber, for telephone poles, for tanning extract, and for pulp, makes it the most widely useful tree commercially of any in that region.

Can we afford to lose this important source of revenue without a struggle? We certainly can not.

Every member of this Association can do something towards delaying or preventing the invasion of this State by the chestnut bark disease by writing to his Congressman to support the bill now before Congress, which calls for an appropriation of \$80,000 for the use of the United States Department of Agriculture, to be used in a thorough study and investigation of this tree disease, with the view of devising ways and means to combat its further spread. If this bill is passed, the department would undoubtedly send experts into North Carolina the coming summer to watch out for this disease and to plan a campaign to prevent its invasion or its further spread, should it appear in this State. I think also that this Association, as a body, should go on record as approving this bill.

Every person who goes into the woods where chestnut grows, should make a point of looking out for this disease and reporting it to the Government as soon as it is discovered, that immediate steps may be taken to combat it.

In order that I need not take up valuable time with a description of the appearance of this disease, I have brought a sterilized sample, which was sent me by the Bureau of Plant Industry, which all who are interested can examine. Anyone who has once seen it will have no difficulty in recognizing this disease.

For detailed description and suggested methods of control, I would refer you to Farmers Bulletin 467, issued by the United States Department of Agriculture, and to the report on the Harrisburg Chestnut Bark Disease Conference which will no doubt be published without delay by the Chestnut Blight Commission of Pennsylvania.

Mr. E. B. Mason, an expert in the office of Forest Insect Investigations of the United States Bureau of Entomology, who the past year was in charge of the Spartanburg (S. C.) Field Station of that office, which was charged with conducting a campaign for the control of the Southern Pine Beetle through the South Atlantic States, was then introduced. Mr. Mason's address was as follows:

THE SOUTHERN PINE BEETLE AND ITS CONTROL.

BY E. B. MASON, UNITED STATES BUREAU OF ENTOMOLOGY.

GENTLEMEN:—It is a great pleasure for me to be present at this meeting for three excellent reasons:

First, because the first State recognition of our efforts to show the people of the South how to save their pine from the attacks of the Southern pine beetle was from North Carolina.

Second, because to the coöperation of the North Carolina Forestry Association, with those interested, was due the formation of the Mecklenburg Pine Beetle Association and the Gaston Forestry Association, which were followed by the formation of similar organizations in other Southern States.

Third, because these two associations formed for fighting the beetle are not merely names, but have actually performed the work for which they were organized.

I look forward with confidence to a time within the near future when we can say that the people of North Carolina have established systematic insect control for the benefit of every pine timber owner in the State.

I do not think it necessary for me to dwell on the seriousness of the situation in regard to the Southern pine beetle. There is not a man here who has not seen the appalling amount of dead pine. This dead pine is gone. We can not bring it to life again, but we can, and I am sure we will, try to stop the dying of further large quantities of timber. Since it is possible for us to make efforts in this direction, it seems to me that we should look on further loss from this cause as absolutely unnecessary, and hold no one but ourselves to blame for it.

The Southern pine beetle has existed, to our knowledge, in the South for over forty years. It is only at long intervals, however, that it increases to such numbers as to cause widespread depredations such as the great invasion of 1890-'93, which destroyed a large percentage of the pine in the Virginias and was only stopped by unusual climatic conditions. The warning sign of a depredation is the increase in number and size of the groups of dying pine. This warning has been only too plainly manifest the last two years. We have no reason to anticipate that any natural factor will come to our aid. We should be more than foolish if we based our hopes of relief on any such intervention of Providence. In other words, gentlemen, it is distinctly and plainly up to us.

In order that you may understand the reasons for the methods of control we advise, I am going to run through the life history of this beetle, beginning with the early summer, as outlined by Dr. A. D. Hopkins, who is the authority on forest insects of the Department of Agriculture, Bureau of Entomology.

The beetles attack and leave a tree in about thirty days or even more quickly. Three or four generations in the North and four or five in the South develop during the season. In other words, they may be increased thousands of times from their original numbers during the year. They fly during the night, and sometimes in the day, and alight on the upper trunk of a living pine. (Observation has shown that they seldom go as far down as the first eight or ten feet of the butt cut, depending, of course, on the size of the tree.) When they alight on a tree they bore through the bark to the wood, but they do not bore into the wood. In the inner bark and marked on the surface of the wood they make those winding galleries with which you are all familiar. These galleries, crossing and recrossing, girdle the tree many times, thus killing it. The eggs are laid along these galleries, hatch into little grubs, which feed for a short time on the inner bark, and then go into the outer bark where they change into beetles with wings. The beetles bore out of the bark to the light, fly away and attack other trees. They can fly for three or four miles or more, may go in any direction, and, therefore, are a direct menace to all pine within three or four miles of a center of infestation.

Since they kill and leave a tree in thirty days or even more quickly, you will never find their broods in old dead trees or trees from which the foliage has fallen. You will find many other kinds of beetles in old dead trees, but never this one. You will find this beetle in trees on which the foliage has begun to fade to light green or has faded to yellow or greenish brown. In fact, after November 1st, any dying or dead trees which retain their foliage are apt to harbor the hibernating beetles, and in addition they are also found in trees on which the foliage is green but which have pitch tubes on the trunk—these trees fade later.

After November the beetles remain in the trees and instead of coming out in thirty days they don't come out till spring. You have them trapped. That is the time to go after them. It is only necessary to cut down the trees containing the beetles and destroy the bark in which the broods are spending the winter. You do not have to destroy the wood, you do not even have to destroy the tops and laps. Bear in mind that the beetles have left the old dead trees from which the foliage has fallen. The old dead trees may be totally disregarded in control operations.

About destroying the bark in which the broods of the beetle are wintering, it can be destroyed in several ways and in most cases in such a manner as not to involve a direct expense. The tree in which the beetles are spending the winter may be turned into cordwood. This cordwood should be burned, however, and care should be taken to gather up the bark that falls in cutting between November 1st and May 1st. These same kinds of trees may be turned into timber, but the slabs with the bark on must be burned between November 1st and May 1st. There are other methods, but these are the principal ones. In all methods the underlying principle is the same—the destruction of the bark in which the broods of the beetle are wintering.

You notice I have confined control operations to the winter. There is an excellent reason for this. The cutting of any dead or living pine during the summer months in a beetle infested country will attract the beetles from three or four miles. They will go to some extent into the fresh felled green timber, but the greater part of the attack will be against the surrounding healthy timber. It is therefore a very dangerous thing to cut pine during the summer unless every one in the neighborhood cuts their dying infested trees at the same time and destroys the bark. Of course, when the beetle is under control there should be no reason for not cutting timber at any season of the year.

I want to speak briefly on two popular errors. Some people will tell you that the dying of the pine during the last summer was due to the drought. Trees have been dying every month in the year in moist as well as dry localities, in wet weather as well as in dry weather. Drought is, therefore, out of the question. Many people will tell you that the death of the pine is due to the sawyer or borer. This is a natural mistake, because of the size of the sawyer and the noise which it makes when at work. It is, nevertheless, a mistake. It has long since been determined that this class of borer never attacks a living, uninjured pine. It comes in while the beetle is working or after the beetle has left the tree.

We can divide the problems to be met into two divisions: The woodlot proposition and the lumbering proposition. In the woodlot proposition the owner uses his woodlot for his fuel supply. He can just as well use his in-

fested trees for cordwood and thus control the beetle at no expense. On large holdings where cutting is going on the desired result can be obtained by burning the slabs from the infected trees with the bark on. Where the timber is to be held and there is no market for cordwood, control measures must be conducted at direct expense. The question to determine is whether the amount expended will be justified by the timber saved. Disregarding the increase in the danger of fire from the dead timber and the very great possibility of an increase in the number of trees killed each year, I want to say distinctly to you that it *will* pay. The trouble with the large holders is that they do not know how much timber they are losing.

No lumberman who is suffering from inroads by the beetle, after he has made an investigation into how much timber he is losing, will hesitate for a moment in starting control operations. He will not hesitate any more than he would hesitate to go out and fight a forest fire—indeed, an attack by insects differs only from a forest fire in that you have more time to fight it, and I quote your forester, Mr. Holmes, as saying that more timber has been killed in the southern Piedmont section of North Carolina by the Southern pine beetle than has been killed by fire.

Gentlemen, the proposition is up to every individual timber owner. Dr. Howard, Chief of the Bureau of Entomology, has put the resources of the Bureau at your service. We can only give advice, however. You must do the actual work. If all will help, if all will go at the very simple task before them without waiting for their neighbors to begin, we can control this beetle and save an amount of pine from dying, the value of which I should not dare estimate in dollars.

Gentlemen of the North Carolina Forestry Association, I have endeavored to put this matter before you as simply as possible. If there are any questions unanswered in your minds, do not, in justice to yourselves and to us, let me go away with them unanswered. I think you will agree with me that every man here who controls pine timber should get at this matter at once. It does not admit of delay. Realize that you are engaged in a labor not only for yourself, but for your neighbor, and indeed for the whole South, and let your watchword be, "Do It Now."

A general discussion followed Mr. Mason's speech, in which Mr. Z. W. Whitehead, of Wilmington; Dr. C. H. Herty, of Chapel Hill; Mr. W. S. Pharr, of Charlotte; Mr. G. K. Massengill, of Four Oaks, and several other delegates, took part.

Honorable James R. Young, State Insurance Commissioner, then read a paper on what his department can do to prevent forest fires. This address was as follows:

ENFORCING THE PRESENT FOREST FIRE LAWS.

BY JAMES R. YOUNG, INSURANCE COMMISSIONER.

It is especially gratifying to me to be present at your meeting and by my presence and words endorse and extend aid to the North Carolina Forestry Association in the great work it is undertaking to do in the preservation of our forests. Upon me as a State official devolves the duty of attempting their

preservation by enforcing the law upon our statute books to punish any one responsible for their destruction or injury by fire, and I most heartily welcome the aid of the members of your Association, both collectively and individually. We are justly proud of our great nation; but as a people we are at the same time the most progressive as well as the most careless and wasteful people on earth. There are none equal to us. It is, indeed, a hopeful sign that we are being aroused by the cry of "Conservation." It is encouraging to see many of our best men traveling over this broad land, stirring up and organizing our people to aid in the conservation of America's natural resources. That much has been and more will be accomplished goes without saying, for who is not in one way or another endorsing this great work and aiding in its accomplishment!

FIRE WASTE.

I venture the assertion, and feel that I can make good the statement, that in no field is there a greater need of conservation, or an opportunity of so certainly accomplishing big results as in stopping our fire waste. We can and should hasten the day when we as a nation no longer countenance in our midst the criminals who, by carelessness, indifference, or deliberate incendiarism, are destroying our property and menacing the lives of our men, women, and children. The total fire losses in the United States and Canada during the year 1911 were \$234,337,250, and during the past thirty-five years these losses amount to \$5,181,345,425. These figures do not include the cost of insurance nor the money expended in fire departments.

The fire losses and cost of fire prevention in the United States amount annually to \$450,000,000, or more than the total American production of gold, silver, copper, and petroleum in a year.

Fire losses exceed the total cost of the army and navy of the United States for a year, and are greater than the annual expenditure for pensions, or the annual cost of the United States Postal Service. Fire in the United States costs over five hundred dollars each minute. Every two minutes the value of the average home of our working man goes up in smoke; while every ten or fifteen minutes there is consumed by the flames the value of fine homes such as we point to with pride as ornaments to our cities and towns. As if this were not enough to arouse us, over fifteen hundred people are killed and more than five thousand injured annually by the result of fires.

PREVENTABLE.

This great fire waste is preventable to a large extent, and by the exercise of even ordinary care and foresight over one-half of our fire waste can be prevented. The general per capita fire waste in the United States is \$2.51; in Europe, 33 cents. Cause: The latter has better construction, less carelessness, and increased responsibility. In nothing is the old adage, "An ounce of prevention is worth a pound of cure," so true as in stopping our appalling annual loss by fire. If the buildings in the United States were fireproof, as in Europe, the annual cost of fire losses and protection would be less than \$100,000,000.

The enormity of our fire waste and its effects upon the business and progress of our country is shown by the importance of the business of fire insurance.

The insurance companies engaged in this class of business alone have assets of about \$450,000,000. In 1910, one hundred and seventy-five stock fire companies assumed risks of \$36,357,713,046 for premiums of \$273,557,380, while in North Carolina alone \$257,375,954 were assumed in risks for premiums of \$3,296,096. The fire losses in North Carolina amount annually to practically \$1,500,000, or \$4,000 a day, and yet with proper care two-thirds could be prevented, with a saving to our State in taxable property and to our citizens of \$1,000,000 a year, or over \$2,500 a day. The loss of property is not all, for, as in the rest of the country, there is a great loss of life. During last year I noted in the papers twenty-one persons who lost their lives by fire in this State; while so far this year, with only one and a half months gone, the State papers have recorded already as burned fifteen persons, of whom twelve have died as the result so far.

FOREST FIRES.

In 1910 the loss by forest fires was \$26,000,000, or over ten per cent of the fire waste of the country. If the same per cent holds good in our State, and I see no good reason why it should not, then the annual loss in North Carolina by forest fires amounts to \$150,000. This can hardly be considered a large estimate when you count not only the standing timber and buildings but the destruction of buildings and small growth.

My observation would lead me to believe that by far the larger bulk of this loss was caused by thoughtlessness and carelessness, rather than by maliciousness. This shows the wisdom of our legislators in providing for the punishment of those responsible for fires due to either cause, as set out in Section 3346 of The Revisal of 1905 of North Carolina, as follows:

SECTION 3346. Woods.—If any person shall set fire to any woods, except it be his own property or, in that case, without first giving notice in writing to all persons owning lands adjoining to the woodlands intended to be fired, at least two days before the time of firing such woods, and also taking effectual care to extinguish such fire before it shall reach any vacant or patented lands near to or adjoining the lands so fired, he shall, for every such offense, forfeit and pay to any person who shall sue for the same, fifty dollars, and be liable to any one injured in an action, and shall moreover be guilty of a misdemeanor.

Of course, I have had some forest fires investigated, but so far I have not had the success in ferreting them out and punishing the originators as I have in other fires, where I have obtained five convictions since January 1, 1912, and one hundred and thirty-three since I have been charged with this fire marshal work in this State.

All laws designed to stop fire waste are largely educational, and accomplish much when handled in this way; hence, I have attempted to spread this law over North Carolina in the form of posters, such as you see distributed among you today. These posters are sent out to the sheriff and other officers of our counties, as well as to all lumber companies and others interested in the protection of our forests. The Department will continue to send them in such quantities to any citizen of North Carolina as they will post or distribute.

Of course our attempts to stop forest fires must take into consideration all the different causes for which they are started, and our people must be edu-

cated to realize that the results along the lines desired do not by any means compensate for the possible, or even actual loss by such fires. There are many things that in themselves appear to be small that cause these forest fires. The night hunter, by carelessly handling his torches, or leaving fires in the woods to be fanned into flames and spread by rising winds, often starts a fire that sweeps over the forest and does immense damage. Again, the smoker in passing through the forest, or the hunter by day or night, carelessly throwing aside the stump of a cigar or cigarette, or shaking the ashes from a pipe, starts a fire that spreads over the whole country and does immense damage. A great many of our owners of lands have undertaken to prohibit hunters from passing through their lands, and in this way a considerable prejudice has been raised against landowners, the hunters feeling that the objection is raised purely because of the game that they seek, while as a matter of fact the landowner is more interested in preventing damage to his lands by fires than he is in the game caught upon his land or a few trees cut down by the night hunter. A proper education must be undertaken and carried out to overcome this prejudice.

Again, the farmer in clearing his lands in the spring will build up fires to burn off the brush, and by carelessness or thoughtlessness allow the flames to be carried into adjacent fields or forests by the winds prevalent in the spring, and thus the country around for miles will be swept by fire and a damage done that will amount to more than all the crops that will be raised on the lands being cleared. The farmers need to be educated to the danger of spreading these fires, and the necessity of laws for the prevention of these fires in order to do away with the damage caused by them. Again, the railroads should be required by law to keep their rights of way so protected from the surrounding country that the sparks from their engines will not start these fires, for they not only do a great damage to the country and the owners of the lands, but tend to promote a prejudice between the people and the railroads.

In conclusion, Mr. President and gentlemen, I beg to say that it will afford me great pleasure to do anything I can in enforcing the laws that we now have on our statute books to prevent forest fires, and to aid in having our Legislature to add other suitable and necessary laws, and especially should these laws be so formed and enforced that the people may be educated to realize their advantage and necessity, so as to lessen instead of increasing the friction between the different classes of our people. We have already had some of this in the prejudices brought against lumber companies who have undertaken to protect their holdings by prosecutions against parties for starting fires.

I will unite with you, and use every means in my power in enforcing the laws, and reducing our fire waste from this cause in our State.

An interesting discussion followed Mr. Young's paper, in which Mr. Joseph Hyde Pratt, Mr. J. S. Holmes, and others took part.

Mr. Joseph Hyde Pratt, State Geologist, then gave a talk on the work the North Carolina Geological and Economic Survey was doing to

interest the people in the subject of forest protection. His address was as follows:

FORESTRY WORK OF THE NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY.

BY JOSEPH HYDE PRATT, STATE GEOLOGIST.

The North Carolina General Assembly of 1905 reorganized the North Carolina Geological Survey, changing its name to the North Carolina Geological and Economic Survey, and in stating the object of the Survey the law says, in part, that the Survey shall make examination of the forest resources of the State and shall make a classification of the forests with special reference to their bearing upon the occupation of the people; and shall study a plan for protection of the forests, with special reference to the preservation of the flow of streams and water powers of the State. This phase of the work of the Geological Survey has become one of its more important problems and studies.

It has been estimated that approximately eleven million acres of land in North Carolina are now supporting some kind of forest growth. Nearly one-half of this area is probably absolute forest land, that is, the land is too rough to cultivate properly; is too easily washed by rain or floods; is too poor to yield adequate returns for the labor put upon it, or, for other reasons, the production of timber crops is the most profitable use to which it can be put, for a great many years to come. This large amount of forest land represents an investment of from twenty-five to fifty million dollars at the least. One-sixth of the entire wealth producing capital of the State is invested in forest lands or in industries directly depending upon the products obtained from the forests. Thus it is seen that the problems relating to forestry are most vital to the industrial life of the State, and the State should put forth every effort to make these forests as nearly perpetual as she possibly can, and encourage and stimulate the owners of these lands to assist her in conserving them.

The Geological and Economic Survey has from its investigations realized most thoroughly the need of conserving and protecting the forest areas of the State, and has for the past two years employed constantly a forester to investigate and assist in carrying out measures that would tend toward awakening the people of North Carolina to a realization that some legislation must be enacted to prevent the total destruction of our forests, and thus one of the most valuable assets of the State.

The forestry work is varied in character and consists of:

1. An investigation of the forest conditions of North Carolina.
2. A study of forest fires in North Carolina.
3. A statistical study of the wood-using industries of North Carolina.
4. The examination of timber areas in regard to practicing scientific forestry.
5. Examination of watersheds belonging to municipalities in regard to their protection from fire and contamination.
6. Investigations regarding the reforestation of abandoned farm lands and cut-over lands.

In order to obtain more accurate knowledge regarding the timber resources of the State, it was decided to make a thorough investigation of the various conditions of the forests, county by county, so that the Geological and Eco-

conomic Survey would be in a position to answer the many questions that were being asked regarding our forestry resources, such as:

What are our forest resources, and how long are they likely to last at the present rate of timber consumption?

Can we insure a permanent supply for our manufacturers, as well as for domestic and other uses?

Is the timberland yielding to its owners and to the State as large returns on the enormous amount of money invested as is possible?

Can the actual yield be increased?

Over fifty counties have thus far been examined and one report has already been published on the timber resources of the counties west of the Blue Ridge. The counties in the western half of the Piedmont section have also been examined and a report has been prepared on this which will be published at an early date.

By far the greatest enemy which the forests of the State have to contend with is fire. The destruction wrought by the annual and periodic fires which burn over many thousand acres of woodland each year involves an enormous loss to the people of the State through the diminished value of their property. No attempt has ever been made to collect statistics regarding the amount of damage to our forests from this source, but it was considered advisable by the Survey to obtain such data so that it could show more forcibly to the people of the State what they were losing each year from the effects of forest fires. Unfortunately, forest fires usually have been taken as a matter of course by our people, and in many cases have scarcely been noticed. Our lumbermen, however, have begun to realize that with the possible exception of land supporting mature pine timber with little or no young growth, ground fires can do and are doing great injury to our timberlands. Our farmers and other landowners are beginning to realize that every time a ground cover of leaves is burned up the land becomes that much poorer. Owners of waterpowers know that with the burning of the woods the rains run off faster, permitting a much smaller amount of water to soak into the soil, so that floods and periods of low water are both more frequent. Cattlemen who have contended that by burning the range they get earlier grass for their stock are now beginning to realize that in doing this they are really killing the goose that lays the golden egg, for by burning they get less and less grass every year. The man who owns forest land and is holding it for increase of growth, both for domestic supply and for sale, has learned that he is losing at least half the yield he ought to get by allowing his woodland to be burned over. Unfortunately, however, it is necessary to instruct the people at large regarding the great loss to the State by forest fires before we can obtain legislation that will give the necessary protection.

A series of studies has been made regarding the forest fires of North Carolina and statistics have been collected for several years regarding the number of fires, their causes, damage done, etc. The results of these investigations have been published as Economic Papers Nos. 19 and 22. The damage done by fires is estimated as over \$400,000 per year during the past three years.

Although there are a number of laws on the statute books of North Carolina relating to forest fires, yet the machinery necessary to carry out these laws has never been passed, and it is absolutely necessary that other laws shall be passed if we are to preserve our forests from fire.

As such a large part of North Carolina's wealth is invested in timberland and wood-using industries, and realizing the growing shortage in the supply of timber suitable for the use of these wood-using industries and the consequent gradual modification in the requirements fixed by these consumers, and recognizing the value both to the producers and consumers of timber of a more intimate knowledge of local market conditions, the State Survey has made a statistical study of the wood-using industries of the State.

This report has been published as Economic Paper No. 20, on Wood-using Industries of North Carolina, and should be of value to the State in assisting her in forming an independent forest policy, and in presenting the advantages the State offers to wood-using industries to locate in it. The timber owner—even the farmer who has a few scattered trees to sell—can learn from this report where a market can be found. The sawmill operator may learn a new use for a wood which he previously considered of little commercial value. The manufacturer will have a source of fairly accurate information concerning a region most likely to supply the lumber he needs. The merchants throughout the country who handle wood products can obtain considerable advantage in buying and selling. There is given in the report the uses of the different kinds of wood that grow in North Carolina and as complete a list as possible of manufacturers who use wood.

Other lines of forestry work taken up by the Survey are the examination of private forest lands for the purpose of recommending improved methods of management and the examination of watersheds from which cities or towns obtain their water supply, in order to recommend the best method of protecting these watersheds from fires and contamination.

The reforestation of cut-over and abandoned farm land is another phase of forestry work that demands considerable attention of the forestry division.

Many hundred thousand acres in all parts of North Carolina now lying either entirely waste or producing scarcely any timber of value can be made to yield their full capacity and make remunerative returns to their owners. The forest lands that have been cut over once or twice can be made to produce other cuttings as valuable as any that have already been removed. In order to secure reproduction it is necessary that seed trees should be left on the cut-over lands to furnish the seed required, or else it will be necessary to set out young trees or sow seed brought in from outside. Then there must be adequate protection for the young growth, and fire and stock must be kept out of the area. Besides these cut-over areas there are many thousands of acres, especially in the middle and western portions of North Carolina, which have been cleared for cultivation and proved unprofitable. Whatever may have been the cause of this, the lands should be reforested. Where lands of this character do not naturally restock in trees, they can profitably be planted in some desirable species. This will not only insure some earning from such land, but it will protect it from washing or deterioration.

Young trees are very susceptible to fire, and many of them, such as the pines, are destroyed in large quantities by stock and hogs, when these are allowed to run at large. Thus, if good results are to be obtained in reforestation, it is absolutely necessary that the planted areas be protected from fire and stock. This is just as true when applied to forests that are reproducing themselves, because the young trees must have a chance to grow, for unless

there is young growth and abundance of it there can be no trees to take the place of the old ones when they are cut.

The chief injury to our forests from cattle, however, is an indirect one, not only in the mountains, but wherever the stock law is not in force. Every year fires are set out and thousands of acres are burnt over in practically every county in which the cattle still run at large, the reason given being that "it improves the range." There is no more widespread or fallacious argument advanced as an excuse for burning the woods than this. And the only basis for it is that the young herbage, having no old growth to cover it, is available for the stock somewhat earlier in the spring if the ground is burnt over in the winter. The total effect of burning the range is very harmful, not only to the woods, but to the range itself. The soils get poorer and poorer year by year by the destruction of all vegetable matter, while the better quality of forage plants are seriously injured or killed out by the fire. The quantity of the poorer kinds of grass which make only early spring pasture, may be slightly increased by killing out the young trees and bushes, but the other forage plants, such as the beggar lice and other peas, on which the stock fatten in the fall, are seriously injured or killed out entirely by fire.

The sooner the whole State comes under the operation of the stock law, the better it will be, not only for the State at large, but more especially for those parts that are now without its advantages. The chief thing lacking to make many parts of North Carolina prosperous agricultural regions is the enforcement of a stock law. Only by putting all the land to its highest use, namely, by cultivating thoroughly and raising as much stock and feed as possible on the cleared land, and by keeping the woodland in the best possible condition by excluding fire and stock, can the present and future prosperity of a community or a State be assured. If it is impossible to bring the whole State under a stock law, there should be a law passed which would make it obligatory on those counties which do not wish a stock law to fence themselves from the counties that adopt the stock law. Thus the counties which wish the open range would be compelled to build a fence entirely around the county, and also be compelled to keep up these fences.

The forestry work that the State Geological and Economic Survey is doing can be very much increased and assisted by the North Carolina Forestry Association, and as State Geologist I can assure this Association of the most hearty coöperation of the Survey in the great work that this Association is undertaking.

Attorney-General T. W. Bickett, who was on the program for an address on the "Forest Fire Laws of North Carolina," explained that owing to insufficient notice having been given him he had been unable to prepare a paper. He, however, showed his interest in the question by attending, and offered his services to the Association in drafting any necessary laws which the Association might recommend. The President then appointed the following committees:

Committee on Resolutions.—Mr. E. B. Wright, Mr. C. P. Heyward, Professor J. F. Webb, Dr. F. P. Venable, Mr. Hugh MacRae.

Committee on Nominations.—Mr. Alston Grimes, Miss Annie F. Petty, Dr. C. H. Herty, Mr. W. S. Pharr, Mr. C. C. Smoot, III.

Auditing Committee.—Mr. D. A. White, Mr. R. R. Cotten, Mr. Z. W. Whitehead.

The Convention then adjourned to meet at three o'clock.

AFTERNOON SESSION.

The afternoon session was called to order by President Hill at 3:10 o'clock, in the Hall of the House of Representatives. Mr. Alston Grimes, of Pitt County, a vice-president of the Association, was introduced and gave an interesting talk on the profits in forest management in Pitt County, and the efforts being made to keep out fires.

He told first of a neighbor of his who bought a tract of land for \$500 from which he had sold \$3,500 worth of timber, retaining still the land and much of the timber. The neighbor, he said, had preserved the forests by prohibiting hunting. "I have not been successful myself in this respect," Mr. Grimes said, "but after giving written permission I do not allow the hunter to carry an axe and chop the 'possum tree down."

Mr. Grimes said he required all of his tenants to pay five dollars an acre when fire is allowed to run over land for which they are responsible. "They think it is a hardship at first, but agree afterwards that it is the right thing."

Mr. C. C. Smoot, III, of Wilkes County, another vice-president, then gave a short account of the Wilkes way of fighting fires where a neighborhood war was waged against the blazes of the community. He said he had become greatly interested in the fight against the blight which is killing the chestnut trees in the States to the north of us and which threatens to invade our own State.

Mrs. Al Fairbrother, a delegate from the Woman's Club of Greensboro, was then called upon by the President to say a word upon the subject from the viewpoint of the ladies. She said she had not come as a speaker or as a suggester, but as a learner. She said that the Woman's Club in Greensboro was going upon the principle that one of the chief civic works was to educate the children in conservation. She told of some of the work done by the ladies of Greensboro, such as the recent establishment of a children's playground there, which is the first public playground in North Carolina. This was accomplished entirely through the work of the Civic Association.

The President then called on Mr. W. D. Johnson, a colored man who is Agent of the United States Forest Service now temporarily stationed

at the colored Agricultural and Mechanical College at Greensboro, to say a few words about the interest of our colored citizens in forest protection.

Mr. Johnson declared that as poor a man as he is, he would have declined a gift of \$500 rather than have been kept from this meeting. He was born in the old country, he said, and had not known what the dominant race has done for the colored people until he came to the South. "I want to say," he said, "that not half what has been written and said about this question is true." He declared that as an agricultural race, a knowledge of forestry would be a great help to them.

Mr. J. G. Peters, Chief of State Coöperation in the United States Forest Service, who had come down from Washington especially for the meeting, then made an address on "State Coöperation in Fire Protection With the United States, Under the Weeks Law."

COOPERATIVE FIRE PROTECTION UNDER THE WEEKS LAW.

BY J. G. PETERS, UNITED STATES FOREST SERVICE.

Members of the North Carolina Forestry Association, Ladies and Gentlemen:

The protection of our forests from fire is receiving increased attention throughout the country. It is the result not only of the enormous amounts of timber destroyed, but especially of the constantly growing value of timber. The loss in the coniferous forests of the North is frequently the destruction of the merchantable timber itself, while in the pine and hardwood forests of the South the chief damage is the repeated killing of young growth, especially on cut-over lands. This young growth has a very great future value, for upon it depends the permanency of the lumber industry in the region.

Fire also destroys the soil covering, causing rapid run-off on steep slopes and erosion is chiefly the origin of sediment in the channels of navigable streams. This injury to streamflow and navigation furnishes ground for active assistance from the Federal Government. A year ago Congress passed the Weeks law, section 2 of which is designed to authorize this assistance.

The purpose of this section of the law is primarily to protect navigable streams, and secondly to promote forest protection by the States and private owners. The appropriation for the purpose is \$200,000, which is available until expended. The law requires that (1) the protection must be confined to the forested watersheds of navigable streams; (2) the State must have provided by law for a system of forest fire protection; and (3) the Federal expenditure in any State must not exceed in any Federal fiscal year the amount appropriated by the State for the same purpose for the same fiscal year.

The law is administered by the Forest Service under an agreement between the Secretary of Agriculture and the State.

A broad interpretation has been placed on what constitutes a navigable stream, and in every case the stream is given the benefit of any doubt. However, streams used only for floating logs, canoes or rowboats are not consid-

ered navigable. As a general basis for decisions on the question of navigability the reports of the Chief of Engineers, United States Army, are used.

The work is being conducted on a conservative basis and the fund available for the purpose used so as to encourage local effort in as many different States as possible. The educational value of the work is very great, and the Government desires every State that can fulfill the requirements to receive a share of the fund. Our policy is to make the appropriation last three years. The expenditures in 1911 were practically \$39,000. The allotments for 1912 will aggregate about \$70,000. No State receives more than \$10,000 in any one year.

The aim is to assist each State as far as possible, helping especially the one that has a hard time helping itself. The State that can make only a small appropriation may have it duplicated, while the one that has an appropriation which is relatively very large and can of itself provide safe protection must expect a relatively small allotment.

The coöperative agreement provides that the State supply the Service with a comprehensive fire plan, including maps showing the areas to be protected, the headquarters and approximate routes of patrolmen, and all features necessary to a clear understanding of the State's plan of fire control.

The expenditures made by the Federal Government are exclusively for the salaries of patrolmen, including men assigned to lookout duty, railroad patrol, and the like. This is advisable in order to simplify the Federal inspection of the work. The expenditures of the State, which are to offset those of the Federal Government, may, however, properly include any expenditure for the purpose of protecting forested watersheds of navigable streams from fire. The construction of lookout stations or other protective facilities and proportionate amounts of supervisory expenses are proper charges on the part of the State against the expenditures made by the Federal Government. A distinction is made between State patrolmen and Federal patrolmen, which facilitates keeping separate the work charged to the State and that charged to the Federal Government.

The State Forester or similar officer is given a Forest Service appointment, which permits him to employ Federal patrolmen and certify to their services on Government vouchers. He is given as much authority and latitude as possible in the expenditure of Federal funds. The Forest Service places him in practically the same position as a National Forest Supervisor by allowing him a wide degree of discretion while at the same time making him fully accountable for results. He selects the Federal patrolmen, instructs them in their duties, and supervises their work.

The Federal patrolmen must have such police powers for the prevention and control of forest fires as the laws of the State provide; they must be authorized to employ assistance in fighting fires; and they must be equipped with fire fighting tools.

The Forest Service inspects the coöperative work on the protected areas, and can withdraw its approval of any area or terminate the employment of the State officer or any Federal patrolman.

The States which received Federal aid under the Weeks law in 1911, and the amounts expended by the Government and the States are shown in the following summary:

State	*State Expenditures	Federal Expenditures	Allotment to States	UNEXPENDED	
				Balance of Allotment	Balance of \$200,000 Fund Jan. 1, 1912
Maine.....	\$ 23,557.07	\$ 9,991.80	\$ 10,000.00	\$ 8.20	
New Hampshire.....	13,876.21	6,219.50	7,200.00	980.50	
Vermont.....	2,243.90	1,218.00	2,000.00	782.00	
Massachusetts.....	400.12	365.00	1,800.00	1,435.00	
Connecticut.....	513.96	6.00	1,000.00	994.00	
New York.....	3,837.59	2,000.00	2,000.00	0.00	
New Jersey.....	1,241.50	990.00	1,000.00	10.00	
Maryland.....	262.85	261.00	600.00	339.00	
Wisconsin.....	20,841.87	4,437.25	5,000.00	562.75	
Minnesota.....	25,675.77	10,000.00	10,000.00	0.00	
Oregon.....	8,758.89	3,305.00	5,000.00	1,695.00	
Total.....	\$ 101,209.73	\$ 38,793.55	\$ 45,600.00	\$ 6,806.45	\$ 161,206.45

* As shown on State vouchers or statements forwarded with Federal vouchers. These vouchers are not necessarily the total State expenditures.

The watersheds that received coöperative protection were the following:

Maine—Narraguagus, Union, Penobscot, and Kennebec.

New Hampshire—Androscoggin, Saco, Connecticut, and Merrimac.

Vermont—Connecticut, Otter Creek, and Hudson.

Massachusetts—Nashua, Thames, Connecticut, Housatonic, and Hudson.

Connecticut—Thames, Connecticut, and Housatonic.

New York—Hudson and Delaware.

New Jersey—Hackensack, Passaic, Delaware, and Raritan.

Maryland—Potomac and Youghiogheny.

Wisconsin—Chippewa and Wisconsin (headwaters of the Mississippi).

Minnesota—St. Louis, Rainy, Mississippi, and Red River of the North.

Oregon—Columbia, Willamette, Nehalem, Wilson, Siletz, Umpqua, Coos, Rogue, and Klamath.

There were five hundred and nine Federal patrolmen employed, of which about two hundred were on continuous pay from the date of appointment to the end of the season. They received from \$2 to \$2.50 a day. Each had a district to guard varying in area from about 25,000 to 100,000 acres. Without necessarily attempting to cover the whole district he made his rounds of the dangerous places on the most valuable areas at the most advantageous times. The routes he followed varied from ten to forty miles a day, depending on the method of travel, usually on foot, horseback, or bicycle, whichever was the most feasible. Along the railroads, except where oil was burned, there was a special and continuous patrol, in some places on foot and in others on veloped or bicycle.

The patrolman carried a map of his district and adjoining districts, showing the major topographic features, approximate location of the Federal and State patrol routes, patrolman's and fire warden's headquarters, and such improvements as telephone lines, lookout stations, roads, trails, tool supply boxes, and the like, as might be necessary to aid him in emergency. He also carried some fire fighting tool like a shovel or collapsible canvas pail.

The most important duties of the patrolman were putting out small fires, warning persons he met of the fire danger, and recording their names wherever advisable. In the case of larger fires, where assistance was necessary, he had authority under the State law to call out help to extinguish them.

Often fires were left unextinguished by camping parties; fishermen stopped to cook a meal and left the fire burning; many fires were also caused by smokers and locomotives. The patrolmen found hundreds of such fires as these on their routes last season and extinguished them.

In addition to regular patrol duty and fire fighting, there was other work, which included the watching for fires from lookout stations, burning slash, and constructing protective improvements.

Besides the practical tangible results of the coöperation under the Weeks law, which have been apparent from the start, its educational value, although not measurable, has been far reaching in effect. Except in a few States, last year was the first that any systematic patrol of the forests by the State had ever been done. It marked the general extension of the State organization, in coöperation with the Federal Government, getting out among the people; educating them, through the actual work done, in the need of fire protection, and soliciting their coöperation.

The most effective work of the patrolmen was in warning persons met in the woods of the danger from fire and informing them about the fire laws. The patrolmen were instructed generally to record the names and addresses of fishermen, hunters, and campers wherever possible, and send them to the district chief. In New Hampshire, for example, 4,200 warnings of this sort were given. Over half the names were recorded and are now on file in the office of the State Forestry Commission. Before the next fire season a copy of the fire laws will be sent to each of these persons. The educational value of this work can not be questioned.

The result of the warnings given and the other protective measures adopted is that the public is coming to know something about the forest fire laws of the State and the practical value of fire protection. Loggers and those who traveled the woods began taking greater care in the use of fire; quicker notifications of fire were given to the proper State officers, where before they had at best been desultory; in many cases private owners, who were skeptical at the start, later saw the practical value of the work and began contributing to it by the hire of patrolmen, building lookout stations, and the like; and the increased interest of the public was shown by the widespread demand for information on fire protection received by the various State foresters and the Federal Forest Service.

The first question that naturally occurs to one looking for measurable results is just how far the expenditures succeeded in saving possible losses. Maine and New Hampshire furnish very good examples of comparative losses in 1911 and 1903, two of the most dangerous fire years on record in these

States, on the watersheds where coöperative fire protection was established last year by the State and the timberland owners with the Federal Government.

Year	Season of Drought	MAINE		NEW HAMPSHIRE	
		Acres Burned	Damage	Acres Burned	Damage
1911	April 16—June 1	91,471	\$ 154,284	10,925	\$ 34,036
	June 20—July 17				
1903	April 17—June 6	172,040	679,423	84,255	200,000

While the danger season of 1911 was the longer, and was considered generally to be the more severe, still the area burned over and the value of the damage were considerably less than in 1903. This is very significant. The decrease can unquestionably be attributed largely to the protection afforded in 1911 as compared with the almost utter lack of it, except by some few private owners, in 1903.

The Federal Government desires to extend this coöperative protection to other States. To secure its benefits they must enact a forest fire law and appropriate funds for administering it. There are many States which could take hardly a more effective step toward the conservation of resources which support important industries than to inaugurate systematic fire protection. The fact that the immediate financial interests of timber owners make them backward in undertaking this insurance of their industry is an additional reason for the States to take the lead. The readiness of the Federal Government to coöperate with the States, under the terms of the Weeks law, as soon as they make a start is an incentive to immediate action.

A State fire law should provide, in addition to an organization to fight fires, a patrol force to prevent fires, as far as possible, from starting. The law should, of course, carry an adequate appropriation. A general defect in State forest fire laws is that they provide only for fighting fires and not for a patrol. Their most serious handicap is the inadequacy of the appropriations. To protect the national forests costs about two cents an acre annually; the Biltmore tract in this State, about five cents an acre; and the lands of the various timberland protective associations in the northeastern and northwestern States, from two to four cents an acre. It is probable that a State can secure efficient protection for one cent an acre, if the larger private owners will assist by contributing toward the protection of their own lands. If, for example, a State has five million acres that need protection, an annual expenditure of \$50,000 should be sufficient to handle the work effectively. It is improbable that the State would appropriate this amount at the beginning. An appropriation of \$10,000 or even less would be sufficient to start the work and demonstrate its value.

It will interest you to know what the States appropriate yearly for fire protection. Maine appropriates \$68,000, New Hampshire \$12,000, Vermont \$2,300, Massachusetts \$10,000, Connecticut \$2,000, New York \$100,000, New Jersey \$15,000, Pennsylvania \$50,000, Maryland \$1,500, Michigan \$10,000, Wisconsin \$35,000, Minnesota \$75,000, Idaho \$12,000, Washington \$38,000, and Oregon \$30,000.

I can not urge too strongly the adoption by North Carolina of a forest fire protective system with an adequate appropriation to meet its expenses. The State, which is so rich in timber resources, can then avail itself of the benefits offered by the Weeks law.

At the request of the President the discussion on Mr. Peters' paper was postponed until after the next paper, which gives a view of the same subject from the standpoint of one of the States which is now coöperating with the Federal Government in fire protection.

In the unavoidable absence of Mr. F. W. Besley, State Forester of Maryland, his paper was read by the Secretary. His paper follows:

FOREST PROTECTION AS APPLIED IN MARYLAND UNDER THE WEEKS LAW.

BY F. W. BESLEY, STATE FORESTER OF MARYLAND.

The limited way in which Maryland has been able to participate in the benefits of the Weeks law has shown that it is a good thing and makes us anxious to do more along this line. Since forest conditions in North Carolina are somewhat similar to those in Maryland, our experience in this connection may have some suggestive value, at least.

In order that any State may take advantage of the coöperative offer of the Federal Government in fire protection, there are three conditions that must be fulfilled. First, the State must have adequate fire laws, giving full authority for inaugurating a policy of forest protection; second, there must be a suitable organization for carrying into effect these laws, that full benefits may be secured; and third, the State itself must appropriate money for the purpose of fire protection, as the Federal Government, under the Weeks law, will not, in any case, spend more money than the State spends for the same purpose during the same time.

There are certain other limitations upon the expenditure of the Federal allotments, such as limiting it to patrol and lookout station work, on the watersheds of navigable streams in the mountain sections, but under conditions that exist in Maryland and in North Carolina these limitations will probably not reduce the usefulness of the work.

Maryland has a good forest fire law and a forest warden system for putting the law into effect. The State has been expending about \$1,200 annually for forest fire protection, so that we were able to take advantage, to a small extent, of the Federal coöperation. An arrangement was made for the fall of 1911, whereby the State allotted \$600 and the Federal Government a like sum for fire protection. Seven mounted patrolmen were employed at three dollars per day to patrol on days when the woods were dry enough for fires to burn. The patrolmen were selected by the State Forester and worked under his direction, so that there was no interference whatever with the State forest organization. These men were selected with great care, for the work that they were called upon to do required tact in dealing with the mountain people. Furthermore, the number of patrolmen employed and the amount of money available was so small that close supervision was not practicable; hence the necessity of securing men that could be fully relied upon.

The fall of 1911 was unusually wet, so that the efficiency of the patrol work was not fully tested. Only eight fires were reported during the season. These were all small fires, discovered by the patrolmen soon after they started and promptly extinguished before any serious damage was done. The fact that these small fires were discovered and extinguished before they assumed serious proportions demonstrates fully the value of the patrol service. Under our forest warden system, the Forest Warden is not authorized to incur any expense in patrol work, or to do anything until after the fire has been reported to him, and, generally, the fire has done considerable damage and is difficult to control by the time it comes to the attention of the Forest Warden. Under the patrol system this trouble is largely overcome, and certainly for the mountain district, where there is a large percentage of woodland in continuous bodies, the patrol system is the practical method of dealing with the forest fire question. The State Forester outlined for the forest patrolmen and the regular State forest wardens, a plan of coöperation by which each was to work in harmony, and it is gratifying to report that this plan, so far as it could be observed under the limited opportunities for action this fall, worked out very satisfactorily.

EDUCATIONAL VALUE OF THE WORK.

Considerable stress was laid upon the educational feature of the work during the past season. The patrolmen were provided with printed matter relating to our forest fire laws and fire protection, and they were instructed to avail themselves of every opportunity to place this literature in the hands of landowners in their district and to talk with them on the subject of fire protection. While it is difficult to measure the effect of this work, it is believed that it has been instrumental in securing a more thorough coöperation on the part of the landowners of the mountains in suppressing forest fires. The landowners have, in every case, shown their willingness to cooperate, and now that their attention has been called to the forest laws, and the determination on the part of the State and Federal governments to aid them in securing fire protection, they have been encouraged to hold an entirely different view toward the forest fire question. It was just such work as this which was required to crystallize the sentiment and make it effective. The forest patrolmen not only visited the landowners in their districts, posted warning notices, and warned the careless, but also visited the schoolhouses and got the teachers interested. Our forest laws are sufficiently comprehensive to cover the situation and to meet any emergency that may arise, but it is just such an agency as this patrol which creates a public sentiment that will make their enforcement certain. The fact that the Federal Government is paying men to patrol the woodlands and enforce the forest fire laws carries with it a dignity and force which can not fail to arouse the admiration and good will of the people generally. I feel reasonably certain that these results have been secured in the Maryland work.

VALUE OF FEDERAL COOPERATION IN FIRE PROTECTION.

Under present conditions in Maryland, the State can not fail to appreciate fully the coöperation of the Federal Government. As has been stated, our forest laws are excellent in many respects. The Forest Warden Service has

been in operation for some time, but the whole system has shown its weakness in not making any provision for fire patrol and an utter lack of funds to carry on the protective work. The coöperation of the Federal Government, under the Weeks law, solves for us one of these great questions, namely, the forest patrol. Outside of the mountain counties the forests are generally held in woodlots, or isolated wooded tracts, where a fire patrol is less important. With the Federal coöperation, however, we are able to meet this situation without a change in our forest laws. The question, however, of increased appropriations for fire protection work is yet unsolved, but the fact that the Government has agreed to practically duplicate the amount we spend for fire protection purposes is the strongest kind of an argument that could be used for securing a special appropriation for forest protection from the Legislature this winter. The very limited amount that we had to expend has greatly curtailed the amount that could be secured from the Federal Government, but it has strikingly shown the need of extending the work.

A general discussion of the subject of coöperative fire protection under the Weeks law was then taken up, Mr. Alston Grimes and Mr. E. A. Blake of the Norfolk and Western Railway taking a prominent part. In answer to a question, Mr. Peters said that the implements of warfare in firefighting were the hoe, the rake, and the collapsible canvas bag. In regard to the pay we shall give to patrolmen, he said that various wages were paid, some receiving compensation by the hour, others by the month. He declared that volunteers are supported by the State and compensation to them varies from fifteen cents or twenty cents to fifty cents an hour.

Mr. Hugh MacRae, of Wilmington, then read an address on the "Stock Law and Forest Protection," prefacing his remarks with the statement that his subject was not a popular one, and giving as one of his reasons that men are not naturally lovers of effort.

THE STOCK LAW AND FOREST PROTECTION.

BY HUGH MACRAE.

The question of Stock Law in its relation to forestry is so simple that it could be covered by a few emphatic sentences, but as this would savor of dogmatism and would not further the economic interests which we have met here to consider, I am going to ask you to let me surround the bare statement of facts with certain bits of information which I hope will emphasize the importance of this subject.

I shall speak of the longleaf pine forests of the coastal plain, because the problem there is simple and will serve very well to illustrate the subject. As to these forests of the coastal plain, could Nature have been more prodigal? Could we have been less appreciative? Here is a tree, the longleaf pine, of the very highest economic value, absolutely suited to soil and climate, which Nature insists on reproducing.

One growing or defective tree, left standing for two or three years after its fellows are taken, will reforest two or three acres of ground.* The pine burrs begin to pop open on the coming of cold weather in October or November and scatter the winged seed or "mast," which is whirled in every direction by the prevailing winds of the winter. Almost every seed can germinate, for it falls on an ideal seed bed of sandy loam, which is kept almost constantly moist by the frequent rains.

After a few warm days the seed sprouts and puts down its small tap root. As soon as the tap root digs its way into the sand it performs one of the miracles of Nature by straightening up and lifting the mother seed into the air. Now the little tree is nourished from below and fed from above. It is fed through the tips of the pine needles until all proper dangers are passed; and with the warm days of spring it soon is six inches high, and by fall it is firmly established in the soil.

Compare this with the slow, expensive process of reforesting in Europe (with trees of far less value), where each tree is planted and replanted by hand.

It may be interesting to you to know that while I have been accustomed to going into the woods all my life, I never had the opportunity to observe the growth of the young longleaf pine from the seed, as above described, until after the stock law was passed in New Hanover County a few years ago. The hogs ran at large in that county and were so strenuous that they succeeded in making this phenomenon one rarely to be observed. Now you can see the longleaf pine reproduce itself everywhere.

Recently a gentleman from New York, who spoke Italian fluently, was questioning an Italian at St. Helena about the results obtained from the vineyards of the colony. It was noticeable that the Italian replied with great enthusiasm, and later when the gentleman was asked what was said he replied that there were no expressions in English to give the exact idea; but as near as he could express it the Italian said, "We can not understand why Nature has done so much for us, why she is so bountiful with the harvests. We feel that she has made a mistake."

The area of the coastal plain is somewhat in excess of ten million acres. If the value of reforestation is duly appreciated and the forests protected, there should be an increase of at least four million dollars per year to the value of the forests from the natural reproduction.

Can Nature do more for us in the way of providing forests? Why has she been so generous in soil and climate, in abundance of moisture? We can quite understand the Italian's point of view.

When we think of the vast areas of the earth's surface not adapted to reforestation and others where the forests, once destroyed, can not possibly be reproduced, we ought to be thankful and protect intelligently what has come to us as a gift.

At the moment we can not feel proud of the part man is playing. Because of ignorance and natural aversion to effort, he sets fire to the woods in order to give the benefit of the new growth of almost worthless grasses to almost worthless cattle, which are enabled thereby to get a scanty living. He ranges his hogs in the woods, when they would prove far more profitable if

* A forester would recommend leaving at least one seed tree per acre, and preferably two, to make the reforesting from seed quicker and more sure.—Editor.

kept at home. From the time the pine mast falls* until the little tree is one year old it affords a natural delicacy for the hogs—but only a delicacy, from the fact that a hog has to cover so much territory to live on this scattered food that he evolves into a high-speed brute, like Kipling's "kangaroo."

The fires and the hogs are enough to complete the destruction; but add to these a few sheep which have the habit of eating the conelike buds out of the tops, and the little trees, which have escaped other enemies, are killed.

Without being in possession of any figures obtained by scientific investigation, it might be safe to say that one fire-spreading man, with twenty hogs, twenty sheep, and ten cows, will keep ten thousand acres devastated.

Nature does not give up the fight, however. She attacks the hogs with cholera, the cows with tick fever, and the man with poverty; but with what terrific cost to civilization!

Let me tell you of one tract of ten thousand acres which reforested itself. The seeding period was fifty years ago when men were in the war and when hogs and cows were scarce. About one-half the timber on this tract is longleaf pine; the other half is shortleaf pine. The reforestation did not cost the owner one cent. As it came easily, it was sold cheap; land, timber and all for \$27,000. During the past five years this tract has paid the owners \$27,000 in turpentine rent; has paid to the renter more than \$100,000, I understand, in the value of the turpentine. The timber is worth at present stumpage prices over \$50,000; and on a good market would be worth more than \$75,000. The sawed value of the timber would probably be worth as much as \$500,000. As the land alone is worth much more than the purchase price, we can see that Nature's gift on this tract must be considerably in excess of \$200,000; or more than \$4,000 per year. While this land has probably been fire swept during recent years, the pine tree after it is several years old fortunately has a bark which will stand fire. The fire retards its growth, but does not kill the tree after the first few years.

A friend told me of an experience he had in the pine belt where there was no stock law. He bought about five hundred acres from which the pine trees had been cut. About six years ago he fenced ten acres of it. Recently he visited the place and found all the land outside of the fence just as he had left it years ago. Inside of the fence was a beautiful growth of longleaf pine, not less than one hundred trees to the acre. This man is naturally a strong advocate of stock laws which will protect the forest.

In this connection it is well to consider the worthlessness of woods cattle. This was brought home to me recently. Some parties joined in a plan to carry on a small cattle feeding and dairying experiment, which was to be enlarged if it proved a success. The manager was a Hollander who, while he understands cows, was a stranger to the cattle and methods of this country. He was struck with the cheapness of the woods cow and thought he could start with these and improve them. After feeding about forty head of woods cattle until they had about consumed their value in feed, and after going through the trials of tick fever and working with the cattle all fall and winter, it became perfectly clear that the wise thing to do was to dispose of them and start over again; and the owners were glad to sell the cows

* Nearly all of the seeds of the longleaf pine are devoured by hogs before they have time to germinate. Those that by some lucky chance escape, and become seedlings, are rooted out, even after they reach several years of age, the succulent roots of the pine being relished by the hog.—Editor.

at their original cost price, losing one-half of the capital, which had been used up in expenses.

Do we want forests? Yes. Not only because of their economic value in furnishing fuel, cross-ties, and material for building and for the manufacture of furniture; but because they help to regulate the rainfall and conserve the water supply, which is essential to the prosperity of the agriculturist; and because the forests have a favorable influence on the climate, making it more equable by protecting the country against the sweep of cold winds.

In an article written by W. J. McGee, which appeared in a recent issue of the *World's Work*, it is made clear that the power of this country to support a very large population, one billion, with comfort, is directly measurable by the amount of available water supply—namely, the annual rainfall and that stored under the surface of the earth. He says: "The limit of our capacity for production and population lies not in the land or its living forms—both susceptible of immeasurable improvement—but in the supply of water on which life depends; for without water there are no plants, no soils, no animals, no men, no intelligence to control lower nature."

With the abundance of rainfall which we have in North Carolina, the great future of the country undoubtedly lies in the direction of intensive farming. If it is water and not land which sets the limits to population, and the chief feature in preserving our water supply is the care of our forests, then indeed we must handle this problem without delay. Twenty-five acre-feet of water per year on five acres of land will enable a family of five persons to support themselves with comfort and contribute to the support of an equal number of persons engaged in manufacturing or other kinds of work. With ample water, in other words, five acres will yield an easier living than 640 acres, or a square mile, on the plains; and eastern North Carolina will support easily one person per acre. In Holland there is a section where five hundred people are comfortably supported on fifty acres of land.

I wish I had the eloquence to demonstrate convincingly that because of this fact of abundant rainfall we of North Carolina live in one of the most favored spots on the globe; but we are not rising to the level of our natural surroundings. We are allowing generation after generation to go by and miss this miraculous opportunity. It seems that we must suffer by falling short of our birthright. It is common sense to proceed along the lines of least resistance, and to do the thing which can be done to greatest advantage.

We have met to consider ways of protecting the forests. It is obvious that forest fires must be avoided, and that ranging cattle and hogs must first be stopped.

The United States Department of Agriculture and the State Department make clear to us the great loss of profits to the farmer from tick fever and cholera, which are directly due to permitting scrub cattle and woods hogs to run at large. This information is interesting; but to be valuable we should apply the real remedy, which is the adoption of a *State-wide stock law*. If some of our farmers in certain sections are still too ignorant to be alive to their best interests, it is the duty of those who do understand this to insist that our Legislature shall take care of this matter. A development in one progressive line assists every other, and I think nothing will do more to help drainage projects, the building of good roads, better education, better home

comforts, and more profitable agriculture, than the passage of a stock law; and these things mean the development of our country.

A State stock law, then, means that a man shall keep his cattle, hogs, and sheep fenced in, instead of permitting them to roam at pleasure over the lands of other persons. If he owned sufficient land so that his hogs and cattle could range freely without interfering with others, we would not be so much interested in the problem; but even though this man owned land he does not have the rights over rainfall and climate. These are for the common good.

It is the function of good government to promote the welfare of the governed, to protect the weak against the unfair encroachment of the strong, and to do whatever is best for the interests of the majority of the people.

If forests are for the general good, and the protection of forests is advantageous to our civilization and necessary to our comfort, then we are justified in asking our Legislature, which should be composed of intelligent representatives and statesmen, to make the laws necessary for the protection of the forests.

Mr. MacRae's paper was listened to with profound attention, and was received with applause. In the discussion which followed Professor W. N. Hutt, of the State Department of Agriculture, stated that an un-intelligent or "stand-pat" farmer had recommended to a more progressive one the rearing of hogs in the woods, as they could there get their own living. On being asked what he thought it cost per pound to raise such meat, the "stand-pat" farmer replied that he thought it cost nearly nothing. The progressive farmer, after showing the large amount of land that was run over by these hogs and the small amount of pork that was produced per acre and per one hundred dollars invested in this land, declared that in his opinion range pork cost three dollars per pound.

REPORTS OF COMMITTEES

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. C. P. Heyward read the report of the Resolutions Committee, which recommended the following resolutions:

RESOLUTION No. 1.

WHEREAS, The North Carolina Geological and Economic Survey has been commissioned by the Legislature to make investigations and recommend plans to the people and the Legislature for the improvement of the forest conditions of the State; and,

WHEREAS, The Survey has done and is doing as much as possible in this way with the limited amount of money at its disposal: be it

Resolved, That the North Carolina Forestry Association do endorse the work of the Survey, and do hereby show its appreciation of the assistance the Survey has given to this Association; and,

Resolved further, That we hereby memorialize the next Legislature to liberally support this branch of the work of the North Carolina Geological and Economic Survey.

RESOLUTION No. 2.

WHEREAS, The Weeks Act provides an appropriation of \$200,000, available until exhausted, to enable the United States Government to coöperate with States in protecting from fire the forested watersheds of navigable streams; and,

WHEREAS, No State can take advantage of this offer of coöperation unless it has some paid system of forest fire protection: therefore, be it

Resolved, That the North Carolina Forestry Association urges upon the people of the State and upon their Representatives to the General Assembly who are to be elected during the coming summer the necessity of North Carolina's passing legislation which will enable her to receive this assistance from the Federal Government for the protection of her forests.

RESOLUTION No. 3.

WHEREAS, We realize that a better understanding of the value of our forests and the need for more conservative methods in handling them has got to begin with the younger generation: therefore, be it

Resolved, That we hereby advocate the introduction into our schools and colleges of elementary courses in forestry, which will give the children of the State a better appreciation of the worth of these most valuable natural resources; and,

Resolved further, That we heartily second the efforts of the Federation of Women's Clubs to have a forestry course introduced at our State University; and,

Resolved further, That we heartily endorse the efforts of the North Carolina Geological and Economic Survey to make general the observance of Arbor Day in our public schools, and we do hereby respectfully request the State Board of Education to require the annual observance of Arbor Day by the schools of North Carolina.

RESOLUTION No. 4.

WHEREAS, The annual yield from the forests of this State is exceeded only by the yield of cotton and corn; and,

WHEREAS, These forests are being cut at a much faster rate than they are producing timber, which will increase the demand for our second growth forests year by year; and,

WHEREAS, Forest fires annually destroy not only large amounts of merchantable timber, but also immense areas of young growth which ought to be reserved for the future use of our citizens: therefore, be it

Resolved, That the North Carolina Forestry Association advocates a State system of fire protection supported by an appropriation of the Legislature, to be administered by a technical and nonpartisan organization for the protection of all the timber lands of the State.

RESOLUTION No. 5.

WHEREAS, A virulent fungus disease, known as the Chestnut Tree Blight, has already infected a large portion of the chestnut region of the New Eng-

land States, of New York, New Jersey, Pennsylvania, and Maryland; has entered and gained a foothold in Delaware, Virginia, and West Virginia, and threatens the destruction of this valuable timber tree in our own State; and,

WHEREAS, North Carolina and the other States not yet reached by the infection are justly entitled to every possible help and protection which Congress and the States themselves may be able to employ in saving their chestnut timber from attack: therefore, be it

Resolved, That the North Carolina Forestry Association pledges its support in arousing the public to recognize and combat this disease; and,

Resolved further. That this Association urges the Representatives of North Carolina in Congress to support a bill now pending before that body appropriating \$80,000 for the use of the United States Department of Agriculture, to be used in a thorough study and investigation of this tree disease, with the view of devising ways and means to combat its further spread, and to subject it to possible control.

Resolved further, That this Association bring this matter as soon as possible to the attention of the next General Assembly of North Carolina, with a view to making an appropriation, if then found advisable, towards protecting this State from this disease.

RESOLUTION No. 6.

WHEREAS, The indiscriminate ranging of stock through the open lands of both Eastern and Western North Carolina is a menace to the perpetuation of the forests of these regions through the destruction of the seed and young growth by stock, and because many of the forests fires indirectly result from this ranging: be it

Resolved, That the North Carolina Forestry Association heartily favors the extension of the stock law to those parts of the State which are now without this advantage.

RESOLUTION No. 7.

WHEREAS, Numerous fires are caused by sparks from locomotives: be it

Resolved, That the Legislative Committee be instructed to prepare a bill to be presented to the next General Assembly, requiring railroads to place spark arresters on all locomotives within one year after such act is passed; and,

Resolved further, That this Association request all civic clubs and similar associations to hold meetings with this object in view, and endeavor to pledge their Member of the General Assembly to support such bill when introduced.

RESOLUTION No. 8.

WHEREAS, The pine timber in many of the counties of the State has suffered enormous injury from the attacks of the Southern pine beetle, to the serious loss of the farmers and other timberland owners of the State; and,

WHEREAS, The United States Bureau of Entomology has studied this question thoroughly and worked out a method of control, which, if carried out, would free our State from this pest, and has advocated this plan both in the press and in public meetings in this State: be it

Resolved, That the North Carolina Forestry Association recognizes with appreciation the efforts of this Bureau to suppress this pest in North Carolina; and,

Resolved further, That this Association pledge its support to the further efforts of this Bureau and of the North Carolina Geological and Economic Survey, which is coöperating with this Bureau in this work; and,

Resolved further, That the question of more efficient coöperation through the Survey be brought to the attention of the next General Assembly, with the hope that an appropriation will be made to carry on this work more generally than they can now do.

These resolutions were unanimously adopted by the Convention.

REPORT OF COMMITTEE ON NOMINATIONS.

Miss Annie F. Petty reported for the Committee on Nominations, nominating the following gentlemen as officers for the ensuing year: Mr. E. B. Wright, of Bladen County, for President; Mr. J. S. Holmes, of Chapel Hill, for Secretary-Treasurer. The report of the Committee on Nominations was then adopted, and Mr. Wright was elected President, and Mr. Holmes was reëlected Secretary-Treasurer.

The constitution which had been drawn up and previously approved by the Executive Committee was then read by the Secretary, and was formally adopted by the Association.

CONSTITUTION OF THE NORTH CAROLINA FORESTRY ASSOCIATION

Name: The name of this Association shall be the North Carolina Forestry Association.

Object: The object of this Association is to promote the protection of the forests of North Carolina from fire and from destructive insects, and to promote their perpetuation by wise use and by the reforestation of cut-over and abandoned lands.

Office: The official headquarters of this Association shall be located and maintained at the office of the Secretary.

Membership: The membership of this Association shall be composed of all who have registered with the Secretary and all those who may hereafter apply to the Secretary and have their names enrolled as members.

Officers: The officers of this Association shall consist of a President, a maximum of thirty-nine Vice-Presidents, one from each Senatorial District of the State, and a Secretary-Treasurer, who shall hold their respective offices for one year, or until their successors shall be duly elected and qualified. In the absence of the President or his inability to perform the duties of his office, the Vice-President for the district in which the meeting is held shall act in his stead.

Executive Committee: The Executive Committee shall consist of the President, the Secretary-Treasurer, and five other members of the Association, to be named by the President. At all meetings of this committee three members shall constitute a quorum for the transaction of business.

Duties of Officers: The President shall preside at all meetings of the Association and of the Executive Committee, and sign all orders on the Secretary-Treasurer, and perform all other necessary duties in furtherance of the purposes of this Association.

The Secretary-Treasurer shall keep the records, books, and accounts, shall be the custodian of the funds of the Association, and disburse the same upon the order of the President, and perform the other usual duties incumbent upon such office.

The Executive Committee shall have charge of the affairs of the Association pertaining to its business, provide ways and means for its proper finances, and perform all things necessary for the promotion of its interests.

Meetings: The annual meeting of the Association shall be held at such time and place as may be agreed upon by the Executive Committee. Notice of such meetings shall be mailed to each member of the Association at least two weeks prior to the date of meeting. Special meetings may be called by the President or by the Executive Committee.

The Executive Committee shall hold its regular, stated meetings at such times as it may select, and may adopt rules and regulations for the government of itself and the business of the Association.

Notice of special meetings as above provided for shall be mailed to each member of the Association at his last known post-office address at least ten days before the date of such meeting. Such notice shall set forth the object for which such meeting is called.

Dues: The annual dues shall be one dollar a year.

Amendments: These articles may be amended at any regular meeting of the Association by a majority of the votes cast.

The report of the Auditing Committee was made by Mr. D. A. White, approving the Treasurer's report.

This report of the Treasurer, for the year ending February 19, 1912, shows a total in receipts of \$102, disbursements \$52.25, leaving a balance on hand of \$49.75. Twenty-two subscriptions of one dollar each were received, the remaining eighty dollars having been given in two handsome donations by the John L. Roper Lumber Company and the Butters Lumber Company. The disbursements were all for stamps and stationery. The above balance will, however, be largely eliminated by the expenses of the Convention.

Several short talks were then made by delegates and guests of the Convention.

Mr. H. M. Cates, of Graham, N. C., representing the North Carolina Farmers' Alliance, said that he had been sent here to hear what was going on. "The farmers, I believe," he said, "are with you. I don't belong to your organization, but I have got my dollar with me and I am going to join. Our motto in regard to the forests seems to have been 'Take no thought for the morrow.' We have, however, got to protect our forests against the fires and careless men."

Mrs. R. R. Cotten, President of the North Carolina Federation of Women's Clubs, spoke of her intense wish for the perpetuity and continuity of the longleaf pine forests of the State. The women's clubs are

doing what they can to get forest preservation taught in the public schools. The women of the State are with this Association in this work.

Colonel J. Bryan Grimes spoke with force and conviction on the evidently increasing enthusiasm of the people in this matter. He declared that if there were one thousand farmers like Mr. Cates in North Carolina there would be a revolution in the State upon forest protection.

He called the attention of the men present to the ruthless destruction of the trees and even the lands, by the unintelligent handling of the timber when gotten out by the mill men. It destroys not only the undergrowth, the forests of tomorrow, but hurts the lands. He spoke of the trifling prices which timber had been sold at in the past. He asserted that we need education for our people and protection for our forests. We have seen Legislature after Legislature refuse to give laws for forest protection, because, he said, the laws that had been proposed did not seem to be what was needed for the various parts of the State. In concluding, Mr. Grimes moved that the President be requested to appoint a Legislative Committee to consult with the Attorney-General in outlining a law which will fill the needs for forest protection for the various parts of the State.

This motion was then put by the President, and was carried with enthusiasm. The following committee was subsequently named by the President: Mr. Alston Grimes, of Pitt; Mr. C. C. Smoot, III, of Wilkes; Mr. G. C. Speight, of Craven; Mr. Hugh MacRae, of New Hanover; Mr. Thomas A. Cox, of Jackson.

Ex-Governor Thomas J. Jarvis was then called upon by the President to say a few words. He said that he was glad to be present; that he made it a business to be present when there was anything for the good of North Carolina going on. He said that this meeting reminded him of the truism that the value of a gift is never really appreciated until it has slipped away from us. The people of North Carolina are in that condition. They have seen their forest wealth swept away and now they are beginning to take better care of the remnant. With properly directed efforts the forests may yet be preserved. They reproduce rapidly and with adequate laws to protect the forests the men who are now interested in this work can accomplish this end. The Governor said that he had been able to learn something at this meeting, and that he had come out to it as soon as he heard of it. He hoped that the Association would grow and increase in influence in order to protect the forests that are left and to secure others.

Mr. D. A. White, of Mebane, representing the Southern Furniture

Manufacturers' Association, said that his Association wished to coöperate with us in every way possible. His Association, he said, represents about two hundred factories, mostly in North Carolina, which are turning out furniture and allied articles. Mr. White gave a sketch of the furniture industry in North Carolina and spoke of himself as the father of the chair industry in the South. He was greatly interested in seeing the forests preserved and pledged the coöperation of the Southern Furniture Manufacturers' Association in the efforts of the Forestry Association to protect and preserve the forests of the State.

Mr. Z. W. Whitehead, of Wilmington, editor of the *Southern Lumber Journal*, spoke for the lumber fraternity and pledged their support in this movement. Thinking that the lumbermen as a class had been reflected upon in one of the talks, Mr. Whitehead defended the North Carolina lumbermen from the charge of vandalism. The average lumberman, he said, is not so ruthless as might be thought. He had found the sawmill men a great deal more conscientious than the fire vandal. The State suffers very much more from the firebug than from the acts of the lumberman.

The meeting was then adjourned, notice being given by the President of the illustrated lecture of Mr. J. G. Peters in the Auditorium at eight o'clock in the evening.

EVENING SESSION.

The evening session of the Convention was held in the Auditorium. In the absence of the President, Mr. J. S. Holmes, Secretary of the Association, introduced Mr. J. G. Peters, of the United States Forest Service, to an audience of something over two hundred people, including a considerable number of school children.

Mr. Peters then gave the following short introductory address on the general principles of forestry, which was followed by an illustrated lecture:

GENERAL PRINCIPLES OF FORESTRY.

BY J. G. PETERS, UNITED STATES FOREST SERVICE.

Members of the North Carolina Forestry Association. Ladies and Gentlemen:

The question is often asked, "What is Forestry?" which reminds me of an incident that happened soon after I arrived at New Haven to enter the Yale Forest School, something over ten years ago. Those were the early days, and the school had yet to graduate its first class. Walking across the campus I met a friend, then in college, from my home city, Baltimore. He wanted to know what I was doing up there, and I replied that I was studying forestry. "Forestry!" he exclaimed; "Forestry! for heaven's sake, what's forestry?" Although forestry is a much commoner word now than it was then,

still there is yet a generally vague idea of what forestry really is. In its broad meaning, forestry is simply the growing of trees for profit. Trees are considered as a crop of the soil, and the chief aim of forestry is to grow as much timber as possible in the shortest period of time.

In the practice of forestry a number of fundamental principles are considered. The first is that forests should eventually occupy only lands unsuited for agriculture. No forester will contend that rich soil, more profitable for growing agricultural crops, should be grown to trees. There are vast areas in forest in the South that are suited only for the production of timber; there are vast areas now in forest which will ultimately be used for agriculture; and also there are areas of cleared land that are better suited for the production of timber than for agriculture. Land should eventually be put to the use to which it is best suited. Real forest land should be kept in timber; real farming land eventually cleared. But, so long as any farming land remains forested it should be made to produce the largest possible amount of timber.

Another principle of forestry is that the amount of timber cut from a forest in a given period should not exceed the amount grown by the forest in that period; the forest is producing capital from which only the interest should be taken. Considerable cutting may be necessary for the improvement of the forest; many trees may be removed to give others a chance to grow, and low grade trees taking up valuable space may be eliminated.

Perhaps the greatest principle of forestry is that the cutting should be done in such a way that the forest will reproduce itself or, in other words, grow timber continuously.

Now, in order to practice forestry, and this is the point I wish to emphasize in particular, we must prevent the forest from burning up. Fire protection is a large part of the foundation on which the practice of forestry stands. Protection is the first law of forestry. Obviously it is unwise to make an investment in the form of conservative lumbering, or planting, or the like, if one is not reasonably sure that fire will not come along and destroy it. It has been estimated that the loss each year from forest fires in the United States averages more than 10,000,000 acres burned over and \$20,000,000 worth of property damaged or destroyed. In North Carolina the average yearly loss probably exceeds a half million dollars.

I am going to show a number of views which I have selected for the purpose chiefly of illustrating the good results from keeping fire out of the forest as compared with the great damage that may come through lack of protection. The first set of pictures will show virgin forests in North Carolina; the second set, the lumbering of the forest; third, the effects of fire and measures for prevention; fourth, the effects of erosion; and lastly, the practical application of the methods of forestry where fire and erosion have been prevented.

About seventy-five views, principally of North Carolina (furnished by the United States Forest Service), many of them colored, were then shown, and a short explanation made of each one by Mr. Peters.

This is the first illustrated lecture that has been given in Raleigh's new Auditorium, and so far as the Association is aware, is the first

public illustrated lecture on forestry given in Raleigh. The lantern used at the lecture was kindly loaned by Dr. Rankin, of the State Board of Health.

About seventy delegates were registered as in attendance on the convention, representing nineteen counties of the State, besides two delegates from Virginia. The following bodies were represented by delegates:

North Carolina State Federation of Women's Clubs, Southern Furniture Manufacturers' Association, North Carolina Farmers' Alliance, After School Club, North Carolina Pine Association, Mecklenburg Pine Beetle Association, Southern Pines Civic Club, Woman's Clubs of Raleigh and Greensboro, Chambers of Commerce of Raleigh, Greensboro, and New Bern, Norfolk and Western and Atlantic Coast Line railroads.

EXTRACTS FROM LETTERS RELATING TO FORESTRY

The following extracts from the letters of some of those who were invited to attend the Convention are here given, not only because they show the general and growing interest in the subject of forest protection, but also because they contain some valuable suggestions, and convey words of encouragement and sympathy.

Honorable H. S. Graves, Chief United States Forester, wrote:

"I appreciate very much your invitation to the annual meeting of the North Carolina Forestry Association on February 21st. I am awfully sorry that I can not accept the invitation, because it is going to be impossible for me to do more than meet the engagements which I already have ahead.

"If I were present I should call especial attention to the fact that under the present conditions the Southern States are not able to take advantage of the offer of the Government to aid in fire protection under the Weeks law. I think that this could be used as a very strong argument looking to fire protection under State direction."

Dr. Haven Metcalf, Pathologist in Charge, United States Bureau of Plant Industry, who was invited to address the Convention on the Chestnut Bark Disease, wrote:

"Your letter of the 7th was duly received, and I have given it very careful consideration. I regret very much that it is impossible for me to come myself, or send you a man for the meeting of your Association, as it seems necessary to have every one at Harrisburg who has any knowledge of the disease. I regret very much being unable to be present myself, as there is a good deal to be said on the subject of the chestnut bark disease, and I have little doubt that it will reach North Carolina by another year."

Honorable W. W. Finley, President of the Southern Railway, who was invited to address the convention on "The Close Relationship Be-

tween the State, the People, and the Railroads in the Prevention of Forest Fires," and who was prevented by sickness in his family, wrote in part as follows:

"I am, as you know, intensely interested in conservative forestry and the adoption of scientific methods of forest management throughout the South-eastern States. I believe it is of the utmost importance to our section that its forests should be so managed as to be a perpetual source of supply for raw materials for woodworking industries of all kinds. I am convinced that, with the upward tendency of lumber values, owners of forest lands will find it profitable to adopt conservative methods.

"If a suitable opportunity shall present itself during the sessions of the convention, I shall be glad to have you express my great interest in the whole subject and my regret that circumstances are such that I can not be present."

A telegram was received from the president of the John L. Roper Lumber Company as follows:

"Very much regret enforced absence from Forestry Convention. Consider your suggestion regarding fence law is of utmost importance to all land-owners as well as lumbermen. Wish you success.

(Signed) "C. I. MILLARD."

Mr. F. W. Besley, State Forester of Maryland, wrote:

"The conference at Harrisburg on February 20-21, in regard to the chestnut bark disease, which conference I have agreed to attend, will not permit me to accept your very kind invitation to address the North Carolina Forestry Association at its regular meeting in Raleigh, February 21st.

"I have often felt that here in Maryland we are very much isolated in forestry work, as the States which are showing the most interest in forestry are the Northern States, in which the forest problems are quite different from those that exist here. It is, therefore, very gratifying to know that North Carolina is taking up the work so earnestly, and I hope that Virginia may do likewise before long. This gives us a certain bond of sympathy and community of interests that can not fully exist with the Northern States, which have problems so different from those we have in the South. This will be an added disappointment in not being able to meet with you in the discussion of the problems that are of mutual interest.

"I trust, however, that you may have a very interesting and profitable meeting, and that under the stimulus of the coöperative arrangement of the Weeks law that you may develop a plan which will be of great benefit to North Carolina."

Mr. L. T. Nichols, General Manager of the Carolina and Northwestern Railway wrote:

"I wish to assure you that we are heartily in sympathy with the work and are willing to coöperate with you in any manner our limited resources will permit."

But the citizens of our own State took no less interest than those from outside. A letter from the Secretary of the State Board of Public Charities, who is also a prominent clubwoman, is here given in full because it gives a good idea of what the women of the State have done, are doing, and are willing to do for the cause of forestry education.

"I thank you for the appointment as a delegate to the annual meeting at Raleigh. I shall take pleasure in attending the sessions.

"You know that the State Federation of Women's Clubs (about three thousand women) are interested in the subject of Conservation, and that there is a Forestry Committee in that Federation. This committee consists of Mrs. W. G. Smith, chairman, Asheville; Mrs. T. P. Harrison, President of the Raleigh Woman's Club, Raleigh; Miss Adelaide Fries, Winston-Salem; Mrs. W. J. Cocke, Asheville, and Mrs. W. G. Rogers, Charlotte. Mrs. W. J. Cocke, of Asheville, is the most interested and was chairman for three years, but we have time limits in our appointments and so she was obliged to be put on as a member merely, and the time limit took me off. But we have not lost our interest, and Mrs. Cocke as chairman last year tried to get a Chair of Forestry established at the University. I have the very beautifully written resolutions passed by the Federation in favor of this chair and the report. Mrs. Cocke had letters from Governor Kitchin, Judge Clark, Senator Simmons, Hon. J. Y. Joyner, Senator Overman, Judge Pritchard, Hon. W. C. Dowd, Governor Newland, and Dr. Joseph Hyde Pratt, endorsing the movement for a Chair of Forestry. A number of papers also wrote in favor of it, and the only trouble seemed to be *funds* sufficient for the new departure. It is probable that an endorsement by the Forestry Association of this movement coming from the Federation would greatly help the ladies and would serve as a bond between the working forces in the two organizations.

"Wishing you much success.

(Signed)

DAISY DENSON."

Three of our State Senators wrote as follows:

"I thank you very much for the invitation, and if I had not already made an engagement for that date, I would most certainly be with you. I am greatly interested in the question of forestry, and while I was abroad last summer I studied the modes, ways and means of the great German Empire and her great forests and posted myself about this great question which America must very soon take up and take up in earnest.

"Trusting that your meeting will be a success in every way, I am,

"Very sincerely yours,

A. H. BOYDEN."

"I regret very much that it is impossible for me to attend the Forestry Convention which is to meet in Raleigh on the 21st, owing to court which I can not neglect. I thoroughly and deeply sympathize with the movement, and had hoped to be able to contribute some of my services to the worthy work being done in the country. With highest regards and very best wishes, I am,

"Yours truly,

J. FRANK RAY."

"I hope you will have a successful meeting which will result in a great deal of good in the protection of our forests. If there is any aid that I may be able in the future to give along this line I will be glad to do so.

"Respectfully,

J. C. FISHER."

Two prominent lawyers wrote :

"I am heartily in sympathy with this movement, as I can see where great good will result to the country by concerted action taken by the Association to check the destruction of so much forest by forest fires in this State.

(Signed) GEORGE H. SMATHERS."

"This is one of the most vital matters which affect the interest of our people. It was only a few nights ago that I saw the forest fires in the mountains near here, which was a very sickening sight.

"While I can not be personally present with you, you have my sympathy and influence, whatever it may be, and will try and meet with you on some future occasion.

(Signed) A. M. FRYE."

The Vice-President of the Southern Power Company wrote :

"I regret very much that I will not be able to attend the Forestry Association meeting at Raleigh on Wednesday, the 22d, as I have to be in New York at that time. I wish, however, every success to the organization, and I am glad to note that the people in this section here are taking a great deal more interest in this matter.

(Signed) W. S. LEE."

And one of the State's foremost educators wrote :

"I appreciate your appointment of me as a delegate. I had hoped that my engagements would allow me to attend, but I find to my regret that it will be impossible.

"With all good wishes for the success of your important work,

(Signed) WM. LOUIS POTEAT,

"President Wake Forest College."

FOREST FIRES IN NORTH CAROLINA DURING 1911

BY J. S. HOLMES, FORESTER.

INTRODUCTION

During the past three years the State Geological and Economic Survey has collected statistics on the extent of the damage done by forest fires in North Carolina. These figures for 1909, collected in coöperation with the United States Forest Service, together with a short study of the various kinds of injury done by fire, an inquiry into the common causes of fires and a few suggestions as to the best methods of preventing and extinguishing forest fires were published by the Survey as Economic Paper No. 19. The statistics for 1910 which were collected by the Survey alone, were published as Economic Paper 22, "Forest Fires and Their Prevention." This publication also contains a review of some of the educational and legislative measures which are calculated to help reduce the fire risk, the State law on the subject of forest fires which is now operative, as well as three proposed laws. A limited number of both bulletins are still available for distribution.

The figures on forest fires for 1911 have been gathered in the same way as in previous years, *i. e.*, from voluntary correspondents. Many of the earlier correspondents have dropped out, while others have been added to the list. The valuable assistance rendered by the North Carolina Forestry Association, which furnished complete lists of correspondents for about one-fourth of the counties of the State, has added considerably to the accuracy of the figures, though until such lists can be obtained for every county no attempt at completeness can be claimed for these statistics.

The object in collecting and publishing these figures is not to give exact information on the subject, as under present conditions that is impossible, but to draw the attention of the general public to the extent of the damage done by forest fires, with the hope of gradually bringing about better conditions.

THE WEATHER

As the weather is one of the chief factors in the fire risk, a glance at weather conditions during 1911 is here given.

The United States Weather Bureau thus summarizes conditions for the past year:

"The year was an exceptional one in temperature and precipitation. A number of records were broken. The average annual precipitation, 42.68

inches, was less than any previous record; a peculiar coincidence in this connection is the fact that the four driest years of record have been at intervals of seven years, viz: 1890, 1897, 1904, and 1911. * * * There was a marked deficiency in precipitation from January to October 10th, with the exception of a very slight excess in April and August, but it was somewhat above normal during the remainder of the year. During the summer and early fall the water supply was affected in some localities, but the distribution of precipitation, in slight showers, was generally sufficient for surface requirements."

These well distributed showers also served to assist in keeping down the damage done by forest fires, which, gauged by precipitation alone, should have been more disastrous in 1911 than ever before. As a matter of fact, many counties, especially in eastern North Carolina, did suffer very seriously, the newspapers reporting excessive damage in March, April, June, and July. Unfortunately, figures from many of the counties which have suffered the most in eastern North Carolina have not been secured, so that the statement for this year is decidedly incomplete.

TABULAR STATEMENT

From the following tables it will be seen that the returns have been very incomplete, only one-third of the townships being reported on in any way. The remaining townships have no doubt men in them who would be willing to assist in this effort to educate the public towards better treatment of our forests, but they have not offered to help and their names have not been suggested by friends of the movement.

If this is read by any who would be willing to help, it is hoped that they will notify the Forester, North Carolina Geological and Economic Survey, Chapel Hill, N. C., who will be only too glad to secure their coöperation in the future.

TABLE 1.—FOREST FIRES IN NORTH CAROLINA DURING 1911. COMPARATIVE STATEMENT. SUMMARY OF REPORTS FROM CORRESPONDENTS BY REGIONS, FOR 1911, 1910, AND 1909.

	Mountain			Piedmont			Coastal Plain			State		
	1911	1910	1909	1911	1910	1909	1911	1910	1909	1911	1910	1909
	Total number of townships in region.....	166	166	---	450	450	---	364	364	---	980	980
Number of townships reporting.....	59	51	---	161	146	---	112	131	---	332	328	---
Number of replies received.....	70	48	47	179	142	61	119	131	50	367	321	158
Number of forest fires reported.....	189	136	249	249	258	86	199	312	272	637	706	607
Total area burnt over, in acres.....	41,100	89,825	166,295	32,424	158,948	100,070	86,725	339,780	139,100	160,225	579,553	406,065
Total standing timber destroyed in M ft. bd. measure.....	10,639	6,915	17,325	4,496	12,553	11,027	23,418	42,550	9,280	38,550	62,018	37,632
Value of timber destroyed in dollars.....	\$ 36,440	\$ 25,095	\$ 47,520	\$ 12,997	\$ 35,930	\$ 33,374	\$ 64,021	\$108,995	\$ 26,360	\$114,000	\$170,020	\$ 107,254
Area of young growth destroyed, in acres.....	7,252	7,190	13,100	16,623	55,712	14,555	40,190	78,735	27,050	64,065	141,637	54,705
Value of young growth destroyed, in dollars.....	\$ 12,380	---	---	\$ 20,325	---	---	\$ 78,250	---	---	\$110,955	---	---
Value of forest products destroyed, in dollars.....	\$ 44,680	\$ 28,215	\$ 17,075	\$ 41,045	\$100,415	\$ 39,425	\$ 90,233	\$129,545	\$ 30,245	\$175,955	\$258,175	\$ 86,745
Value of improvements destroyed, in dollars.....	\$ 10,440	\$ 19,375	\$ 26,550	\$ 16,120	\$ 25,615	\$ 14,750	\$ 21,200	\$ 53,865	\$ 17,165	\$ 47,730	\$ 98,795	\$ 58,405
Total damage reported, in dollars.....	\$103,910	\$ 72,685	\$ 91,145	\$ 90,490	\$161,960	\$ 87,549	\$254,300	\$292,345	\$ 73,710	\$448,700	\$526,960	\$ 252,404
Number of lives lost.....	---	1	---	---	1	---	1	3	---	---	5	---
Cost to private individuals to fight fire.....	\$ 1,965	\$ 13,155	\$ 6,650	\$ 2,327	\$ 10,303	\$ 1,059	\$ 6,790	\$ 11,780	\$ 6,355	\$ 10,780	\$ 35,438	\$ 14,064

TABLE 2.—FOREST FIRES IN NORTH CAROLINA DURING 1911. SUMMARY OF REPORTS FROM CORRESPONDENTS BY COUNTIES.

MOUNTAIN REGION.

COUNTY.	Total No. of Townships in County	No. of Townships Reporting	No. of Replies	No. of Fires.	Total area burnt over	Merchantable Timber Destroyed, M	Value of Timber Destroyed	Area of Young Growth Destroyed, in Acres	Value of Young Growth Destroyed	Value of Products Destroyed	Value of Improvements Destroyed	Lives Lost	Cost of Fighting Fire
Alleghany.....	8	1	2	10	100	50	\$ 200	50	\$ 200	\$ 400	\$ 500		\$ 50
Ashe.....	15	1	1	0									
Avery.....	7	2	3	2	300	500	500	200	200	400	2,000		
Buncombe.....	13	5	5	10	1,300	30	120	400	50	200	200		100
Cherokee.....	6	3	5	93	5,800	50	75	1,100	100	1,175	50		110
Clay.....	5	2	2	2	1,000	40	60	200	400	1,000	100		150
Graham.....	3	1	1	0									
Haywood.....	13	4	4	7	3,750	30	120	150	1,300	1,500	150		150
Henderson.....	8	3	3	3	200								5
Jackson.....	15	3	2	13	3,200	30	150	200	100			25	50
Macon.....	11	3	3	4	2,200								
Madison.....	16	13	14	17	10,450	7,784	24,590	3,550	4,200	35,185	6,175		510
Mitchell.....	9	5	5	6	300			150	200				100
Swain.....	5	2	3	3	10,000	2,000	10,000	1,000	5,000	4,000	1,000		500
Transylvania.....	9	3	3	3	50			2	30				10
Watauga.....	12	2	4	0									
Yancey.....	11	6	10	16	2,450	125	625	250	600	820	210		230
Total.....	166	59	70	189	41,100	10,639	\$36,440	7,252	\$12,380	\$44,680	\$10,410		\$1,965

TABLE 3.—FOREST FIRES IN NORTH CAROLINA DURING 1911. SUMMARY OF REPORTS FROM CORRESPONDENTS BY COUNTIES.

PIEDMONT REGION.

COUNTY.	Total No. of Townships in County	No. of Townships Reporting	No. of Replies	No. of Fires	Total area burnt over	Merchandise Timber Destroyed, M	Value of Timber Destroyed	Area of Young Growth Destroyed, in Acres	Value of Young Growth Destroyed	Value of Products Destroyed	Value of Improvements Destroyed	Lives Lost	Cost of Fighting Fire
Alamance.....	13	3	3	0			\$		\$	\$	\$		\$
Alexander.....	8	5	5	2	120	5	15	120	1,100	300			70
Anson.....	8		0										
Burke.....	11	1	1	0									
Cabarrus.....	12	4	7	2	200	50	200	100	50	500	100		40
Caldwell.....	12	3	1	0									
Caswell.....	9	3	3	0									
Catawba.....	8	6	8	1	35	25	30	10	50				
Chatham.....	14	4	3	4	145	100	200	20					
Cleveland.....	11	10	13	7	190	375	1,225	50	600	1,500	5,000		
Davidson.....	17	1	1	1	2					2,000			
Davie.....	7	6	10	4	115		100	25		200			
Durham.....	6	1	1	1	200								
Forsyth.....	14	3	3	1		35				420	1,000		
Franklin.....	10	6	6	91	1,585		300	900	2,100		5,050		525
Gaston.....	6	2	3	2	600								
Granville.....	9	5	7	4	200	100	500	100	500	1,500			
Guilford.....	18	2	2	0									
Iredell.....	16	4	4	10	795	166	517	360	1,425	25,800	1,000		200
Lee.....	7	4	3	4	525	320	1,000	310	3,050	200	1,000		225
Lincoln.....	5	3	3	0									
McDowell.....	10	3	4	7	225	50	200	10	100	100			
Mecklenburg.....	15	7	8	2	3			3	75				
Montgomery.....	11	3	3	1	500	15	75	100	100	425	20		5
Moore.....	9	3	3	8	10,000			10,000					10
Orange.....	7	1	2	3	5						50		2
Person.....	9	2	2	0									
Polk.....	6	6	5	42	7,500			500	500				50
Randolph.....	19	4	3	2	2,000	2,000	4,000	1,500	3,000				200
Rockingham.....	11	2	2	0									
Rowan.....	14	7	8	5	410			200	2,000				50
Rutherford.....	12	5	2	0									
Stanly.....	8	2	2	5	306	150	300	150	1,025	2,500	1,000		
Stokes.....	8	2	2	1	500		2,000			2,000			
Surry.....	14	9	13	9	3,063	555	660	50	50		1,000		205
Union.....	9	1	1	0									
Vance.....	8	2	2	0									
Wake.....	19	1	1	3	150			100	500				
Warren.....	12	2	2	2	200	50	175	100	200	600			25
Wilkes.....	20	15	17	19	2,750	500	1,500	1,840	3,300	3,000	600		700
Yadkin.....	8	8	10	6	100			75	500		300		
Total.....	450	161	179	249	32,424	4,496	\$12,997	16,623	\$20,325	\$41,045	\$16,120		\$2,327

TABLE 4.—FOREST FIRES IN NORTH CAROLINA DURING 1911. SUMMARY OF REPORTS FROM CORRESPONDENTS BY COUNTIES.

COASTAL PLAIN REGION.

COUNTY.	Total No. of Townships in County	No. of Townships Reporting	No. of Replies	No. of Fires	Total area burnt over	Merchantable Timber Destroyed, M	Value of Timber Destroyed	Area of Young Growth Destroyed, in Acres	Value of Young Growth Destroyed	Value of Products Destroyed	Value of Improvements Destroyed	Lives Lost	Cost of Fighting Fire
Beaufort.....	6	2	2	15	11,000	1,000	\$ 3,000	11,000	\$34,000	\$ 1,000	\$ 5,000		\$ 250
Bertie.....	9	5	6	5	850	110	300	325	650	500	550		110
Bladen.....	15	3	3	13	5,400	2,700	5,000	6,350	11,150	5,000	500		
Brunswick.....	6	4	3	11	8,500	5,025	22,050	7,500	10,000	25,000	200		325
Camden.....	3		0										
Carteret.....	9		0										
Chowan.....	4	3	2	2	100	0		100	1,000				25
Columbus.....	14	3	5	5	1,200	300	900	1,200	2,200	1,350	1,000		1,000
Craven.....	9	2	5	2	300	150	600						50
Cumberland.....	11	4	4	8	510					3,000			65
Currituck.....	5	3	3	0									
Dare.....	5		0										
Duplin.....	13	5	2	10	1,500	600	1,300	1,300	800	1,300	500		150
Edgecombe.....	14	1	1	0									
Gates.....	7	1	2	15	2,000	0		1,500		2,000			300
Greene.....	10	2	2	4	1,000	20	100	500	5,000	15,000			100
Halifax.....	12		0										
Harnett.....	13	6	7	8	3,000	75	225	50	200	1,000			50
Hertford.....	6	2	3	8	700	300	1,200	200	200	2,000	550		225
Hoke.....	5	1	1	0									
Hyde.....	4	2	3	2	2,000	100	250	1,100	1,000		500		
Johnston.....	16	10	9	8	500	2,500	4,890	575	900	2,000	3,000		1,000
Jones.....	7	1	1	1	5,000	50	100			100			
Lenoir.....	12	4	4	6	2,150	100	300	150	1,500	5,000			500
Martin.....	10		0										
Nash.....	12	8	8	8	645	70	300	505	425		50		
New Hanover.....	4		0										
Northampton.....	9	3	4	4	5,010	2,500	5,000	10	100		50		110
Onslow.....	5	3	3	14	10,000	630	800	3,200	900	75	475		350
Pamlico.....	4	3	2	2	5,000	250	500	2,500	500	2,000	200		500
Pasquotank.....	6	2	2	0									
Pender.....	10	1	1	1	9,000	1,500	4,500					1	
Perquimans.....	5	1	2	0									
Pitt.....	11	4	6	15	2,325	1,120	3,250	525	1,625	16,700	1,200		750
Richmond.....	7	1	1	4	500					500	5,000		500
Robeson.....	19	8	7	19	5,425	4,090	9,160	3,400	6,100	4,500	1,225		105
Sampson.....	16	4	4	3	900	8	16			1,008			25
Scotland.....	4	1	1	0									
Tyrrell.....	5		0										
Washington.....	4	1	2	1	2,000								300
Wayne.....	12	4	4	2									
Wilson.....	10	4	4	3	210	220	880	200		1,200	1,200		
Total.....	364	112	119	199	86,725	23,418	\$64,621	42,190	\$78,250	\$90,233	\$21,200	1	\$6,790

FOREST FIRES AND THEIR PREVENTION.
 TABLE 5.—COMPARATIVE STATEMENT OF AVERAGES BY REGIONS FOR 1911, 1910 AND 1909.

	Mountain			Piedmont			Coastal Plain			State		
	1911	1910	1909	1911	1910	1909	1911	1910	1909	1911	1910	1909
	Percentage of townships reporting.....	35	31	-----	36	32	-----	30	36	-----	335	335
Average area of each fire, in acres.....	217	594	668	130	616	1,171	436	1,089	511	250	821	667
Average damage by each fire, in dollars.....	\$ 5.50	\$ 6.31	\$ 3.93	\$ 3.63	\$ 6.68	\$10.30	\$12.78	\$ 9.74	\$ 2.94	\$ 7.05	\$ 7.75	\$ 4.39
Average area burnt over per township reporting, in acres.....	697	1,585	-----	201	1,089	-----	774	2,594	-----	483	1,805	-----
Average damage per acre burnt, in dollars.....	\$ 2.53	\$ 1.06	\$.59	\$ 2.79	\$ 1.08	\$.88	\$ 2.33	\$.90	\$.57	\$ 2.30	\$.97	\$.66

From the foregoing tables it is seen that the number of fires reported is practically the same as for the two previous years, and most of the other figures correspond fairly closely, showing that the annual damage from forest fires is not decreasing at any appreciable rate. The most notable thing about these figures is the reduction in the amount of land burned over by each fire, and, consequently, the large total reduction in area burned over, this being less than one-third of what was burned in 1910.

The total amount of damage done by the fires that were reported is estimated at \$428,000, which is less than the damage for 1910, but considerably more than that given for 1909. The average damage per acre has largely increased, being \$2.80 for the whole State. One reason for this large increase is that the figures for 1911 include estimates of damage done to young growth, which were not included in the earlier figures.

One remarkable thing about these figures is the comparative uniformity of the reports coming from the different regions of the State, showing that they are not the result of exaggerated ideas of a few correspondents, but represent the opinion of the average citizen of North Carolina.

Though some sections of the State were singularly free from fires during the past year, others suffered extreme injury. This is especially true of some of the eastern counties, several of which have unfortunately failed to report. The accounts of fires, appearing in the daily papers last summer, which occurred in Carteret, Dare, Pasquotank, Perquimans, Tyrrell and other counties, none of which are reported here, makes one realize that the figures given are much below the actual amount, and convinces one that strong measures should be taken at once to reduce this enormous annual loss.

CAUSES OF FOREST FIRES

The principal causes of forest fires as given by the various correspondents for their own townships have been compiled. They are given in percentages in Table 6, and are compared with similar figures for the two preceding years.

TABLE 6.—CAUSES OF FOREST FIRES IN THE DIFFERENT REGIONS OF NORTH CAROLINA IN 1911 COMPARED WITH FORMER YEARS, IN PERCENTAGES.

	1911				1910	1909
	Mountain	Piedmont	Coastal	State	State	State
Farmers burning brush, grass, rubbish, etc.....	17	16	9	13	13	10
Hunters.....	17	6	10	10	6	16
Cigars, cigarettes, matches, etc.....		4	4	3	3	3
Carelessness and negligence of individuals.....	16	25	20	20	20	15
Railroad locomotives, sparks from.....	10	19	31	22	20	17
Logging locomotives, dummy engines, etc.....	7	6	13	9	9	5
Sawmills, etc.....	3	8	3	4	5	3
Traction engines.....					1	
Accidental, caught from burning buildings, etc.....					1	1
To improve the range.....	3	2		2	3	4
Set by chestnut gatherers, root diggers, etc.....	7			2		2
Without much object, to see it burn, etc.....	3			1	2	13
Malice or incendiary.....	10	2	3	4	9	4
Unknown causes.....	7	8	3	6	8	7
Lightning.....		4	3	3		
Fishing camp fires.....			1	1		

The two most notable facts that can be gathered from the above table are: (1) The large proportion of fires which are started from farmers carelessly burning brush, grass, and rubbish in the spring; (2) the large and increasing percentage of fires started by railroads.

As can be seen by a glance at the first four items in the table, fires caused by carelessness and negligence of the individual constitute about one-half of the total causes given. Practically all of the fires under the fourth heading should be attributed to one of the three former causes and probably most of them to the carelessness of farmers in clearing up farm land in the spring. It is this carelessness of farmers and renters, assisted by the usual high winds and frequently by dry weather, that makes the spring months by far the most dangerous, fires at this time of the year being more frequent and much more destructive than at any other season.

The following table, compiled from replies from the correspondents to the question "In what month or months did the worst forest fires occur

(in 1911)?" indicates pretty clearly what is the danger season in North Carolina.

TABLE 7. RELATIVE FIRE RISK IN 1911, BY MONTHS AND SEASONS, IN PERCENTAGES.

March	14	} Spring	57	June	9	} Summer	26
April	27		July	10			
May	16		August	7			
September	7	} Fall	14	December	2	} Winter	3
October	4		January	0.5			
November	3		February	0.5			

The largest number of fires attributed to any one cause are laid to sparks from railroad locomotives, twenty-two per cent being attributed to this cause, an increase of two per cent over the year 1910, and of five per cent over the year 1909. This increased proportion is still greater if the logging railroads are included. Forty-four per cent of all the fires in the Coastal Plain region are attributed to locomotives, while in the mountain counties this number is reduced one-half. The great increase of the proportion of railroad fires may be due rather to the reduction of the number of fires from other causes than to the actual increase in the number of fires from this cause. It is evident, however, that the railroads are a great menace to the forests of the State, and a determined effort both on the part of the people and on the part of the railroads should be made to remedy this evil. A suggested law for the suppression of forest fires which is reprinted from Economic Paper No. 22 is given herewith, with the hope that the intelligent public will study this matter, and will call the attention of their next representatives in the General Assembly to their need of such laws. The protection of the forests from fire depends first of all upon the people. If they want to stop the frequent and destructive fires, the State Government will help them; that is what it is for. But they must show in some way that they desire such assistance, and they can do that best by appealing to their representatives.

SUGGESTED FORESTRY LEGISLATION

The following chapter was prepared for and published in Economic Paper No. 22, "Forest Fires and Their Prevention." This bulletin has been distributed so widely over the State that the original edition is nearly exhausted.

As the question of Forest Fire laws will no doubt occupy the attention of many people during the coming political campaign and subsequently, it is hoped, of the entire Legislature also, it has been thought best to publish the part of this paper relating to present proposed forest fire laws as a part of Economic Paper 25 rather than reprint the whole of Economic Paper 22, much of which is superseded by the report on forest fires for 1911 which is included in this present bulletin.

The proposed laws are given not as legislation which must be adopted or rejected as a whole, but rather as suggestions to aid in the formation of public opinion, and possibly as a basis from which to build a much needed law which may be adapted to all portions of our State. It may be said of the railroad law, however, that it was highly commended by the Federal Forest Service, and during the session of the last Legislature it firmly withstood the criticisms of the more important railroads of the State.

PRESENT LAWS RELATING TO FORESTRY

In 1777 the General Assembly of North Carolina passed a statute making it unlawful for any one to set fire to the woods, except it be his own property, and in that case not without first giving two days notice in writing to adjoining property owners. After one hundred and thirty-four years this law still remains on our statute books, the best and practically the only law we have on the subject. In its present form in The Revisal of 1905 it reads:

SECTION 3346. *Woods*.—If any person shall set fire to any woods, except it be his own property or, in that case, without first giving notice in writing to all persons owning lands adjoining to the woodlands intended to be fired, at least two days before the time of firing such woods, and also taking effectual care to extinguish such fire before it shall reach any vacant or patented lands near to or adjoining the lands so fired, he shall, for every such offense, forfeit and pay to any person who shall sue for the same, fifty dollars, and be liable to any one injured in an action, and shall moreover be guilty of a misdemeanor.

The law, therefore, forbids setting fire to woods, even though it be one's own property, without giving two days notice in writing to adjoining land-owners. This law is rarely enforced, because the "two days notice in writing" is considered an impractical measure, and also because the strong objection among most people to prosecuting their neighbors acts as a deterrent. One of the most frequent causes of fire, that from burning brush while clearing up new grounds in the spring, is not covered by this law, for the courts have held that these "new ground" fires do not come within the stat-

ute. This law is susceptible of considerable improvement and should be amended.

Since the great extension of railroad facilities all over the State, the practice of hauling farm crops and merchandise long distances to market, which used to be the universal custom, has almost ceased. In the rougher and more remote parts of the State, however, where more than one day's trip is required to reach the market, the abandoned campfire is still a menace. That North Carolina has a law against leaving such fires unextinguished is often not known by wagoners, and a notice quoting the following section posted near frequented camping places would often be of great advantage to the passerby, as well as a safeguard to the property owner:

3347. *Woods, from Camp Fires.*—If any wagoner or other person encamping in the open air shall leave his camp without totally extinguishing the camp fires, he shall be guilty of a misdemeanor, and upon conviction thereof, shall be fined not exceeding fifty dollars, or imprisoned not exceeding thirty days.

These two laws, the most important dating back some one hundred and thirty years, constitute the present working forest fire laws of North Carolina. Even these, however, are rarely enforced.

SUGGESTED LEGISLATION RELATING TO FORESTRY

As we have previously seen, the largest number of fires are due to the carelessness or indifference of individuals, and to the negligence of railroads, lumbermen, and other operators of engines. In order to successfully cope with this situation, we need: (1) Better laws to control the private citizen; (2) stricter regulations controlling the railroad and other engine users; (3) a system maintained by the State, or the State and counties together, to properly enforce the forest fire laws. These three features may be combined in one act, as was done in the bill which was introduced into the last Legislature, or they may be passed as three separate acts, as is here proposed.

Fires Set by Private Individuals.—The present law, which has previously been given, should be amended to include grassland, but the two days written notice required should apply to woods only, or should be eliminated altogether. By broadening the second section to make it include hunters and other persons, some approach to controlling that fertile source of forest fires would be made.

In New Jersey and several other States to the north and west of us, the burning of woods, brush, stumps, rubbish, and other material is not allowed during a dry season, and in some cases throughout the year, without a written permit from the proper officer. This has been found to work well in preventing fires, especially the destructive early spring fires. In North Carolina, however, we are hardly ready for such a law. A law to compel all who burn material to watch it till it is extinguished would seem to meet a definite need and would be more easily enforced.

The following suggested bill contains all of the above features:

A BILL TO BE ENTITLED AN ACT TO PROTECT THE FORESTS OF THIS STATE FROM FIRE.

The General Assembly of North Carolina do enact:

SECTION 1. That section three thousand three hundred and forty-six of The Revisal of one thousand nine hundred and five be amended to read as follows:

If any person shall set fire to any grassland, brushland, or woodland, except it be his own property, or, in that case, without first giving notice to all persons owning or in charge of lands adjoining to the land intended to be fired, and also taking care to watch such fire while burning and taking effectual care to extinguish such fire before it shall reach any lands near to or adjoining the land so fired, he shall for every such offense be guilty of a misdemeanor and be fined or imprisoned in the discretion of the court. This shall not prevent action for damages sustained by the owner of any property.

SEC. 2. That section three thousand three hundred and forty-seven of The Revisal of one thousand nine hundred and five be amended to read as follows: Any wagoner, hunter, camper or other person who shall leave a campfire without fully extinguishing it, or who shall accidentally or negligently, by the use of any torch, gun, match or other instrumentality, or in any manner whatever, start any fire upon any grassland, brushland or woodland, without fully extinguishing the same, shall be guilty of a misdemeanor, and upon conviction shall be punishable by a fine of not less than twenty-five dollars nor more than fifty dollars or imprisoned not exceeding thirty days.

SEC. 3. All persons, firms or corporations who shall burn any tar kiln or pit of charcoal or set fire to or burn any brush, grass or other material whereby any property may be endangered or destroyed, shall keep and maintain a careful and competent watchman in charge of said kiln, pit, brush or other material while burning. Any person, firm or corporation violating the provisions of this section shall be guilty of a misdemeanor.

Railroad Fires.—The railroads and lumber companies, though great offenders, having caused probably one-third of the fires in the State in 1910, are also great sufferers, being generally held responsible for injury and made to pay damages. A few of the replies to the question asking about prosecutions are here quoted: "Railroad paid for several acres of timber"; "Railroad compromised, nothing done about the rest"; "No; the railroad people always pay damage"; "The railroad has paid about \$1,000"; "No; railroad company paid about \$2,000"; "The railroad company goes over the ground and sees how much it burns over, and pays about thirty-five cents per acre"; "Set by traction engine, and damage paid"; "Lumber company sued for \$5,000"; "Lumber company forced to pay damages"; "Suit entered against one lumber company." These prosecutions are, of course, as said before, brought under the civil law, and do not invoke the present fire laws. They do, however, show that it is as much to the interest of the railroads as to that of the owners of woodland that fires should be prevented. Until there is some general demand, however, that the railroads take necessary precautions, they prefer to drift along in the old way, paying damages now and then—the average cost of which they know—rather than advocate new laws, which, though they might save them money, still would cost them an unknown amount to carry out. When reasonable laws are once passed the railroads will undoubtedly coöperate actively in their enforcement, trusting thereby to cut down their large annual bill of damages.

During the last session of the Legislature the following bill was drawn up, after careful discussion and criticism of every point by the representatives of the people and of the railroad and lumber companies. It was at first introduced as part of the general forestry bill, but was later drawn up as a separate law. It is in this form that its passage by the next Legislature is strongly urged.

A BILL TO BE ENTITLED AN ACT TO REQUIRE THE RAILROADS OF THE STATE TO TAKE CERTAIN PRECAUTIONS FOR THE PREVENTION OF FOREST FIRES.

The General Assembly of North Carolina do enact:

SECTION 1. All persons, firms or corporations operating any railroad, logging road or tramroad through woodland within this State shall keep their right of way cleared of all combustible materials within a horizontal distance of one hundred (100) feet, nowhere to exceed one hundred and fifty (150) feet surface measurement, from the outer rail on each side of the track, by burning or other method. Combustible material, as referred to in this act, shall be construed to mean only such brush, grass, leaves or other material that would ordinarily become ignited from a spark from the engine. When the right of way owned does not extend to the width of the cleared space or fire line herein required, the right is hereby granted to said persons, firms or corporations to enter upon adjoining lands not owned by them, for the purpose of clearing off and maintaining the cleared space or fire line herein required. If any landowner should object to the clearing off and maintenance of the fire line herein required, he shall not be entitled to collect any damages thereafter occurring from fires caused by sparks from the engines of said persons, firms or corporations. Each railroad, logging road or tramroad affected hereby shall be required to clear off each year not more than one-fifth (1-5) of the total length of the fire line required by this section until all has been completed, and shall continue to keep such fire line clear after it has once been cleared off. The part of the mileage to be cleared off by such railroad shall be designated by the Geological Board after conference with the proper officer of such railroad, logging road or tramroad. Any railroad wilfully violating the provisions of this section shall be liable to a penalty of not less than ten (\$10.00) dollars nor more than twenty-five (\$25.00) dollars for every mile or fraction thereof of fire line not cleared according to the provisions of this section: *Provided*, that this section shall not be construed to prohibit or prevent any railroad company from piling or keeping upon the right of way, crossties or other material necessary in the operation or maintenance of such railroad or materials intended for shipment over such railroad; nor is it intended to require the removal of buildings, fences or other necessary or valuable improvements from the fire line herein required: *Provided further*, that the notice to the adjoining landowners required by section three thousand three hundred and forty-six of The Revisal of one thousand nine hundred and five shall not apply to any burning necessary to carry out the provisions of this section: *Provided, further*, that nothing in this section shall be construed to require the railroad company to clear the fire line on property not owned by said company should the owner object, and no failure on this account shall be charged against the railroad company as a violation of this act.

SEC. 2. When engineers, conductors or trainmen employed by any railroad discover that fences or other material along the right of way or woodland adjacent to the railroad are burning or in danger from fire, they shall report the same promptly at the next telegraph or telephone station at which the train is scheduled to stop, or at any other stops necessary in the operation of the train. The reporting of such fires shall not be construed to mean that the railroad companies making such report are responsible for such fires, nor shall such report be used in evidence in a suit arising from such fire, but is simply for the purpose of giving information as to the existence of a fire. In seasons of drought the railroad companies shall give instructions to their section foremen for the prevention and prompt extinguishing of fires originating on their right of way, and they shall cause warning placards, furnished by the Geological Board, to be posted at their stations in the vicinity of forest lands. Any railroad company wilfully violating the requirements of this section shall be guilty of a misdemeanor, and railroad employees wilfully violating the requirements of this section shall be guilty of a misdemeanor.

SEC. 3. For the purpose of this act woodland is taken to include all forest areas, both timber land and cut-over land, and all second growth stands on areas that have at one time been cultivated.

This law requires the railroads to clear off a strip one hundred feet wide on each side of their track, where it runs through woodland. It has been demonstrated after careful study that most of the live sparks from railroad locomotives fall within the zone between fifty and one hundred feet on each side of the track, and very few fall beyond that distance. Keeping this strip clear would then prevent most of the fires caused by railroads and logging roads, which, as we have seen above, constitute about one-third of the fires in the State.

Fire Warden System.—The most important problem in the formulation of forest laws is providing effective machinery for putting them into force. Eighteen States have already organized fire protective systems, the purpose of which is to enforce the forest fire laws of these States. Little or nothing has been accomplished in States without such systems, though several, like our own, have some excellent laws. A fire warden system generally consists of district, township, or county wardens, who, as a rule, are responsible to some one State official, either the State Forester, the State Forest Commissioner, or State Fire Warden, who is specifically charged with fire-protective work and usually also with the forestry work of the State. It is the duty of the wardens to extinguish fires, arrest offenders against the fire laws, investigate the causes of fires, post warning notices against fire, and in some cases to patrol the forests during dry weather. They are paid by the State, or by the county, or by the State and county combined, usually by the hour or day, for the time actually employed. In fixing a rate of payment, care is taken not to make it high enough to tempt unscrupulous men to set fire to the woods with the object of drawing pay for extinguishing it. This practice may, of course, be occasionally resorted to, even where the pay is not high, but an efficient county fire warden would soon discover the perpetrators, or at least have his suspicions aroused, and one or two drastic sentences, upon conviction, would put a stop to the practice. There are many counties in North Carolina where fire wardens are not needed, but in counties having fifty per cent and over of their area in woodland they would quickly pay for their cost. If only a few counties were given the advantage of such a law to start with, the demand for fire wardens would rapidly spread, as their usefulness became apparent. The following bill, in a somewhat different form, was introduced into the Legislature of 1911, but failed to pass, chiefly because a special tax of half a cent per acre on all woodlands in the State was asked, to provide revenue for its enforcement. This method of raising the necessary money is perfectly fair and equitable, but until the system can be inaugurated and tested in those counties that most need fire protection, it is thought that a direct appropriation would be much simpler and more practicable.

A BILL TO BE ENTITLED AN ACT TO AUTHORIZE THE APPOINTMENT AND PAYMENT OF FOREST WARDENS.

The General Assembly of North Carolina do enact:

SECTION 1. On petition of four or more owners of timber lands in any one township, owning in the aggregate five thousand acres or more, or the owners of one-third of the forest land in the township, the county commissioners shall appoint, subject to the approval of the Geological Board, a forest warden for that township and as many deputy forest wardens to act with him as the Geological Board may deem necessary for the proper enforcement of this act. All forest wardens and deputy forest wardens must be legal residents of the counties in which they are employed.

SEC. 2. Forest wardens and deputy forest wardens shall have charge of measures for controlling forest fires; they shall make arrests for violations of the forest laws; shall post along highways and in other conspicuous places copies of the forest fire laws and warnings against fires, which shall be supplied by the Geological Board; and they shall perform such other duties as shall be considered necessary by the Geological Board for the protection of forests. The forest wardens of the township in which a fire occurs shall within ten days make such report thereof to the Geological Board as may be prescribed by them. Each deputy forest warden shall promptly report to wardens any fire in his district.

SEC. 3. Any person who shall maliciously or wilfully destroy, deface, remove or disfigure any sign, poster or warning notice, posted by order of the Geological Board under the provisions of this or other act for the purpose of protecting the forests in this State from fire, shall be guilty of a misdemeanor and upon conviction shall be punishable by a fine of not less than ten dollars or more than fifty dollars or imprisoned not exceeding thirty days.

SEC. 4. Any person discovering any forest fire shall immediately give notice to the nearest forest warden or deputy forest warden in that or adjoining townships. All ablebodied male persons between eighteen and forty-five years of age can be summoned by forest wardens or deputy forest wardens to assist in extinguishing forest fires and shall be paid for such services at a rate not to exceed fifteen (15) cents per hour. Any person summoned by a forest warden or his deputy and not attending, without reasonable excuse, shall be subject to a fine of five (\$5) dollars.

SEC. 5. Forest wardens and deputy forest wardens shall have the same power as deputy sheriffs, so far as the provisions of this act are concerned. Neither forest wardens nor their deputies shall be liable for trespass while acting in the performance of their duties, nor shall any person be held guilty of trespass for going on lands when summoned by an officer to control fire.

SEC. 6. Forest wardens and deputy forest wardens shall receive compensation from the State at the rate of twenty cents per hour for the time actually engaged in the performance of their duties and reasonable expenses for equipment and transportation incurred in fighting or extinguishing any fire, according to an itemized statement to be rendered the Geological Board every month and approved by them. Forest wardens shall render to the Geological Board a statement of the services rendered by the men employed by them or their deputy wardens, as provided in this act, within one month of the date of service, which said bill shall show in detail the amount and character of the service performed, the exact duration thereof, the name of each person employed, and any other information required by the Geological Board. If said bill be duly approved, it shall be paid by direction of the Geological Board out of the State Treasury; and the State Treasurer is hereby authorized and required to collect one-half of the wages and expenses incurred by the forest wardens and deputy forest wardens under this section and section three (3) of this act, from the county in which they are incurred.

SEC. 7. The sum of ten thousand dollars annually is hereby appropriated, out of any moneys in the treasury not otherwise appropriated, for the purpose of carrying out the provisions of this act, the same to be drawn upon as directed by the Geological Board.

PUBLICATIONS
OF THE
NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY

BULLETINS.

1. Iron Ores of North Carolina, by Henry B. C. Nitze, 1893. 8°, 239 pp., 20 pl., and map. *Out of print.*
2. Building and Ornamental Stones in North Carolina, by T. L. Watson and F. B. Laney in collaboration with George P. Merrill, 1906. 8°, 283 pp., 32 pl., 2 figs. *Postage 25 cents. Cloth-bound copy 30 cents extra.*
3. Gold Deposits in North Carolina, by Henry B. C. Nitze and George B. Hanna, 1896. 8°, 196 pp., 14 pl., and map. *Out of print.*
4. Road Material and Road Construction in North Carolina, by J. A. Holmes and William Cain, 1893. 8°, 88 pp. *Out of print.*
5. The Forests, Forest Lands, and Forest Products of Eastern North Carolina, by W. W. Ashe, 1894. 8°, 128 pp., 5 pl. *Postage 5 cents.*
6. The Timber Trees of North Carolina, by Gifford Pinchot and W. W. Ashe, 1897. 8°, 227 pp., 22 pl. *Postage 10 cents.*
7. Forest Fires: Their Destructive Work, Causes and Prevention, by W. W. Ashe, 1895. 8°, 66 pp., 1 pl. *Postage 5 cents.*
8. Waterpowers in North Carolina, by George F. Swain, Joseph A. Holmes, and E. W. Myers, 1899. 8°, 362 pp., 16 pl. *Postage 16 cents.*
9. Monazite and Monazite Deposits in North Carolina, by Henry B. C. Nitze, 1895. 8°, 47 pp., 5 pl. *Postage ¼ cents.*
10. Gold Mining in North Carolina and Other Appalachian States, by Henry B. C. Nitze and A. J. Wilkins, 1897. 8°, 164 pp., 10 pl. *Out of print.*
11. Corundum and the Basic Magnesium Rocks of Western North Carolina, by J. Volney Lewis, 1895. 8°, 107 pp., 6 pl. *Postage ¼ cents.*
12. History of the Gems Found in North Carolina, by George Frederick Kunz, 1907. 8°, 60 pp., 15 pl. *Postage 8 cents. Cloth-bound copy 30 cents extra.*
13. Clay Deposits and Clay Industries in North Carolina, by Heinrich Ries, 1897. 8°, 157 pp., 12 pl. *Postage 10 cents.*
14. The Cultivation of the Diamond-back Terrapin, by R. E. Coker, 1906. 8°, 67 pp., 23 pl., 2 figs. *Postage 6 cents.*
15. Experiments in Oyster Culture in Pamlico Sound, North Carolina, by Robert E. Coker, 1907. 8°, 74 pp., 17 pl., 11 figs. *Postage 6 cents.*
16. Shade Trees for North Carolina, by W. W. Ashe, 1908. 8°, 74 pp., 10 pl., 16 figs. *Postage 6 cents.*
17. Terracing of Farm Lands, by W. W. Ashe, 1908. 8°, 38 pp., 6 pl., 2 figs. *Postage ¼ cents.*
18. Bibliography of North Carolina Geology, Mineralogy and Geography, with a list of Maps, by Francis Baker Laney and Katherine Hill Wood, 1909. 8°, 428 pp. *Postage 25 cents. Cloth-bound copies 30 cents extra.*
19. The Tin Deposits of the Carolinas, by Joseph Hyde Pratt and Douglas B. Sterrett, 1905. 8°, 64 pp., 8 figs. *Postage ¼ cents.*
20. Waterpowers of North Carolina: An Appendix to Bulletin 8, 1910. 8°, 383 pp. *Postage 25 cents.*
21. The Gold Hill Mining District of North Carolina, by Francis Baker Laney, 1910. 8°, 137 pp., 23 pl., 5 figs. *Postage 15 cents.*
22. A Report on the Cid Mining District, Davidson County, N. C., by J. E. Pogue, Jr., 1911. 8°, 144 pp., 22 pl., 5 figs. *Postage 15 cents.*
23. Forest Conditions in Western North Carolina, by J. S. Holmes, 1911. 8°, 115 pp., 8 pl. *Postage 15 cents.*

ECONOMIC PAPERS.

1. The Maple Sugar Industry in Western North Carolina, by W. W. Ashe, 1897. 8°, 34 pp. *Postage 2 cents.*

2. Recent Road Legislation in North Carolina, by J. A. Holmes. *Out of print.*

3. Talc and Pyrophyllite Deposits in North Carolina, by Joseph Hyde Pratt, 1900. 8°, 29 pp., 2 maps. *Postage 2 cents.*

4. The Mining Industry in North Carolina During 1900, by Joseph Hyde Pratt, 1901. 8°, 36 pp., and map. *Postage 2 cents.*

Takes up in some detail Occurrences of Gold, Silver, Lead and Zinc, Copper, Iron, Manganese, Corundum, Granite, Mica, Talc, Pyrophyllite, Graphite, Kaolin, Gem Minerals, Monazite, Tungsten, Building Stones, and Coal, in North Carolina.

5. Road Laws of North Carolina, by J. A. Holmes. *Out of print.*

6. The Mining Industry in North Carolina During 1901, by Joseph Hyde Pratt, 1902. 8°, 102 pp. *Postage 4 cents.*

Gives a list of Minerals found in North Carolina; describes the Treatment of Sulphuret Gold Ores, giving Localities; takes up the Occurrence of Copper in the Virgilia, Gold Hill, and Ore Knob districts; gives Occurrence and Uses of Corundum; a List of Garnets, describing Localities; the Occurrence, Associated Minerals, Uses and Localities of Mica; the Occurrence of North Carolina Feldspar, with Analyses; an extended description of North Carolina Gems and Gem Minerals; Occurrences of Monazite, Barytes, Ocher; describes and gives Occurrences of Graphite and Coal; describes and gives Occurrences of Building Stones, including Limestones; describes and gives Uses for the various forms of Clay; and under the head of "Other Economic Minerals" describes and gives Occurrences of Chromite, Asbestos, and Zircon.

7. Mining Industry in North Carolina During 1902, by Joseph Hyde Pratt, 1903. 8°, 27 pp. *Postage 2 cents.*

8. The Mining Industry in North Carolina During 1903, by Joseph Hyde Pratt, 1904. 8°, 74 pp. *Postage 4 cents.*

Gives descriptions of Mines worked for Gold in 1903; descriptions of Properties worked for Copper during 1903, together with assay of ore from Twin-Edwards Mine; Analyses of Limonite ore from Wilson Mine; the Occurrence of Tin; in some detail the Occurrences of Abrasives; Occurrences of Monazite and Zircon; Occurrences and Varieties of Graphite, giving Methods of Cleaning; Occurrences of Marble and other forms of Limestone; Analyses of Kaolin from Barber Creek, Jackson County, North Carolina.

9. The Mining Industry in North Carolina During 1904, by Joseph Hyde Pratt, 1905. 8°, 95 pp. *Postage 4 cents.*

Gives Mines Producing Gold and Silver during 1903 and 1904 and Sources of the Gold Produced during 1904; describes the mineral Chromite, giving Analyses of Selected Samples of Chromite from Mines in Yancey County; describes Commercial Varieties of Mica, giving the manner in which it occurs in North Carolina, Percentage of Mica in the Dikes, Methods of Mining, Associated Minerals, Localities, Uses; describes the mineral Barytes, giving Method of Cleaning and Preparing Barytes for Market; describes the use of Monazite as used in connection with the Preparation of the Bunsen Burner, and goes into the use of Zircon in connection with the Nernst Lamp, giving a List of the Principal Yttrium Minerals; describes the minerals containing Corundum Gems, Hiddenite and Other Gem Minerals, and gives New Occurrences of these Gems; describes the mineral Graphite and gives new Uses for same.

10. Oyster Culture in North Carolina, by Robert E. Coker, 1905. 8°, 39 pp. *Postage 2 cents.*

11. The Mining Industry in North Carolina During 1905, by Joseph Hyde Pratt, 1906. 8°, 95 pp. *Postage 4 cents.*

Describes the mineral Cobalt and the principal minerals that contain Cobalt; Corundum Localities; Monazite and Zircon in considerable detail, giving Analyses of Thorianite; describes Tantalum Mineral and gives description of the Tantalum Lamp; gives brief description of Peat Deposits; the manufacture of Sand-lime Brick; Operations of Concentrating Plant in Black Sand Investigations; gives Laws Relating to Mines, Coal Mines, Mining, Mineral Interest in Land, Phosphate Rock, Marl Beds.

12. Investigations Relative to the Shad Fisheries of North Carolina, by John N. Cobb, 1906. 8°, 74 pp., 8 maps. *Postage 6 cents.*

13. Report of Committee on Fisheries in North Carolina. Compiled by Joseph Hyde Pratt, 1906. 8°, 78 pp. *Postage 4 cents.*

14. The Mining Industry in North Carolina During 1906, by Joseph Hyde Pratt, 1907. 8°, 144 pp., 20 pl., and 5 figs. *Postage 10 cents.*

Under the head of "Recent Changes in Gold Mining in North Carolina," gives methods of mining, describing Log Washers, Square Sets, Cyanide Plants, etc., and detailed descriptions of Gold Deposits and Mines are given; Copper Deposits of Swain County are described; Mica Deposits of Western North Carolina are described, giving Distribution and General Character, General Geology, Occurrence, Associated Minerals, Mining and Treatment of Mica, Origin, together with a description of many of the mines; Monazite is taken up in considerable detail as to Location and Occurrence, Geology, including classes of Rocks, Age, Associations, Weathering, method of Mining and Cleaning, description of Monazite in Original Matrix.

15. The Mining Industry in North Carolina During 1907, by Joseph Hyde Pratt, 1908. 8°, 176 pp., 13 pl., and 4 figs. *Postage 15 cents.*

Takes up in detail the Copper of the Gold Hill Copper District; a description of the Uses of Monazite and its Associated Minerals; descriptions of Ruby, Emerald, Beryl, Hiddenite, and Amethyst Localities; a detailed description with Analyses of the Principal Mineral Springs of North Carolina; a description of the Peat Formations in North Carolina, together with a detailed account of the Uses of Peat and the Results of an Experiment Conducted by the United States Geological Survey on Peat from Elizabeth City, North Carolina.

16. Report of Convention called by Governor R. B. Glenn to Investigate the Fishing Industries in North Carolina, compiled by Joseph Hyde Pratt, State Geologist, 1908. 8°, 45 pp. *Postage 4 cents.*

17. Proceedings of Drainage Convention held at New Bern, North Carolina, September 9, 1908. Compiled by Joseph Hyde Pratt, 1908. 8°, 94 pp. *Postage 5 cents.*

18. Proceedings of Second Annual Drainage Convention held at New Bern, North Carolina, November 11 and 12, 1909, compiled by Joseph Hyde Pratt, and containing North Carolina Drainage Law, 1909. 8°, 50 pp. *Postage 3 cents.*

19. Forest Fires in North Carolina During 1909, by J. S. Holmes, Forester, 1910. 8°, 52 pp., 9 pl. *Postage 5 cents.*

20. Wood-using Industries of North Carolina, by Roger E. Simmons, under the direction of J. S. Holmes and H. S. Sackett, 1910. 8°, 74 pp., 6 pl. *Postage 7 cents.*

21. Proceedings of the Third Annual Drainage Convention, held under Auspices of the North Carolina Drainage Association; and the North Carolina Drainage Law (codified). Compiled by Joseph Hyde Pratt, 1911. 8°, 67 pp., 3 pl. *Postage 5 cents.*

22. Forest Fires in North Carolina During 1910, by J. S. Holmes, Forester, 1911. 8°, 48 pp. *Postage 3 cents.*

23. Mining Industry in North Carolina During 1908, '09, and '10, by Joseph Hyde Pratt and Miss H. M. Berry, 1911. 8°, 134 pp., 1 pl., 27 figs. *Postage 10 cents.*

Gives report on Virgilina Copper District of North Carolina and Virginia, by F. B. Laney; Detailed report on Mica Deposits of North Carolina, by Douglas B. Sterrett; Detailed report on Monazite, by Douglas B. Sterrett; Reports on various Gem Minerals, by Douglas B. Sterrett; Information and Analyses concerning certain Mineral Springs; Extract from Chance Report of the Dan River and Deep River Coal Fields; Some notes on the Peat Industry, by Professor Charles A. Davis; Extract from report of Arthur Keith on the Nantahala Marble; Description of the manufacture of Sand-lime Brick.

24. Fishing Industry of North Carolina, by Joseph Hyde Pratt, 1911. 8°, 44 pp. *Postage 5 cents.*

25. Proceedings of Second Annual Convention of the North Carolina Forestry Association, held at Raleigh, North Carolina, February 21, 1912. Forest Fires in North Carolina During 1911. Suggested Forestry Legislation. Compiled by J. S. Holmes, Forester, 1912. 8°, 71 pp. *Postage 6 cents.*

26. Proceedings of Fourth Annual Drainage Convention, held at Elizabeth City, North Carolina, November 15 and 16, 1911, compiled by Joseph Hyde Pratt, State Geologist, 1912. 8°, . . . pp. *Postage . . . cents.*

27. Highway Work in North Carolina, containing a Statistical Report of Road Work during 1911, by Joseph Hyde Pratt, State Geologist, and Miss H. M. Berry, 1912. 8°, . . . pp., . . . figs. *Postage . . . cents.*

VOLUMES.

Vol. I. Corundum and the Basic Magnesian Rocks in Western North Carolina, by Joseph Hyde Pratt and J. Volney Lewis, 1905. 8°, 464 pp., 44 pl., 35 figs. *Postage 32 cents. Cloth-bound copy 30 cents extra.*

Vol. II. Fishes of North Carolina, by H. M. Smith, 1907. 8°, 453 pp., 21 pl., 188 figs. *Postage 30 cents.*

Vol. III. The Coastal Plain Deposits of North Carolina, by Wm. Bullock Clark, Benjamin L. Miller, L. W. Stephenson, B. L. Johnson, and Horatio N. Parker, 1912. 8°, 509 pp., 62 pl., 21 figs.

Pt. I.—The Physiography and Geology of the Coastal Plain of North Carolina, by Wm. Bullock Clark, Benjamin L. Miller, and L. W. Stephenson.

Pt. II.—The Water Resources of the Coastal Plain of North Carolina, by L. W. Stephenson and B. L. Johnson. *In Press.*

BIENNIAL REPORTS.

First Biennial Report, 1891-1892, J. A. Holmes, State Geologist, 1893. 8°, 111 pp., 12 pl., 2 figs. *Postage 6 cents.*

Administrative report, giving Object and Organization of the Survey; Investigations of Iron Ores, Building Stone, Geological Work in Coastal Plain Region, including supplies of drinking-waters in eastern counties, Report on Forests and Forest Products, Coal and Marble, Investigations of Diamond Drill.

Biennial Report, 1893-1894, J. A. Holmes, State Geologist, 1894. 8°, 15 pp. *Postage 1 cent.*

Administrative report.

Biennial Report, 1895-1896, J. A. Holmes, State Geologist, 1896. 8°, 17 pp. *Postage 1 cent.*

Administrative report.

Biennial Report, 1897-1898, J. A. Holmes, State Geologist, 1898. 8°, 28 pp. *Postage 2 cents.*

Administrative report.

Biennial Report, 1899-1900, J. A. Holmes, State Geologist, 1900. 8°, 20 pp. *Postage 2 cents.*

Administrative report.

Biennial Report, 1901-1902, J. A. Holmes, State Geologist, 1902. 8°, 15 pp. *Postage 1 cent.*

Administrative report.

Biennial Report, 1903-1904, J. A. Holmes, State Geologist, 1905. 8°, 32 pp. *Postage 2 cents.*

Administrative report.

Biennial Report, 1905-1906, Joseph Hyde Pratt, State Geologist, 1907. 8°, 60 pp. *Postage 3 cents.*

Administrative report; report on certain swamp lands belonging to the State, by W. W. Ashe; it also gives certain magnetic observations at North Carolina stations.

Biennial Report, 1907-1908, Joseph Hyde Pratt, State Geologist, 1908. 8°, 60 pp., 2 pl. *Postage 5 cents.*

Administrative report. Gives special report on an Examination of the Sand-banks along the North Carolina Coast, by Jay F. Bond, Forest Assistant, United States Forest Service; certain magnetic observations at North Carolina stations; Results of an Investigation Relating to Clam Cultivation, by Howard E. Enders, of Purdue University.

Biennial Report, 1909-1910, Joseph Hyde Pratt, State Geologist, 1911. 8°, 152 pp. *Postage 10 cents.*

Administrative report. Contains Agreements for Co-operation in Statistical Work, and Topographical and Traverse Mapping Work with the United States Geological Survey; Forest Work with the United States Department of Agriculture (Forest Service); List of Topographic maps of North Carolina and counties partly or wholly topographically mapped; description of special Highways in North Carolina; suggested Road Legislation; list of Drainage Districts and Results of Third Annual Drainage Convention; Forestry reports relating to Connolly Tract, Buncombe County; Transylvania County State Farm; certain Watersheds; Reforestation of Cut-over and Abandoned Farm Lands; on the Woodlands of the Salem Academy and College; Recommendations for the Artificial Regeneration of Longleaf Pine at Pinehurst; Act regulating the use of and for the Protection of Meridian Monuments and Standards of Measure at the several county seats in North Carolina; list of Magnetic Declination at the county seats, January 1, 1910; letter of Fish Commissioner of the United States Bureau of Fisheries relating to the conditions of the North Carolina fish industries; report of the Survey for the North Carolina Fish Commission referring to dutch or pound-nét fishing in Albemarle and Croatan sounds and Chowan River, by Gilbert T. Rude, of the United States Coast and Geodetic Survey; Historical Sketch of the several North Carolina Geological Surveys, with list of publications of each.

Samples of any mineral found in the State may be sent to the office of the Geological and Economic Survey for identification, and the same will be classified free of charge. It must be understood, however, that NO ASSAYS, OR QUANTITATIVE DETERMINATIONS, WILL BE MADE. Samples should be in a lump

form if possible, and marked plainly on outside of package with name of sender, post-office address, etc.; a *letter* should accompany sample and *stamp* should be enclosed for reply.

These publications are mailed to libraries and to individuals who may desire information on any of the special subjects named, free of charge, except that in each case applicants for the reports should forward the amount of *postage* needed, as indicated above, for mailing the bulletins desired, to the *State Geologist, Chapel Hill, N. C.*

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