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Ames Forestry Club

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FORESTRY
WITH PRACTICE

At Iowa State College instruction in the technical side of forestry is combined with an adequate amount of practical work in the field. That combination gives the best possible preparation for the forestry profession, and the young men who complete the four-year course quickly find their way into the more responsible positions in private or public service.

One of the features of the course is its summer camp in some good forest region of the United States where for twelve weeks the student is busy with field work and the study of logging and milling operations.

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For full information about the work in forestry or about other courses in agriculture, engineering, industrial science or veterinary medicine, write to The Registrar.

IOWA STATE COLLEGE
AMES
THE
AMES FORESTER
NINETEEN HUNDRED
TWENTY-THREE

IN the interests of the Peculiar Problems of Forestry and Conservation in Iowa, and of that Wider Field of Forestry as it Affects the Future Development and Prosperity of Our Whole Nation, this, the Eleventh Volume of The Ames Forester, is Published by the Forestry Club of the Iowa State College.

IOWA STATE COLLEGE
AMES, IOWA
# Ames Forester

Published Annually by the

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Iowa Federation of Women’s Clubs.
In Memory of

PROF. SPENCER AMBROSE BEACH
Head of the Department of Horticulture
and Forestry 1905—1922
IOWA PARKS

IOWA PARKS: HISTORY, ORGANIZATION, ACCOMPLISHMENTS AND A LOOK INTO THE FUTURE

An address delivered at Mallard, Iowa, before the County organization of the Iowa Federation of Women's Clubs, October 30, 1922.

I take the liberty of adding to the address a few statistics on the attendance at our state parks and the use of our lakes.

By L. H. Pammel

I am pleased to give you an address bearing on the subject of Iowa Parks, especially so because we are indebted to the women of Iowa for the fine spirit they have shown in this park movement. We are naturally proud of Iowa not only because it is in many ways, agriculturally at least, supreme in the United States, but because of the intelligence of its people. The whole of Iowa once was a splendid park. Its valleys abounded in beautiful trees and flowers and was inhabited freely by birds. Its prairies, what shall we say of them?—beautiful in their carpet of tall blue stem, the lily, the goldenrod, the aster and gentian. They are almost forgotten, because the native prairie in Iowa is almost a thing of the past. It is not too late to save a few bits of prairie so that the future generations may get some idea of what the prairie was like.

Let us for a moment contemplate the pioneer in Iowa. Nature was at his very door. Everything was open and free, the brooks were his for enjoyment, the woods were his without restriction, they were free, but all of this has changed. The doors are locked by the private owner and the people of the great commonwealth are shut out. We cannot change this, nor do we want to because the wealth of the State is derived from its agricultural land, but we can ask the commonwealth to give to the public places for recreation.

The lot of the pioneer, though a hard one, was enjoyable and I doubt whether a better class of men and women were ever reared than in these pioneer homes. The pioneer had to build a home, often hewed out of the woods. The child must be educated and therefore the public school was built and the public school is the great bulwark of our state and nation. The child must be brought up in the spirit of Christianity and so the church was added to the community, and now after the disappearance of the pioneer we are adding the park,—city, state and national—to round out the four fundamentals in our civilization, and as long as these public institutions endure our government will be safe for democracy.
The Movement for Parks in Iowa

Dr. Thomas Macbride in an address before the Iowa Academy of Science in 1895 urged the creation of what he called county parks, what we should now term, using the name in a broader sense, state parks.

"County parks", he said, "would tend to preserve to those who come after us, something of the primitive beauty of this part of the world, as such beauty stood revealed in its original flora. I esteem this from the standpoint of science, and indeed, from the standpoint of intellectual progress, a matter of extreme importance. Who can estimate the intellectual stimulus the world receives by the efforts made to appreciate and understand the varied wealth of nature's living forms".

In 1901 there was organized at Ames an Iowa Park and Forestry Association "to encourage the establishment of parks, the creation of one or more state parks in the vicinity of our lakes and streams, to encourage state and national legislation for rational forest management, and the creation of

Pickeral Lake, Buena Vista County

more forest reserves". This association somewhat later became the Iowa Conservation Association, which association acting with the federated women's clubs has helped the cause of parks greatly.

State Legislature

It was largely through the influence of the Honorable Cady Chase of Webster City that the legislature in 1915 passed a law directing the State Highway Commission to
make a survey of the lakes of Iowa and to recommend lakes which should be preserved, lakes which should be drained, the State keeping title to the same, and lakes which should be drained and the land sold. The Highway Commission made an extensive survey with some most constructive work. It recommended that land be purchased on the shores of lakes. This report had the commendation of all friends interested in parks. A committee of the Iowa Conservation Association, the Curator of the State Historical Department, Assistant State Geologist, the Highway Engineer and several prominent members of the House and Senate, among these Senator Newberry and Senator Horchem (succeeding session of legislature Senator Foskett and Speaker of the House McFarlane) met with the Chairman of the Senate Committee on Fish and Game, the Honorable Perry C. Holdoegel. He was selected to draft a bill to be presented to the Senate and House creating a system of state parks. The bill was duly presented and the Thirty-seventh General Assembly passed a conservation law. This law gave to the State Board of Conservation, the Fish and Game Department and the Executive Council the right to create state parks from fees received by the Fish and
Game Department from the sale of hunters' licenses. The Thirty-eighth General Assembly amended this law by eliminating the support derived from the Fish and Game Department, making a direct appropriation of $100,000.00 annually. The Executive Council at its discretion however was empowered to use funds for park purposes from the Fish and Game Protection fund. It also gave the Board of Conservation charge of the lakes. The Thirty-ninth General Assembly made the State Board of Conservation custodian for park purposes of all of the meandered streams and lakes of Iowa, making it further possible for counties and individuals to advance the payment for park purposes, provided said lands are properly approved by the Board and Executive Council. It also created the Gitchie-Manito Park in Lyon County. The law for the creation of state parks makes the creation a joint action of the State Board of Conservation and the Executive Council. The Executive Council appoints the Board, except the Curator of the State Historical Department who is the ex-officio member. The first Board, appointed during Governor Harding's administration consisted of Joseph Kelso of Bellevue, J. F. Ford of Fort Dodge and L. H. Pammel of Ames. This Board was organized on December 27, 1918, by electing L. H. Pammel president, E. R. Harlan secretary. The present Executive Council with Governor Kendall appointed Hon. W. G. Haskell of Cedar Rapids and Mrs. C. H. McNider of Mason City to succeed Messrs. Kelso and Ford. The present Board elected the same officers as the previous Board. The Executive Council in Governor W. L. Harding's administration consisted of E. H. Hoyt, F. S. Shaw and W. C. Ramsey. The Executive Council during Governor Ken-
dall's administration consisted of W. J. Burbank, W. C. Ramsey and G. C. Haynes. This is a brief story of the law and how the Board and the Executive Council cooperate.

Recreation and Play Grounds are Important

The Executive Council and the State Board of Conservation recognize the value and importance of recreation, and especially so in rural life. They also recognize that in Iowa our parks must be closely articulated with agriculture because every form of business in Iowa is closely identified with agriculture. All of the little cities in Iowa are in a true sense rural cities, their business comes from the farms, and any parks connected with those cities are in a broader sense rural parks.

The national government has set aside, out of its public domain, large areas for recreational purposes. They are however remote from the densely populated sections of the country and are for the enjoyment of all, it is true, but a large percentage of our people either for want of money or on account of business cannot enjoy these advantages. I would not belittle our national parks as an asset because there is nothing just like the Yellowstone, Yosemite, Sequoia, General Grant, Mt. Ranier, Grand Canyon of the Colorado and the Rocky Mountain parks. The creation of the national park system is less than a half century old. These play grounds became a necessity, just as a state or city park becomes a necessity. The whole park idea is a natural outgrowth of the human race in its craving for the out-of-doors. We need only recall how the people of Great Britain had since time immemorial made use of the "commons" implying of course, for the people in common, and we have in our own country the

West Swan Lake, Emmet County.

East Swan Lake, immediately adjoining, has recently been drained.
Boston Commons. Kings and others of the privileged class in England made use of large areas for hunting. The common people simply took possession of these and so the royal

Goose Lake, Greene County
A shallow marsh covering about three-fourths of a section.

parks and gardens of Great Britain and other European countries were established by the various governments. That was the beginning of a wise public policy. No one questions the wisdom of the United States government to establish these national parks, and along with them the national forests, which combined make the finest play grounds in the world. They are marvelous, not only because of the giant forests, but the wonderful carving of the rocks and geological formations as well as its geysers and hot springs.

The Southeast Shoreline of Little Wall Lake
This could be greatly beautified by planting hard wood and coniferous trees.

The city park in the United States is an older institution than the national park, but city parks have not kept pace with the growth of population. New York, Chicago or Philadel-
phila with their wonderful parks do not supply the present-day needs of their population. It is certainly true that the cities of Iowa are lamentably weak in park development. We can all name the cities with five, ten, twenty or thirty thousand people where less than one hundred acres suffice for park purposes. The older cities have long since learned that a park is a wise investment of funds for the prevention of crime.

The state park is of much more recent date as notably New York which has within a short distance of the metropolis the Interstate Palisade Park of some 45,000 acres of land; Minnesota and Wisconsin both have considerable acres in state parks. There is also a healthy growing sentiment for parks in Indiana, Illinois and Michigan.

Why Do We Create Parks?

With most people they are for amusement, some want a dance pavilion, a merry-go-round, etc. Parks are for recreation. If the ordinary form of amusement is desired the pub-

Rush Lake, Palo Alto County

The bed of this lake sustains a prolific aquatic flora.

lic state park is not the place to get it. It may be a necessity in the city, but certainly not in the country park. There is more than recreation in a park, and the Iowa law seems to have met this issue squarely when the words "scientific, historical and recreational" were used. The persons who framed the law had in mind the preservation of animals, rare plants, unique trees, some unique geological formations, the preservation of the Indian mounds, rare old buildings where Iowa history was made. These parks serve an important function for students in high schools and colleges who are invited to make use of the same and are especially valuable for boy
scouts and similar organizations. The framers of this law wished to show generations yet unborn what Iowa had in the way of prairie, valley, lake and river. It was felt that a part of this heritage left to us was not only for the present generations, but that its citizens of the future had a just claim on this heritage. God surely blessed Iowa with the most fertile soil on the face of the globe and He planted here the finest type of citizens who will leave their impression on the nation, so let us do our part to make them happy so long as they are a part of our State.

**What Has Been Accomplished?**

The story of the achievements of the State Board of Conservation and Executive Council is, I believe, praiseworthy in every respect. The most pleasant feature of it is the fine response from the citizens of Iowa. Everywhere communities have been willing to cooperate to make the enterprise a success. We have heard a few discordant notes, but the response in general has been genuine and whole hearted. It may take time, much time, but it is the kind of service the givers have been glad to give to their State because of the value to the commonwealth. I need only remind you that Mr. and Mrs. McCornack of Sioux City gave the Theodore F. Clark Park in Tama County to commemorate an honored pioneer citizen of Tama County, and that Mr. Ellet Lepley and his brother gave the Lepley Park to commemorate their father and the pioneer citizens of Hardin and Marshall counties. Mr. C. M. Mather of Greene will give the State some twenty acres near

Wall Lake in Wright County, covering an area of about one and a half square miles
Greene when we do our share towards the purchase of some thirty acres more. The Brandt sisters of Davenport will give the State some fifty acres when we add to it the remainder of the interesting and unique tract in Muscatine County known as "Wild Cat Den", one of the most interesting places in Iowa. The citizens of the little town of Beaman will purchase some twenty acres and give it to the State when there is added to it a tract of land making a park of about fifty acres. The people of Anamosa gave us the Jones County Park, rugged and picturesque. The little community of Peterson will give us a substantial acreage on the Little Sioux when we take over this park. The City of Estherville will give us a substantial area to preserve some of the fine trees and the fine glacial valley in that vicinity. Mount Vernon, Cedar Rapids and other cities will pay half the initial cost of a track known as the "Palisades". Boone gave the State some $16,000.00 toward the purchase of the Ledges State Park, a tract known to everyone in central Iowa. Fort Dodge gave us some money for the purchase of Dolliver Memorial Park, preferring to use the money collected for the Dolliver memorial into this park rather than some other kind of memorial. The Keosauqua citizens gave the State a quarter of a section of land. It was the starting of the local gift plan. The little City of Farmington gave us about 100 acres of land. The town of Fort Atkinson gave us more than half of the purchase price of the Fort Atkinson State Park. Eldora citizens gave us nearly forty acres of land and a very substantial sum of money. Mr. Merrick gave us the Merrick State Park. Lake Mills will give to the State a considerable sum of money when
Rice Lake is set aside as a park. Forest City gave something like $9,000 toward the creation of the Pilot Knob State Park. I mention these only to show that the response from the citizens of Iowa is splendid. Those who are in charge of this state park work feel that patience is needed, and the problem of other parks will be met as soon as funds will permit and the communities are willing to cooperate by selling the park land at a reasonable figure. The law of course provides that condemnation proceedings can be started, but these proceedings are not only expensive but there are many disagreeable features connected therewith. I hope that communities where parks are to be created will show a public spirit.

Investigation and Survey

There have been more than one hundred and fifty applications for state parks, coming from every part of the State, from villages like Beamen and Peterson, towns like Waverly and Oakland and cities like Cedar Rapids, Sioux City and Dubuque. Manifestly all of these places cannot be taken care of at once. Frequently the local communities ask that some representative of the Board make an address to the citizens of that community. Then an investigation is made from various aspects such as scientific, recreational and historical. The Board has on file a report on every area that has come before the Board. The scientific botanical side of the areas have been made by the Botanical Department of Iowa State College and the State University of Iowa. This has involved a very large amount of gratuitous work on the part of the individual who has made the survey. The geological side has...
been furnished the Board by the State Geological Survey, the forestry survey by the Department of Forestry at Ames. The historical data has been furnished by the State Historical Department. Zoological features have been furnished by the State College and the State University, although this work is quite insufficient. The landscape work has been furnished by the Landscape Architectural Department of Iowa State College. Some assistance has also been rendered by the State Highway Commission. We have on file a thorough survey of the lakes of Iowa, the basis of the work being the report on Iowa Lakes made by the Highway Commission and the Fish and Game Department. Subsequently the Board and the Fish and Game Department made an extensive study of many of

*West Swan Lake, Emmet County.*

Lower picture shows stream at outlet; upper shows a bay covered with reddish algae sphaerella.
the lakes for recreational purposes, giving facts with reference to present life and recreational facilities.

The Executive Council and different members of the Board determined the value of the land for park purposes. Then there are extended reports on highways, location of trails, buildings and other facts in connection with park development.

The well-wooded shores of Iowa Lake, Emmet County. The red cedars were planted by birds.

The State Board of Conservation sponsored the movement of a National Association of State Parks which had its first meeting in Des Moines in 1920, and the second at the Interstate Palisade Park New York, at Bear Mountain, in
1922, the Secretary of the State Board of Conservation, Mr. Harlan, acting as secretary.

The state park system consists of all of the meandered streams and lakes of the State and certain tracts purchased or donated. The following parks have been created: The

**Dr. L. H. Pammel at Pine Creek Hollow, Dubuque County.**

The largest continuous tract of white pine in the State occurs along this creek.

Backbone, Farmington, Lacey-Keosauqua, Dolliver Memorial, Ledges, Lepley, Theodore F. Clark, Eldora Pine Creek, Jones County, Gitchie Manito, Morehead Cave, Pilot Knob, Oakland Mills, Fort Atkinson State Park, Merrick, Wall Lake and Lost Island Lake State Parks.

**The Lakes of Iowa**

There are something like seventy meandered lakes in Iowa, most of which (with the exception of Silver Lake in Delaware County which is in the Iowan drift sheet and the lakes of the Missouri and the Mississippi rivers, old channels or sloughs of these streams), are in the Wisconsin drift sheet. The Wisconsin ice sheet not only gave us the fertile Iowa prairie soil of northern Iowa, but it gave us some wonderfully fine lakes. There is no more beautiful lake in the
northern Mississippi Valley than Lake Okoboji and its sister, Spirit Lake. To the east this area contains Clear Lake, a most beautiful sheet of water, and to the southwest Storm Lake, another beautiful sheet of water. There are many smaller lakes which have become of considerable importance from the standpoint of recreation. These lakes are somewhat nearer the centers of population. I refer to Twin Lakes in Calhoun County, which are only a little more than an hour's ride from Fort Dodge and which are visited more than any

![Silver Lake, Worth County.](image)

Note in the lower picture the ice-formed bank on the south shore.

other lakes in the State, except the larger lakes. Then there is Lizard Lake, only a short distance from Fort Dodge, Medium Lake at Emmetsburg, a beautiful sheet of water, the pride of the citizens of that town. I need not tell you much about
the other lakes. Palo Alto County has some fine lakes like Iowa and Tuttle lakes, with beautiful shores; Clay and Dickinson counties surpass the other counties in their lakes, and I am sure there is not a person here to-day but would like to interest, like Blue Lake in Monona County, once the channel of the Missouri river where Lewis and Clark landed. The served on the shores. Some of these lakes are of historical lakes of the Mississippi and Missouri are of interest because lakes, all of which should be preserved and park places re- see all of these lakes preserved. I might run down the list of the growth of the American lotus, the most beautiful plant of the water lily family. The State owns more than 500 acres of these beautiful lotus beds. One of these lakes of American lotus was given to the State by the generous citizens of Farmington.

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It is well known that the state-owned lakes are meandered and that there are nearly 4,000 acres of land within the meander line. The lake area of the State amounts to more than 43,500 acres, a pretty respectable park area. In many cases the public does not have access to these lakes unless going over private property. This should not be the case. The people must have access, and means must be found to obtain this. It will be expensive in some cases. There was a time when this could have been done cheaply, but the State was not ready at that time to go into the enterprise of state
parks on its lakes. The longer we wait the more expensive the proposition will become.

We cannot measure the wealth of the water areas of the State in dollars and cents when we consider the recreational value. It is, however, interesting to note that more than a million persons this year went to the lakes for some recreation. More than 500,000 persons enjoyed the beauty of Twin Lakes in Calhoun County, Storm Lake in Buena Vista County, Clear Lake in Cerro Gordo County, Medium Lake in Palo Alto County and more than 500,000 at Spirit and Lake Okoboji lakes. I believe the figures I present are too conservative, and possibly the figures should be more than twice the amount I have given here.

Quartzite Rock on Jasper Pool in Lyon County, Gitchie Manito State Park

The Value of Aquatic Life

A few figures may be of interest in this connection. I am told that 4,000 muskrat skins were taken in one year from Blue Lake in Monona County. I am also told that in one year 5,000 muskrats were taken from Skunk Grove Lake. This is not a state lake, but I am in hopes it will be restored as a lake to preserve the muskrats. Figures from the two
THE AMES FORESTER

lakes show that 9,000 skins were taken in one year. The price of these skins fluctuates, but its value cannot be far from $10,000 in a single year from an area of 1,100 acres. Nothing has been said here of the value of the fish in such lakes. There are figures of actual sales made of carp and a few other fish, such figures do not however give us the true value of the products from these waters. The increase in value from fish in experiments conducted at Fairport indicate about $7.00 per acre. The water fowl and other products are not taken into consideration. Ther would be an income of $17,000 from 1,000 acres of land, certainly a pretty good income and it is worth while to preserve these bodies of water.

We should not lose sight of the fact that the aquatic life like fish is an important one, over $300,000 a year, and that this revenue from these lakes is worth while, to say nothing of the enjoyment for those who like to fish.

Then there is the question of breeding of wild fowl, ducks and geese. We are almost entirely dependent upon the fowl which are bred in Minnesota and Canada. I think perhaps a

Ledges State Park, Boone, Iowa

The characteristic sandstone formations are well illustrated here.
few acres should be preserved as game preserves, and we have a number of lakes admirably well suited for this purpose, one of which is Rice Lake in Winnebago and Worth counties. When I first knew it, the lake was a fine sheet of water, but an order from the Executive Council was made allowing it to
be drained. It has been a failure as a farm project. This lake should be restored and made a game preserve. Can we not do this for the ducks and geese? Let us give them a chance somewhere in this great State of Iowa.

Meandered Streams

There are not many of these streams, and practically all of them have their source in the lake region of Iowa. The State made it a part of the duty of the State Board of Conservation and Executive Council to look after these as well as the lakes. I have no means of knowing what the area of State-owned land on these river is, but it is probably equal to that on the lakes, and if so, we might put the figure at 40,000 acres. Surely it is worth while to consider the value of this area for producing power, sand and gravel, coal, fish, game, muskrats and mussels, to say nothing of the value of the timber on these tracts. All of this is potential wealth. The recreational features however are of prime importance for the citizens of Iowa. How much does the State own of the river? It is the line of apparent vegetation, which is determined by the character of the plants like the sand bar willow. The State also owns all islands formed in the beginning as sandbars, later becoming populated with the sand bar willow, birth, cottonwood and soft maple. These areas are covered with water at the ordinary high water. Within this area are many small islands and sloughs that come within the jurisdiction of the State Board of Conservation and Executive Council. It was the intent of the law that the public should have free access to such bodies of water and that there should be no obstruction to the flow of water. The public domain is for the use of the public. The State I am sure is not only interested in the development of every industry along its streams, but it is equally interested in the public at large and its interests should be guarded.

The matter of straightening streams has gone far enough in the State of Iowa. None of the larger streams should be straightened because of disastrous floods caused in the regions farther down the streams. I am, therefore, opposed to the further straightening of streams, except the smaller streams at their source in various parts of the State of Iowa. I believe that under the law, the State Board of Conservation and the Executive Council should have jurisdiction over all matters pertaining to the straightening of streams.

Public State Parks

I have given a list of these on a previous page, and now how can we measure the value of these as places for recrea-
tion. We can only do so by taking a census. In our larger parks we have kept a census of people going to the park, and what has been found? At the Dolliver Memorial Park there were 44,000 visitors during the season; at the Ledges State Park, 36,000; at the Backbone State Park, 30,000; Laceys-Keosauqua State Park, 20,000; Oakland Mills, 4,000; Jones County State Park, 30,000; Pilot Knob State Park, 12,000; Eldora Pine Creek, 5,000; Morehead Cave, 45,000; Fort Atkinson State Park, 3,000, and all other State parks outside of the lake parks, 8,000; making a total of 232,000 persons. The average time spent in the park is about three hours, or 696,000 recreational hours, which if we figure at 25c per recreational hour, and it is surely worth that, we have the value of this form of recreation at $174,000. If we add to this 1,000,000 people who use the lakes with an average time of four hours spent, we have 4,000,000 recreational hours at the same rate of 25c per hour we have a total of $1,000,000. In other words, the State of Iowa has furnished its citizens $1,174,000 worth of recreation.

There is another interesting phase of the recreational value of the park. In every one of these state parks visitors were not confined to those who live in the vicinity. Their use is state wide. For instance Mr. Carl Fritz Henning furnished me with the following interesting data relative to the visitors at the Ledges State Park. In May there were 2,250 visitors: June, 5,150; July, 6,850; August, 10,750; September, 4,500; October, 6,500, the following counties contributing to this attendance: Polk, Story, Carroll, Warren, Greene, Dallas, Kossuth, Ida, Humboldt, Marshall, Wayne, Boone, Hamilton, Jasper, Marion, Floyd, Webster, Scott, Guthrie, Mahaska, Mitchell, Calhoun, Henry, Franklin, Wapello, Iowa and Monroe. When the roads were good and the entrance to the park made possible there were cars from Colorado, South Dakota, Oklahoma, Wisconsin, Illinois, New York, Connecticut, Missouri, Nebraska. The greatest number of Iowa cars came from the following counties, as per the following order: Polk, Story, Boone and Dallas.

There can be but one answer to the question, is the public park worth while, and that is Yes.

Let me describe briefly the parks for you.

**Backbone Park in Delaware County**

This park is situated in northeastern Delaware County. The Maquoketa river flows through the park which comprises an area of something over 1,200 acres. Spring branch of this river heads only a few miles south of Strawberry Point. This stream contains a fine lot of white pine, some of these trees
now being more than 200 years old. A narrow ridge of limestone causes the Maquoketa river to form a bed. This ridge is covered with fine old white pine, also chestnut, white, black and red oaks, quaking aspen, large toothed aspen, hickories, sycamore, American, corky bark and slippery elm, sugar maple, basswood, red cedar and Canadian yew.

Lacey-Keosauqua Park, Van Buren County

This is situated in southeastern Iowa on the Des Moines river in the region known as the great bend near the city of Keosauqua. The rolling hills and narrow valleys are covered with a variety of trees like the chestnut, swamp, shingle, red, white, quercitron and post oaks, black walnut, cottonwood, black willow, coffee bean, basswood, quaking aspen, slippery

The Lotus Pond in the State Park at Farmington.

and red elms, bladder nut, hop tree, hard and soft maple, white and green ash, and an abundance of flowers like golden rod, aster, spring flowers like the mandrake and cohosh. The beautiful oaks, some of which are large, make an impressive sight, especially when the foliage is turning in the fall. Of the animals mention may be made of the fox, raccoon, badger, squirrel, opossum, grouse, quail, and all other birds of Iowa. One hundred and sixty acres of this park area was given to
the State by the citizens of Keosauqua and it is the largest park in the State, about 1,400 acres.

Farmington State Park, Van Buren County

This park is situated near the town of Farmington, a gift to the State by the citizens of Farmington. It contains 100 acres, a little lake of some 35 acres being the most interesting part of the park, because it contains the American lotus, one of the most beautiful of our American lilies. The higher sandy grounds contain the trees mentioned for the Lacey-Keosauqua Park. There are lobelias, asters, goldenrods, mandrake, cohosh and violets in season. Of wild life the raccoon, fox and squirrel might be mentioned, and of birds the quail besides many songsters.

Oakland Mills in Henry County

This park is not far from Mount Pleasant and in proximity to the town of Oakland Mills on the Skunk river. It contains some of the finest hard maples in southern Iowa and is characterized by the outcrop of limestone and a few small narrow gorges in which may be found a variety of spring flowers like the blue and yellow violet, the wind flower, trillium, mandrake, cohosh, aster and flowers like the New England and blue aster, golden rod, etc., also fine white and green ash, sycamore, black walnut, bass wood, red and American elm.

Dolliver Memorial Park in Webster County

This park is situated on the Des Moines river, south of Fort Dodge, with an area of some 400 acres without the meander of the river. It is interesting because of the lower coal measure sandstone. In the narrow valley of the creek there is a fine stream fed by springs from the prairies back. The more important trees are black walnut, hard maple, white, black and bur oaks, cottonwood, quaking aspen and large toothed aspen. On the sandstone rocks may be found a few species of interesting ferns like the cystopteris, pellaea and maiden hair fern, shrubs like the dogwood and gooseberry. In the woods there may be found, in the spring, yellow, blue and dogtoothed violets, hepatica, mandrake, cohosh and in the fall boneset, joe pye weed, lobelia, aster and golden rods.

Ledges State Park, Boone County

This park is situated about five miles from Boone, and the Des Moines river flows through the park. There are some 640 acres in the park, without counting the land in the meandered stream. The floor of the little valley of the Pease creek
is the point most people are familiar with. This has been used for picnic purposes for more than fifty years. On either side of Pease creek may be seen sandstone walls, in some places more than 100 feet high. The sandstone is of the coal measure type. Of trees the white, green and black ash, hard and soft maple, hickory, basswood, hackberry, black cherry, iron wood, blue beech, red, white, chestnut and bur oaks, slippery and American elm, may be mentioned. One of the largest American elms in the State occurs in this park. There are also interesting shrubs like the nine bark, moose wood, pin cherry, dogwood and buck thorn. The ferns are also interesting and consist of the maiden hair, cystopteris, walking leaf and woodsia.

Lepley Park in Hardin County

This park is situated south of Union and covers approximately nine acres, a gift of Ellet Lepley and his brother to commemorate the pioneer citizens of Marshall and Hardin counties. The park is near the Iowa river and contains fine white, red and bur oaks, hickories, hard maple, bass wood and elm, some flowers like violet, mandrake, bloodroot, dutchman's breeches, wild ginger and fall flowers like asters and golden rods.

Eldora and Pine Creek in Hardin County

This park is located near the town of Eldora on the Iowa river and Pine creek, and covers an area of about 200 acres, a substantial gift from Eldora in the way of land and cash. The sandstone cliffs that mark this park belong to the coal measure sandstone. It is so unique that David Dale Owens in his survey of the region a little before the middle of last century made some interesting remarks on the sandstone and the white pine. A perennial stream, Pine creek, flows through the greater part of the tract. There are also some interesting Indian mounds. The white pine, paper, and cherry or gray birch are unique as the most southwesterly distribution of these in the United States. There are also some interesting ferns like the marginal, sensitive and phegopteris beside the brake and Clayton fern. Some of the white pines are probably more than 250 years old. An old stump in the area was four feet in diameter. There are also some interesting shrubs like the round leaved dogwood, red berried elder, moose wood, currants and gooseberries. Of the interesting flowers the large pink lady slipper, yellow lady slipper, blue and yellow violet, wild ginger, golden rod and aster are mentioned.
Jones County Park

This park is located near the City of Anamosa on the Wapsipinnicon river, about 200 acres in the tract, largely a gift from the citizens of Anamosa. It is a rough rolling tract with limestone ledges facing the Wapsie river. It contains an old Indian cave in which the bones of animals which once abounded in the region were found. There is an excellent highway through this park, and there is a fine wooded tract of ground at the farther end of the park. The more important

Natural Bridge near Morehead Caves, Maquoketa, Iowa.

trees are red, white, black and bur oaks, black birch, quaking aspen and large toothed aspen, basswood, hickory, slippery and American elm, hackberry, sugar maple, black and green ash, iron wood, hop horn bean and shrubs like the dogwood, choke cherry, gooseberry, black currant; such spring flowers as hepatica, wind flower, mandrake, cohosh, geranium, meadow rue, false Solomon's seal, Solomon's seal, goldenrod, sunflower and asters.

Morehead Caves in Jackson County

This park is situated on a creek flowing into the Maquoketa river, and has an area of 16 acres. An ancient stream of considerable size once made its way under what is now a natural bridge, which bridge is covered with a growth of hardwood trees. This cave was carved out of limestone rock. While not as wonderful as the Natural Bridge of Virginia, it is truly wonderful for a prairie state like ours. It is interesting also for its plants, like Sullivantia, cliff brake, maiden hair
fern, common brake and such trees as white, red and bur oak, bass wood, slippery and American elm, fine trees of hard maple, and its interesting vernal plants like blood root, Jack-in-the-pulpit, water leaf, hepatica, mandrake, and of the fall flowering plants mention may be made of the asters, golden rods, bonesets, sunflowers, horsemint and lobelias.

Pilot Knob State Park in Hancock County
This interesting park of about 200 acres is situated a few miles from Forest City and north of Garner. It is a part of the Altamont Moraine and the highest point is nearly 1,500 feet above sea level. A half mile from the entrance is an interesting lake known as Dead Man's Lake, much of which is now a floating bog. From the highest point one gets a su-

Dead Man's Lake, Pilot Knob State Park, Hancock County.

perb view of a country which is intensely glaciated with its rolling prairies and timber-covered hills and narrow valleys. The lake contains the spatter dock and white water lily, and is said at one time to have contained the Brasenia, a rare water lily; numerous grasses, reed grass, bog five finger (Comarum), bladder campion, blue lobelia, Joe pye weed and boneset. The trees consist of black walnut, quaking aspen, large toothed aspen, barren oak, butter nut, hackberry, red oak, bur oak and near the park a few white oak, hazel, dogwood; such plants as white boneset, golden rod and aster are common.

Fort Atkinson State Park in Winneshiek County
This park is located near the town of Fort Atkinson and
the Turkey river. It is an old government fort built at the time Prairie du Chien was an important trading post and when we had troops stationed at Fort Crawford. The buildings were erected in 1840 when Jefferson Davis was stationed at Fort Crawford. The park is situated on a beautiful eminence overlooking several little valleys covered with trees. The present buildings number four and are in good state of preservation, having been built of the native limestone, quarried on the grounds. Connected with it is the old dug well which has been fixed up. The houses have, in part, been cleansed and white washed. Connected with the pioneer history of the place is an old Congregational church and a Lutheran church. The latter will be restored by the Lutherans and given to the State. The old Congregational church, too, should be the property of the State. More than fifty percent of the cost price of the area was given to the State by the generous citizens of Fort Atkinson.

Gitchie Manito Park in Lyon County

This park is located in the northwestern quarter section of Iowa, on the Big Sioux river where this state joins South Dakota. It comprises only about 27 acres of land. The three states—Minnesota, South Dakota and Iowa—meet some ten miles east of an interstate highway. The park consists of a pile of rock known as the Sioux quartzite and this is exposed only at a few other points in Iowa, though the Big Sioux has cut its way through this same rock further to the west. It is an old rock and is a mere remnant of a fairly high chain of mountains which spread over this country when the region to the east was once a part of the Gulf of Mexico. The glaciers and other erosive forces have worn this rock away until the park is like the surrounding country. In this park is an interesting pool of clear water from 25 to 30 feet deep. Here the Indian and buffalo were once supreme, and although Longfellow never saw the country, this is where the story of the “Song of Hiawatha” was laid. It was an ideal sight for the Indian camp on the way to the country where the peace pipe (catlinite) is found and where now exists the town of Pipestone. This region from the standpoint of plants is equally interesting. We can imagine a little of what South Dakota plants are like from this region. Here are the typical western prairie plain plants, the prairie cone flower, the blazing star, mesquite grass, buffalo grass, sand grass, cactus, prairie clover, the wooly thistle and the Iowa thistle; the trees are scanty and there are a few bur oaks, as well as a few basswood and green ash.
Wall Lake State Park in Wright County

This is on the shore of Wall Lake, established chiefly for the hunters. In this lake occur the usual rushes, water lilies, arrow heads, wild rice, manna grass, and in the park bass wood, slippery elm, green ash, black willow, almond leaved willow and cottonwood.

The Distribution of Parks

A glance at a map of Iowa will show that we have not been able to establish any parks in southwestern or western Iowa. There should be parks in that section of the State. The region is an interesting one. The Missouri loess along the Missouri river gives tone and character to the whole region. It has been said that the very best soil in Nebraska has been carried to Iowa, and it has left the curiously sculptured hills with a vegetation showing that it is Nebraska; the large beard tongue, yucca, snow-on-the-mountain are characteristic types. There are no trees except on the north and east slopes of the hills and here we find the red oak, bur oak, basswood, slippery elm and the papaw. Such an area is worthy of a state park if for nothing else than the interesting plant life. The Board and Executive Council hope soon to be able to establish one or more parks in southwestern Iowa.

There are other areas in Iowa worthy of preservation. The Palisades of the Cedar, not very far from Cedar Rapids and Mount Vernon, contains not only the yew but large virgin white oak trees.

There is a bit of territory in northeastern Dubuque County far removed from trunk highways and twenty miles from a trunk railroad, a bit of northern Wisconsin transplanted in Iowa. Large white pine trees are found here by the hundred. The cold north icy banks contain great masses of the Canadian yew and the buckthorn.

There is another bit of boreal land in Allamakee County on the Yellow river where one great spring produces enough water to make a good sized stream, on the icy north slope of which occurs the yew,aconite, paper birch, and balsam fir. The balsam fir occurs at only one other point in Iowa, in Winneshiek County.

There is an interesting track of land for park purposes in southeastern Iowa. This is interesting from the standpoint of early settlement and the fine geological horizon and assemblage of plants. This region is known as "The Red Rock
Region" and extends in broken detachments from Mahaska to Marion counties.

Also there are interesting places in southwestern Iowa, one of which is known as "Dexfield Park" and lies on the Coon river between Dexter and Redfield. This tract is especially interesting because of its fine plants and two magnif-

Pictured Rocks, near McGregor, Iowa.

icient artesian wells which furnish an abundance of medicinal water.

Another one of these areas is in Page County near Clarinda where a fine artificial lake has been made. This tract contains a timber belt on a straightened stream.
Mention may also be made of a fine offered park site at Cherokee in the valley of the Sioux, interesting because of the gravel which was left by the recession of the glaciers. Many unique prehistoric mammals are found at the bottom of the gravel pits. Farther up this same stream is an interesting region near Peterson with steep bluffs covered with a superb growth of hard wood trees and fine vernal plants.

Near Rockford on a barren hill occurs the horizontal juniper, the only place in Iowa. It is far removed from its kind, the nearest point being about 300 miles away on Lake Michigan. On this bleak hill is a wonderful collection of fossil shells. It is surely worth while to preserve these spots.

I have given you somewhat in detail the accomplishments of the State Board of Conservation and the Executive Council. I have a feeling that some localities and some persons are impatient about the progress of our work. If the communities which have grown impatient with us will bear with us a little while longer we will take care of your needs, but the money allotted to us cannot possibly take care of all of the park propositions in every county in the State at one time.

I believe public state parks should be made accessible to all, and that the solution will be many small parks, when the communities bear their responsibilities in maintaining these.

A park must be taken care of, and so the authorities must provide for a caretaker or custodian, and we have placed one in each of the larger parks in the State. There must also be adequate toilet facilities and shelter places. This cannot all be done at once. These parks must be laid out so that we may work to a purpose. Reforestation must be done because in everyone of the tracts we were compelled to take over some cleared land.

A word of praise is due the servants who look after the welfare of the thousands who come to our parks. To the custodian, the protector of animal and plant life, the future will owe much, because they protect these denizens of the wood and prairie that future generations may enjoy the same privileges we are enjoying.

**Custodians of State Parks**

You may be interested to know who the park custodians are. The men who look after the parks at the present time are as follows:

L. Y. Trower, LaMont, Iowa, Backbone Park.
H. Rees, Keosauqua, Iowa, Farmington State Park.
H. Rees, Keosauqua, Iowa, Lacey-Keosauqua State Park.
Karl F. Henning, Boone, Iowa, Ledges State Park.
C. N. Douglas, Lehigh, Iowa, Dolliver Memorial State Park.
H. L. Taylor, Forest City, Iowa, Pilot Knob State Park.
Jay Newcomer, Eldora, Iowa, Honorary Custodian, Elora Pine Creek State Park.
Ellet Lepley, Conrad, Iowa, Honorary Custodian Lepley Park.
Clifford Niles, Anamosa, Iowa, Honorary Custodian Jones County Park.
James Falk, Onawa, Iowa, Honorary Custodian Louis & Clark Park.
W. H. Morehead, Maquoketa, Iowa, Honorary Custodian Morehead Caves.
W. G. McCornack, Traer, Iowa, Honorary Custodian Theodore F. Clark Park.
George Bieber, Fort Atkinson, Iowa, Honorary Custodian Fort Atkinson State Park.
Dr. E. J. Anthony, Strawberry Point, Iowa, Honorary Custodian of upper part of Backbone State Park, that portion of the park near the Strawberry Point entrance.
Finally it is a real pleasure for me to tell you the response on the part of citizens has been most generous, and your public servants who are doing this park work gratuitously are glad to contribute their services for the benefit of the State. It is a kind of service, however, which will count most after we have long since ceased to do our work. There are many yet unborn who will give praise to our generation for having started this work. We are proud of Iowa and its people, and the State Board of Conservation and Executive Council hope to establish in rural Iowa a park system of which we, as citizens of Iowa, may well be proud.
Professor Spencer Ambrose Beach

The "Master of all Good Workmen" has called from our Forestry faculty a true friend and a great teacher. Ames Foresters learned of the death of Professor S. A. Beach, Vice-Dean of Agriculture, with heartfelt sorrow; little had we expected when he was with us at our annual spring campfire early last June that it was the last time we would be privileged to have his genial company on such occasions. The brief talk he gave that night was the last he ever addressed to Ames Foresters; yet when we now review in our memories the thoughts he expressed, there seems to have been in them something of the prophetic. Fellowship in service was his theme; the ever valued personal touches in all undertakings, which, he said, were the outstanding points in the characters of leading workers.

The death of Professor Beach was felt as a personal loss, because he had so completely identified himself with the development of Forestry at Iowa State College. When he came to Ames in 1905 but three or four courses were offered in Forestry, and these were of a very superficial nature. Although primarily a horticulturist, Professor Beach was in thorough sympathy with the need throughout the country for trained foresters, and convinced that Iowa State had a place in the training of these foresters, he brought every influence to bear for the broadening of the Forestry curriculum. We are hardly over-estimating his services when we say that the Forestry course as it is today at Iowa State is largely a result of his unceasing interest in the development of a strong department.

A natural outgrowth of his interest in the teaching of Forestry at Iowa State College was a great personal interest in the Forestry students. At least once every year he welcomed all Foresters to his large comfortable home for an evening of fellowship and pleasure; no one ever took a keener interest in our campfires, and in our problems concerning college work, he gave of his time generously and of advice sincerely.

Professor Beach as a scientist was characterized as conservative. Early in his scientific work he wrote quite prolifically, yet every one of his works show a very critical analysis of all facts and data before they were published for his chosen profession. Probably the greatest single contribution to horticultural literature is his two-volume work, the "Apples of New York." If he had written nothing more than this, his place as a great horticulturist would have been secure, for it
is the most complete monograph on the systematic pomology of the apple published in America. In the fourteen years of his connection with the New York Agricultural Experiment Station he published, in addition to the "Apples of New York," thirteen experiment station bulletins. The seventeen years of his service at Ames has witnessed the publication of but three bulletins, but during those years there was hardly a volume of the Iowa Horticultural Society that did not contain one or more valuable contributions to horticultural science.

It would be but folly to measure the services of Professor Beach by the volume of information he published. He was deeply interested in the problem of hardy fruits for the upper Mississippi valley, and he is said to have considered the opportunity for apple breeding here as the chief reason for resigning his position at the New York Experiment Station in 1905. He leaves to Iowa and the world, as a product of his labor and leadership an outstanding collection of apple breeding material containing nearly 30,000 cross-bred seedlings, and upwards of 3,000 trees of bearing age. As his next great job he had planned to bring this material together for publication.

The activities of Professor Beach among the various scientific societies speak nobly of his rare ability as a leader in his particular field. He was a member of the Royal Horticultural Society of London, and the American Association for the Advancement of Science. During the entire period of his work at Ames he was a member of the Iowa Horticultural Society, and was president of that society from 1920 until the time of his death. He was a prime mover in organizing the American Society for Horticultural Science, and a charter member. At Iowa State College he was affiliated with the Alpha Zeta, Sigma XI, Gamma Sigma Delta and Phi Kappa Phi honorary fraternities; and was a charted member of the local chapter of Acacia social fraternity.

As a man, no less than as a scientist, Professor Beach stood for all that was noble and good in life. His strong personality went out as an influence for good to all with whom he came in contact. His lofty ideals of loyalty to home, as well as to his chosen life work, have earned for him the sincere admiration and love of all who came to know him. Ames Foresters feel indeed, that in the passing of Professor Beach they have lost a true friend and a great teacher.

One of his co-workers once gave expression to an ideal which seems a fitting tribute to his own:

"As the crown and end of all true labor, and all skill, is to produce men; as the horticulturist in his disappointments
and failures, as well as in his successes, will, if he is wise and true, aim to perfect fruits more lasting and valuable than those of the apple or vine, and will set the choicest value on the blossoming of truth and justice, let us hope that the taste for and the culture of the sweet and humanizing influence of nature may join with all other agencies to fit us to send out to the world the fruits of integrity, self-respect, and wise judgement."

Bernhard Eduard Fernow

Bernhard E. Fernow, dean of the State College of Forestry at Cornell throughout its brief history, died at his home in Toronto on February 6.

He was born at Inowraclaw, Posen, Prussia, on January 7, 1851. Educated at the Bromberg Gymnasium, the Mueden Forest Academy, and the University of Koenigsberg, he came to America in 1876, and after ten years in metallurgical business, in 1886 became chief of the division of forestry of the U. S. Department of Agriculture, holding this position until he came to Ithaca.

Dr. Fernow later became professor of forestry in Pennsylvania State College. In 1907 he went to the University of Toronto as dean of the faculty of forestry, retiring in 1919 as Professor Emeritus. He became easily the most distinguished forester in North America.

He edited in succession The Forester, The Forestry Quarterly, and The Journal of Forestry. He wrote "The White Pine" (1899), "The Economics of Forestry" (1902), "The History of Forestry" (1907), "The Care of Trees" (1911), and many reports and monographs. He was a fellow of the American Association for the Advancement of Science, vice-president of the American Forestry Association, and a member of the Canadian Conservation Commission.

In 1879 he married Olivia Reynolds, of Brooklyn. She survives him with four sons: Rossiter Raymond Fernow '02, of Cynwyd, Pa., Bernhard Eduard Fernow, Jr., '04, of Ithaca, Fritz Fernow '09, of Buffalo, and Karl Hermann Fernow '16, of Ithaca. A daughter, Gordon Fernow '02, died in Ithaca on January 3, 1902.

—Cornell Alumni News
Preaching Forestry To Farmers
IRWIN T. BODE.

Extension Associate Professor of Forestry Iowa State College

Coming to us from a level-headed business man like Secretary of Agriculture, Henry C. Wallace, the following paragraphs, taken from an interview printed in a recent issue of The American Forestry Magazine, can hardly be labeled "calamity howling," "propaganda," or "theorizing." They must be taken for the cold facts which they contain.

"The rational use of land, the same correlation of timber crops with live stock and food crops, based upon the factors of soil, climate and market, is one of the foremost problems of the whole United States.

"American agriculture has received a terrific jolt during the past four years. Changes both at home and abroad brought about by the war and by economic developments since the war make it necessary for us to resurvey our agriculture. Those of us who are living pretty close to the farmer and his problems during these trying times have become convinced that the expansion of cultivated land in the United States is due for a slowing up, that land tillage will have to be contracted on a lot of poor land along the margin of successful farming, and that for some time to come American agriculture will tend to concentrate capital and labor upon the best soils and in the regions most favorably located in relation to the principal food markets. We must find a profitable crop which can be grown cheaply, with little labor, on land which the plow will pass up. On much land of this kind Nature is ready with the crop—timber; and the needs of the day are ready with the market.

"A new order of land use must take the place of the old. The realignment of agriculture forced upon us by the great war will give it tremendous impetus. I can conceive of nothing more important than an intellectual co-ordination of rural effort that will afford profitable crop of lands which cannot economically be tilled.

"And just as the land economist was wrinkling his brow over this problem came the national need for timber knocking at the door, indeed, bursting right through it. While the old order in American farming, under which men reached out constantly for more raw land, has changed into a new order which impels contraction, our national timber supply has been silently and steadily disappearing. One forest region after another has been swept over. The average carload of lumber has had to be hauled farther and farther from the saw-
mill which made it, to the farmer or city man who put it into his home. Last year, I believe, the country hauled something over two million carloads of lumber an average of 485 miles and paid $275,000,000 in lumber freight bills.

"The answer is so plain that he who runs may read it. Here are two big birds of ill omen to be killed by one stone. We can put our unplowed acres to work growing a profitable crop for which there is no glutted market; repopulate our deserted forest regions and abandoned farm districts; give both the earth and the people something to do; and meet the impending shortage of forest products—by growing wood, east, west, north, and south as part of a rational scheme of land use, with somewhat the same intelligence and skill that we put into the growing of cereals and fruit. National refor-

A demonstration planting in Tama County, Iowa, on land cleared of timber and from which all the good top soil has been washed, leaving only eroding hillsides.

estation should command the interest and support of every thinking American citizen.

"There is an urgent call that we make ourselves a timber growing nation. The day of timber mining is over."

**Relation of Forestry and Farming**

This view in itself comes to many of us as a "jolt." Neither the farmer nor the forester has been prone to think of agriculture and forestry together. The forester, for the most part,
has turned his attention almost completely to the field of the large forest tract. The farmer, being adequately supplied from the bounty of our hitherto plentious forests, has been too busy to reflect much upon timber possibilities for his idle acres. Farm Forestry courses have existed in many of the agricultural colleges for years, but perhaps, if the truth were told, they have meant in more than one of these institutions merely one more subject that a fellow had to take as a necessary evil, or even had to teach along with the “more important” real forestry subjects. The results that have actually been produced upon the farm are negligible. Now, let there be no misunderstanding. No reflection is intended in the present discussion upon either the importance of the broader field of forestry or upon the desire of the agricultural student and the farmer to devote their entire attention to those things which are the chief business of the farm. Neither is it intended to pervert the sense of Secretary Wallace’s statements from reference to the relation of farmlands and forestry as it exists in the eastern and Lake States to an exclusive reference of a relation between these two industries as it exists or should exist in some of the midwestern, highly agriculturalized states—such states as Iowa, where 85.5 percent of the land is improved farm land, and where 43.7 percent of the population is rural. It would be wrong economy surely, as well as absurd, to suppose that such states should drop farming as a business and start to raising forests. However, even in these states, the day is rapidly passing when idle land is excusable on any farm, and even here there are many acres which are non-productive so far as agricultural crops or pasturage are concerned. There is scarcely an acre of this idle land that will not raise good timber crops, and the relation to which Secretary Wallace refers should exist in these states as well as in those states with greater percentage of timber soil. It is with this latter field that the following discussion deals.

Why Forestry for the Farmer?

“But,” you say, “it is the business of the farmer to farm and of the forester to raise trees, and the farmer should devote his time to farming and buy his wood and use substitutes when there is no wood. Why attempt to make a forester out of the farmer?”

This is undoubtedly true up to a certain point, yet it cannot be made as a blanket statement without reservation. The farmer is the largest wood-user that we have. Forty percent or more of the wood consumed in the United States goes to the farm. The average farm consumes 2,000 board
feet of lumber per year. In Iowa, alone, one of the most typically agricultural states we can think of, there are consumed some 20 to 25 million fence posts per year, and one-half million of cords of wood, while the wood using industries in the state require yearly over 262 million board feet of wood. This is a wood bill of more than 35 million dollars for a purely agricultural state. On top of this there are in Iowa some two to two and a half million acres of land best suited to growing wood crops. Surely the farmer is far from being unconcerned about wood,

In spite of substitutes our demand for forest products is increasing daily. There are some things, especially on the farm, for which wood will always be the most practical material as long as it is obtainable—posts, poles, fuelwood, rough construction timber. The farmer finds on his farm certain acres better suited for the producing of trees than for anything else. These acres are a part of a permanent property and comparatively small in extent, and the tax and carrying charge problems are not what they are for large forest tracts. Therefore, the product can be harvested as needed, and that which is left until the farm needs it or until the market conditions improve for its sale can be held over on the stump without deterioration. The work on the forest crop can be done nearly altogether during the winter when man and team labor is plentiful. So, after all, the business of producing wood materials on the farm works ill well with the rest of the farm cropping plan, and the farmer as a wood producer in an agricultural state is not at all an irrational conception.

Preaching—Easy: Practicing Meets Its Snag

It is all well and good to preach to the farmer that it is practical for him to raise timber crops, but it is another matter to help to do it and to show him that it is a profitable thing to do. Here again, we are dealing with the situation as it exists in the regions where the woodlot is only a few acres in extent at the most, and where large scale lumbering does not take place. Certain problems immediately present themselves to the worker in this field which are peculiar to it alone.

Little By Way of Precedent to Go By

Outstanding among these problems is the fact that there is very little by way of precedent to guide the new worker. The chances are that any such endeavor in any of the states will be more or less linked up with Extension Service or at least Extension methods. It is true, there are those States where timber is recognized as one of the chief products, where state aid is available to the farmer in the matter of securing
trees for planting, etc. and where certain methods of procedure have been developed along the lines of woodlot practice. In such states many things can be done with plantings and woodlot crops that cannot be done when it comes to dealing with woodlot situations in Iowa. Yet the woodlot is a valuable asset to the Iowa farm, has its place there, and should receive careful consideration. The consequence is that the forester, attempting to translate his technical training into terms of farm forestry in Iowa, finds a new language and new conditions.

The problems with which he must deal are those of forest mensuration, increment of stands, types of stands, land classification, utilization, etc., just as truly as in large forest regions. Yet they are different in character and purpose. For the present at least, it seems wise to put these subjects into terms of the farm itself.

Profitable Disposal of Surplus Crops a Problem

To adapt the technical phases of forestry to the size of operation required by the needs of the farm rather than to outside industrial requirements of the localities is another task. This is generally speaking, for there are areas where
trees should be growing regardless of whether the farm itself can or cannot consume the entire crop. When this latter becomes the case, it means that to present any reason at all for economy is expending time and labor raising timber on such land there must be some outlet for the product at a figure which will insure a little more than the cost of raising it. To date this has been one of the biggest snags in the way of otherwise favorable promotion of woodlot practice. This condition does not arise because of a surplus of wood materials for wood working industries, or because of a lack of industries using wood material. It is believed that there exist in the state of Iowa or near the borders enough wood using industries to absorb any such production. These industries now obtain the large bulk of their raw material from distant states and pay considerable in freight for transportation to the point of manufacture. Many of them would undoubtedly be willing to purchase their raw material nearer home if it were practical to do so. But this only raises another problem, namely, that of putting a possible product of idle farm acres on the market in such quantity and in such form and quality that it is acceptable to the user of wood in the rough. There are certain localities where considerable amounts of local timber are purchased by manufacturers now, but there is much more timber available for such purposes, and there could be much more of it produced on now waste land if some adequate system could be worked out for getting the buyers and producers together.

Fair Profits and Soil Values

Immediately upon the heels of the foregoing problems comes the question of what should be a fair profit, even if timber can be grown on waste farm land. Almost at the same time, in fact unavoidably linked with profits, is the charge which a farmer should be allowed to make for his land as capital. Of course, under forest conditions it is a recognized fact that forest land does not and should not carry a high soil value, but in dealing with the Iowa farmer one has to deal with the man who is accustomed to talking of a farm as a piece of land of so many acres and that farm as being worth so many dollars per acre for each acre included. In other words, if a farm in Iowa is sold, it is sold for a lump sum or for so much per acre regardless of whether or not all the acres are good farm acres, except as poor land affects indirectly the sale price of a whole piece. The result is that the farmer is used to thinking of farm land as worth $100 or $200 or $300 per acre whether that land will raise 60 bushels of corn or whether it is so low and wet or so steep or so poor and
dry that it will hardly raise a blade of grass. It is hard to get him to appreciate, to a workable degree, the fact that he must make a "classification" of his poor and good land; that as long as he is in possession of the farm and will therefore not be able to realize on any actual sale of those idle acres they are not worth $200 or $300; that as they stand in their present condition they are not worth $1.00 an acre so far as their productive power is concerned. Furthermore, even though convinced of the plausibility of a proper soil value for forest crops, too many of the farmers feel that they are too busy to start such land producing timber. At the same time many of them are hauling fence posts and coal from town.

**Forests and Their Indirect Relation to Farming**

Then, besides these problems, come the ones which although of paramount importance to agriculture are most intangible and therefore most likely to receive a deaf or at least indifferent ear of the land-owner. These problems are the ones which have to do with the effect of tree growth on climate, water holding capacity of soil, underground water supplies, etc. There come repeated and increasing evidence of such problems in reports such as the following:

*Cherokee, Iowa, September 18th.* "For the first time in many years, if not in the history of the settlement of the county, an increasing number of farmers are being compelled to haul water for domestic use and for stock purposes. Flowage of deep wells has continuously diminished for the period of eighteen months, until some of them have failed. There has been sufficient rainfall for crops but deep veins have not been reached. From farms supplied by springs no complaint of water shortage has been received. Those who have reserves stored in cisterns are able to continue feeding operations without the addition of over-head expense represented by hauling."

*Or again:*

*Galesburg, Illinois, January 25th.* "More than a million gallons of water are being imported daily by the Burlington Railroad here. Unusual low levels of lakes of the neighborhood have virtually shut off the local supply of water. The road is building a new reservoir, which, when completed, will eliminate future water shortage such as is being experienced at this time."

It is clearly recognized that many other factors enter into these changing conditions. To place the forestry problem in its proper relation to these others and then to get the man who is interested in the land that is affected to appreciate this relationship is clearly a task in itself. Land
drainage, straightening of streams, removal of forest growth, etc., have made available for cultivation many acres of otherwise non-agricultural land, and undisputably have their place in our intensive agricultural system, so that there is no attempt to discredit these practices wherever they will prove permanently beneficial. Yet, there has undoubtedly been a tendency to use these practices with only present results in mind. It may be we shall learn too late that some of our

Many of the Iowa lake shores are in urgent need of forestation.

swamp lands were worth more actual dollars many times over as swamp land than as drained agricultural land. It may be we shall regret deeply the fact that some of our streams no longer wind idly through our fields but rush down through them in a straight channel, carrying too much of the earth’s water supply at one season and not nearly enough at another. It is already regretted in many places that the hillsides no longer carry their forest growth, but have been stripped and bared, and now have given up even their profitable soil covering and are rapidly becoming useless, decreasing, rather than increasing the improved farm lands. In short, even in Iowa, the day is bound to come when it will be realized that trees and woodlands in their economic aspects with relation to agriculture in general, are worth all the land they occupy outside of any intrinsic value they may have as crops.
THE AMES FORESTER

Forestry Extension for Iowa

It is because of these considerations that Iowa is attempting what to some may seem a useless thing.

"Forestry and Forestry Extension for Iowa! Seems rather foolish on the face of it."

Yes, but only on the face. It will not be forestry of the sort that goes on in Minnesota or Pennsylvania, or Georgia or Oregon. It must be of the type involving the problems already set forth and linked very intimately with farming.

Something more than a year ago there was organized in the general Agricultural Extension Division of the Iowa State College a Forestry Extension Service. A year's work has established one or two facts beyond question: The need for forestry work in Iowa is greater even than had been supposed and its possibilities more promising; the methods for carrying on the work and the work done will have to be especially related to the requirements of intensified agriculture and hence adapted to the small farm woodlot and utilization of material mostly in a localized field; the increasing interest in this type of forestry points to the developing appreciation of the beneficial influences of woodlands to farms.

The following analysis will give the clearest idea of the field and the lines of work to be carried out.

I. WOODLOT MANAGEMENT
   A. The Native Woodlot—Care, Proper Management, Provision for Regeneration.
   B. The Planted Woodlot
      2. Young Plantings—Thinning, Plan of Management.

II. SHELTERBELTS
   A. Mature Temporary Planting—Needs, Renewal.
   B. The New Shelterbelt—Proper Species, Arrangement

III. REFORESTATION
   A. On Eroding Lands.
   B. On Waste Lands.
   C. On Overflow Lands.
   D. On Areas for Aesthetic Purposes.

IV. WOOD UTILIZATION
   A. Woodlot Crops—Their Value, Marketing.
   B. Wood Preservation.

Here is a peculiar field for the forester; one in which the problems have received only partial consideration. The Forester has been very apt to consider such states as Iowa as well separated from the forestry field. Yet such a type of forestry must be considered in any National forestry program.
Recreation as a Basic Forest Product

By Arthur H. Carhart,
Former Recreation Engineer, U. S. F. S.

There is a widespread attitude among technical foresters that the sole function of the forest is wood production. Wood, wood and more wood is the motto. Nothing shall stand in the way of even a little more production of wood according to this even if it is accomplished through the elimination from forest territory of other uses which add invaluable service to the people who are owners of these public properties.

This is a narrow one track policy, however. In all of the schools of the country where scientific agriculture is taught there is a slogan “Diversified agriculture.” What the progressive forester of today must have is a slogan of diversified forestry. Forests must grow wood but must also produce every valuable thing possible in community service. It is the total value of all such service that counts, not the total in one field.

One of the most valuable things which the forest can give to the people who own them is recreation. We are prone to look on recreation as purely amusement. The word recreation is often taken as a synonym for entertainment.

Now, recreation as it must come to be recognized is a rebuilding force. It is just what the word implies—re-creation. Recreation is not a luxury. It is a necessity to human life and is the essential complement of work.

Recreation is of many kinds. It is marketed every day by the organized commercial recreation concerns of the city. The movie, amusement park, dance hall, lecture, opera, all offer recreation. But none of these demand the beneficial individual initiative and the degree of personal participation that recreation in the outdoors demands. There is no higher class of recreation found in the world than that which is found in forest lands. There are not only the mental reactions, all wholesome but there are the physical values produced under the best environment. And more important than all, the recreation activities of the forest take the person securing them away from his habitual surrounding which in itself is a recreation and further gives a setting for other activities which heightens their values many times.

We have hitherto looked upon parks as representing all of the field of outdoor recreation of the country. But forests owned by the people now are producing more rural recreation than the parks. The future will witness relatively more in-
crease in recreation produced by forest-like than by park-like areas.

Before we dig deeper into this statement let us look at the fundamental fact that practically no outdoor recreation area, including parks, is of much service as recreation producing property unless there are trees. Take the most ordinary prairie and add trees to it and there are recreation values

Photo by U. S. Forest Service.

Fishing on Lake Creek, Leadville National Forest, Colorado.
Some water and trees are nearly absolutely indispensable in recreation areas. But trees, on almost any sort of ground will produce recreation values of some sort.

So we may state an axiom. Where there are green trees, there also will be found outdoor recreation of high quality. When and where trees grow there too is some type of forest. Anyway is it not more sensible to realize on this service to humans at the same time as wood is growing, for there is no tree in the country known to stop growth when a recreationist camps under its branches. It just keeps right on growing, and whereas wood harvest is once a century, recreation harvest is every year and month. And the production of wood, the prime function of the forest, and the coincident and inseparable invaluable human service in recreation use move right along together.

It would be well for the technical schools of forestry to scan their courses and see if there has been ample consideration of this service to the human family through direct use. Recognition of this service of the forest is inevitable. It will be better to anticipate it and meet it in an intelligent manner than have it forced. It will be well for all technical foresters to take stock of these ideas along similar lines. There will be less friction and greater accomplishment if those men now studying and practicing forestry recognize that this recreation service is a fundamental thing which comes inevitably when trees are grown.

This recreation use of forests will come surely. We have looked on parks as the sum of our recreation fields. Soon we will come to view our forests as our major recreation grounds and the parks as preserves of natural beauty that are more out-door museums than simply recreation grounds. Or if there are rural recreation areas of great extent, called parks, they will be handled mostly as forests. This statement refers to the rural type of park rather than city parks. It includes municipal outer park belts, country, and state park systems.

The one reason this evolution will come lies in the fact that the forests serving recreation as well as other forest uses can be made many more times extensive than parks. Parks serve one use. Forests not only give recreation averaging per unit as high in quality as that afforded by similar areas in parks but they serve other economic purposes. We can afford to tie up only about so much in every section of the country in parks serving only one purpose. We can afford to put many times more in the forest for they serve recreation plus wood production and often grazing, watershed protec-
tion and other economic uses. While the people are playing in them all these material productions go on at one and the same time. That is, if diversified forestry comes. The precept that the forest is to be just as much total service as possible through every value it offers is essential. It must be looked upon as something more than only a wood lot.

Take our own state of Iowa as an example. We have now an admirable start on a state park system. These park areas are necessarily limited. Further, there is a continual cost of upkeep justified only by the recreation produced. Forests, through material production, pay their own way. Iowa land is too valuable to tie up beyond a certain quantity if it is to serve only one purpose. Of course it can serve no better purpose than the upbuilding, the re-creation, of the the people. It is sure that there will be a saturation point reached in all state park development. That point will be where the state feels that it cannot afford to tie up and maintain any more land surface for the exclusive function of parks.

This is the point where the state forest will be introduced in serving increasing and major recreation demands for the state.

Iowa has many areas where there is land that is not suited for anything but forest or park purposes. There are certain of the bluffs along the Missouri River, banks of the Des Moines, choppy breaks of the northeastern section, all lands where timber can be made a paying crop. But just as soon as there are trees on the poorest waste areas they have very material recreation values. But because of the fact that these may pay for themselves through the growth of timber they can be extended far beyond the acreage which can reasonably be included in parks and this very quality of large extent makes it possible to have better recreation production of higher quality that can possibly be produced on the necessarily limited areas in parks.

Do not misunderstand. There is a place in a recreation service system for rural parks. They are very necessary. Every state and county needs more of them. But they are only part of the system. The forests are another portion heretofore unrecognized as such. The forests furnish the quantity while the parks furnish the quality recreation and in the past this has been disregarded.

It is safe to say that there is going to be a progress in thought, a broadening of outlook in the recreation service field. We have only had slight vision of the possibilities and values of it. They are immense and in this field it is probable that there will be no one piece of ground producing recreation
as much or as well as the state forest. Of all the system of the nation giving our people the indispensable touch with the outdoors this piece of public land will give more than other publicity owned areas. It is extensive, attractive, full of recreation possibilities and nearest to those who use it. And it pays its own way through production of economic materials.

The planning of forest recreation service is not so much
a field of forestry as of landscape architecture. However, the administration of the whole forest is forestry. The application and development of the plans of the landscape designer will often be in the hands of the forester. And the man who hopes to be a forester should be thoroughly informed as to what such a design attempts and just how it fits snugly into the administration of the entire forest. In the diversified forestry of the future there will be a big place for the human service which the forest can give through the recreation uses, a place too for the landscape architect designing recreation service. Wood will not then be master, its production worshipped as a fetish, but wood will be subservient to a sensible program making it serve humans in other ways than only as lumber. Board feet will not then mean so much as human service from all forest values.
Rice Lake Iowa,—Its History and Possibilities for Developments

A Series of Discussions Regarding the Unpopular Drainage of One of Iowa's Natural Lakes

Compiled By F. B. Trenk

At a time when a sister state of ours is turning to her "ten-thousand lakes," with a jealous pride and is engaged in a determined effort to make safe forever from the exploiting industrialist the virgin beauty of her natural waterways, Iowa may well look to her own heritage of lakes and lake beds and adopt a similar policy. If Minnesota, with her great wealth of fresh water lakes in the northern part of the state, can find it profitable to dam and maintain smaller lakes in the southern part, Iowa surely can afford to handle wisely the limited bodies of fresh water that are still hers. But Iowa has not always recognized the wisdom of such a policy.

In 1906, Rice Lake was a body of clear water, covering some 1200 acres of land, dotted here and there with well wooded islands, and varying in depth from four to twenty-five feet. It lay partly in Winnebago County and partly in Worth County. Its wooded shores were inhabited by numerous fur and game animals; its bayous of wild rice (Zizania aquatica) provided a rich store of food for the migratory water fowl as they journeyed southward in the fall; its water contained an abundant supply of the choicest game fish. Not only did the wild rice fields serve to attract great numbers of ducks and geese on their southward journey; it was one of the few spots in the state where many such birds chose to spend the summer months and rear their young. Vacationists had built a number of fine cottages on the higher banks of the south shore, while the community in and around Lake Mills had looked upon Rice Lake as their greatest natural asset.

Then came plans for draining the lake. Citizens of Lake Mills vigorously protested such actions; but it was argued the land would be worth more if drained than covered with water. The proposed drainage ditch approximately 20 feet wide by 9 feet deep was to begin about one and one-half miles above the lake, west of Lake Mills. It was to pass through Greely or Town Lake, a bay of Rice Lake at the southwest, "and thence on the south side of the lake toward the east to join a ditch which passed through the cast end of Rice Lake, and then coming in a southerly direction to join the..."
ditch aforesaid." It was planned to make the bottom of the ditch four feet above the bottom of the lake.

Dr. Thomas MacBride, in volume thirteen of the Iowa Geological Survey, pages 89-90 has given a very entertaining description of the topography of the surrounding country. As a breeding place for wild game and birds, it was unexcelled anywhere in the state. Yet in spite of organized opposition to the project, Rice Lake was drained, and what was once a large sheet of clear water was transformed into an impenetrable marsh, with not over sixty acres of the 1200,

![Image of Pelican Lake, Minn.](https://example.com/image.png)

**A BAYOU OF PELICAN LAKE, MINN.**

Many of the lakes of northern Minnesota have extensive areas of wild rice growing in the more shallow bays. The above picture illustrates how densely it will grow.

bearing the semblance of what might be called a lake. The success of the attempt has well been questioned. Today, much of the original ditch has been filled in; none of the land has been put to agricultural use, though some few acres support a dense growth of sedges and coarse wire grass which are used for cattle. The white pond-lily bed of about eighty acres in the northwest part of the lake has disappeared, and a rank growth of weeds, cat-tails and rushes has taken its place. The State Highway Commission, in its report on Iowa Lakes and Lake Beds, 1917, refers to the failure of Rice Lake drainage and its impracticibility. It says in part:

"During the progress of the investigation the Commission has taken opportunities, when offered, to inspect the beds of lakes already drained to determine their actual value as farm lands. Several of these lake beds were found
supporting a crop of weeds, shoulder high. The ground under foot was soggy and good for nothing else. A few were used in whole or in part for pasture land. On only two were crops actually found growing.

"These conditions are due to several reasons. In the first place the plans for drainage have often been entirely inadequate. The ditches have been too shallow to drain the water from the deep soft mud of the lake bottoms. Rice Lake in Winnebago County is an example. The lake was drained in 1906. In 1916 a stagnant pool of water covers several acres in the south central part of the lake bed. The remainder is a marsh too wet to afford safe footing and covered with a rank plant growth. Plans on file in the county auditor's office show that the bottom of the ditch was to be four feet above the bottom of the deepest part of the lake. The outlet ditch is eight miles in length and it will cost a large sum of money to deepen it enough to afford good drainage to the lake bed. The people in the vicinity are dissatisfied and wish the lake restored. The fact that some thirteen thousand dollars have been legally collected as assessments on the district above the lake, complicates the situation.

"A second reason is that the purchasers of the beds have often lacked capital to properly tile the land and to plant and subdue it. Such land is heavy and requires considerable time and work before it can be expected to produce common farm crops. Making allowance, however, for these conditions it must be admitted that the development of the land has been distressingly slow.

"This brings us to the third, and what appears to the Commission to be the principal cause of the conditions found to exist in the drained lake beds. In a large number of instances there has been no real demand for the drainage of the lake bed itself as it offered the cheapest outlet for the drainage of surrounding lands. The prices at which much of this land has been sold bears out this conclusion. Taken as a whole the results obtained by lake drainage are discouraging from the State's standpoint."

Possibly those who felt most the great mistake of drainage, are those who have lived a life-time in the vicinity, and have seen a useful gift of nature transformed by man into a marshy waste. Mr. R. T. St. John, Assistant State Fish and Game Warden, when asked to write under title, "Some Things I Know About Rice Lake," said:

"During my boyhood days before the Civil War, Rice Lake was my favorite camp for hunting, fishing and trap-
ping; although eighty miles from my home to the old village of Bristol located near the lake shore. It was a veritable gold mine in fur bearing animals, fish in the waters, and with the bosom of the lake covered with wild fowl and dotted with small wooded islands and its shaded shores, its beauty was beyond description. The same number of acres of improved land in the corn belt of the State could not be compared in value to this wild life refuge and with its health and pleasure added it would be riches untold.

“A few years ago while assisting the State engineer in running the lines with a view to restoring the lake to its former beauty and usefulness, I compared the conditions as nature left it then, and now, as man left it, an unsightly lake bed, useless for anything other than the propagation of wild life, a malarial swamp, with a few acres that could not be drained where coarse fish thrive. One of the beauty spots of our State has passed to the unsightly.”

Mr. J. W. Konvalinka, a resident of Mason City, was asked by the writer to make a statement concerning the drainage of Rice Lake. The statement follows:

“At the Conservation Meeting at Ames, February 27 and 28, the question came up of what benefit the draining of some of our lakes was to the State or the farmer.

“I can speak truthfully of one lake—that is Rice Lake in Winnebago and Worth Counties. I hunted ducks on that lake for a number of years and happened to spend a few hours on the ditcher at the time they were ditching it, and I noticed that the shovel brought up very little dirt. It was all decayed vegetation or peat.

“Before the lake was drained it had some fish in it; there were pickerel, perch, and bullheads, and I think it was one of the best lakes in the State for wild life. There were two islands in the lake and several wooded points surrounded by marshland—just an ideal place for birds to nest as there was plenty of food to be had. I have seen wild rice grow so thick in the lake that a small boat could not be pushed through it. I have seen thousands of pond lillies in bloom on the lake at one time, making a beautiful picture.

“I do not think that the farmers gained one acre of ground that they could raise a crop on, by draining the lake. In fact, it spoiled a pretty little lake and left nothing but an unsightly mud hole.”

Dr. L. H. Pammel of the Botany Department at Iowa
State College, chairman of the State Board of Conservation has always taken a great interest in conserving our lakes, along with our native plant and animal life. Writing of "Rice Lake as a Game Preserve," Dr. Pammel submitted the following:

"For twenty years I have been a visitor to Rice Lake. The first time I went there it was a fine body of water. The second time was after drainage had been ordered. It was in part a slough or a lake with shallow water. The places with shallow water contained great quantities of wild rice. There are beautiful wooded islands, splendid for park purposes. On these islands are such trees as the hard maple (Acer saccharum), northern pin oak (Quercus ellipsoidalis), iron wood (Ostrya virginana), quaking aspen (Populus tremuloides), basswood (Tilia americana), also a few hickory (Carya ovata), slippery elm (Ulmus fulva), American elm (Ulmus americana), green ash (Fraxinus lanceolata), black ash (Fraxinus nigra), black cherry (Prunus serotina), choke cherry (Prunus virginana), pin cherry (Prunus Pennsylvanica), and on the shores, willows like sandbar (Salix fluviatile), almontheaded willow (Salix amygdaloides), black willow (Salix nigra), and beaked willow (Salix rostrata). There are also a good many interesting shrubs like the hazel nut, sumach, wild grape, Virginia creeper, dogwood and the hoary willow (Salix candida) in boggy places. There
are fine shore lines at several points. The banks are high and at one time quite a number of cottages were erected on one of those commanding sights.

"It has always seemed to me that this area would make a most desirable one as a game reserve where wild fowl should be protected. If the hunters of Iowa are to have game, then breeding places must be provided and there is no better place in Iowa. Mr. St. John of the Fish and Game Department has on several occasions recommended that this area be set aside as a game reserve. I heartily concur in this suggestion. The drainage has been a failure. The lake is an important source of water for Lime Creek. It is a water reservoir that should be restored for the benefit of citizens living farther down the stream.

"In a conversation with Dr. Oberholser last summer at McGregor, I suggested that the U. S. Biological Station look into the matter and report to me on its value for this purpose. This was done by Dr. Oberholser and the report is a valuable one. The suggestions of Dr. Oberholser should be taken into consideration."

Following is an article submitted by Dr. Harry C. Oberholser of the U. S. Geological Survey, on "The Value of Rice Lake, Iowa, As a Breeding Ground for Waterfowl."

"Breeding grounds for waterfowl in the United States are rapidly disappearing. This fact has recently been brought forcibly home to conservationists by the great activity in drainage projects, particularly in the Mississippi Valley. To say nothing of the ultimate damage to the country and the lowering of the water level, often to a dangerous point, such draining of lakes and marshy areas destroys, as a natural consequence, their value as a breeding ground for all kinds of water birds.

"The State of Iowa, once famed as a resort for waterfowl, is now largely deserted by them. If even a remnant of the birds of this State is to be preserved, and particularly if an effort to increase their numbers is to have even reasonably good success in Iowa as well as in other states, more lakes and marshes must be made attractive to these birds. Otherwise, it is but a matter of time when our water birds will disappear forever. It is important then to seek out and to preserve or restore all possible lakes in the State of Iowa. There lies in central northern Iowa near the town of Lake Mills, a body of water known as Rice Lake. Its western half is in Winnebago County, the eastern half in Worth County, and all in a rolling
prairie region. It is the source of Beaver Creek, which is one of the headwaters of Lime Creek, a tributary of the Shell River. Originally this lake was about three miles long from east to west and one and one-fourth miles wide at the western end, although irregular in shape. The area of the lake itself together with the marshy lands surrounding it was about 1200 acres, 500 acres of which were open water, and the depth of the water ranged from 2 to 25 feet. A considerable area along the sides of the lake was formerly covered with a heavy growth of wild rice, wild celery and other water plants. Parts of the shore are now timbered with deciduous trees. This lake was ditched and partially drained in 1906, until at the present time its size is reduced to 60 acres of water from 4 to 15 feet deep, about one-half mile long, and 100 yards wide at the widest point. The following species of water birds have been reported as breeding in and about Rice Lake:

- American Eared Grege
- Pied-billed Grebe
- Loon
- Franklin Gull
- Forster Tern
- Hooded Merganser
- Mallard
- Blue-winged Teal
- Pintail
- Wood Duck
- Redhead
- Canada Goose
- Trumpeter Swan
- American Bittern
- Least Bittern

Great Blue Heron
Green Heron
Black-crowned Night Heron
Whooping Crane
Sandhill Crane
King Rail
Carolina Rail
Yellow Rail
American Coot
Florida Gallinule
Wilson Phalarope
Woodcock
Long-billed Curlew
Killdeer

In addition to these, some 70 species of land birds have been recorded as breeding about the lake.

"Rice Lake could be readily restored to its former condition by damming the ditches leading from the lake and it could thus be made again attractive to the water birds that formerly frequented it in numbers. It could thus be easily made a preserve for waterfowl and a recreation ground for the people of Iowa, since 800 acres of land are already owned by the State and the only requirement would be the purchase of some 300 or 400 acres in order to add all the land that would be affected by the raising of the water level and that would be desirable for the purpose in view. In addition, it would be possible to
lease from 1,000 to 2,000 acres of the surrounding land, which would be highly desirable as cover or breeding grounds for certain species of water birds.  

"With our knowledge of the previous condition and value of Rice Lake as a resort for waterfowl, it needs now but a cursory examination to indicate that this lake, if restored to its former condition so far as its water level is concerned would again become an ideal spot as a breeding and a sojourning area for all kinds of waterfowl native to the region. In view of the draining of so many lakes in the State of Iowa and elsewhere that have been the breeding grounds for waterfowl, it is exceedingly desirable that this particular lake be restored, as we know of no lake in the entire region that would be likely to repay so abundantly the money and effort spent in restoration as would Rice Lake; and in view of the great decrease in available resorts for water birds in this general region, it is entirely possible that the lake might be even a more remarkable attraction to water birds than it was in form-

A part of Rice Lake as it appears now.

er years. Proof of its former attractiveness is evident from an examination of the above given long list of breeding water birds that used to frequent this lake. From
the facts above presented, it is evident that every effort should be made to restore Rice Lake."

The citizens of Lake Mills have shown great interest in the proposed restoration of Rice Lake. In a mimeographed circular they ask:

"Can the people of this community and county offer any better proof of their judgement concerning the restoration of Rice Lake, than the self-explanatory and urgent petitions bearing the signatures of some two-thousand local persons as filed with the State Park Board of Conservation, asking for improvement of Rice Lake and its environment as a State Park? Can they offer any better proof than the fact that they have spent several thousand dollars through their Commercial Club and by citizens in general to bring the State and Legislature to see that said improvement should be done? Can they offer any better proof than the fact that they have incorporated for said contemplated purposes to save the timber to themselves and improve said lands for said purposes? This organization has already purchased one-hundred acres of shore line and proposes to continue to do so as to other lands. But the State of Iowa must assist us in the way we are asking."
What Illinois is Doing In Forestry

By V. C. Fisk, '21

Few people of the Central or Prairie States, unless perhaps they have travelled through the southern part of the state know that Illinois has any forests or that any state department is at all concerning itself with forestry matters.

Before a man purchases a store he first calls for an invoice or inventory of stock, as he wishes to know the capability of the store as a producer of revenue. The stock or "growing stock" in a forest is made up of the trees and reproduction on the ground, the growth on this every year representing the interest on the investment in that forest property.

The work of invoicing Illinois woodlands, which according to the census reports for the year 1919 amount to over three million acres on farms alone, started on July 27, 1921. Three men all graduates of forestry schools were employed by the State Natural History Survey to do this work, under the supervision of R. B. Miller, the State Forester. The work first started in southern Illinois and at the present time about three-fifths of the entire state has been surveyed. At first the men traveled on foot or used livery rigs until October (1921) when a Ford was obtained. Three men work in a party, one driving the car, one mapping and the third takes the bumps of the back seat and makes whatever observations he can as to the classes of soil and species of trees in the region. The base maps used are the state topographic quadrangles whenever they are available and when they are not available the county rural delivery maps are used. In every county a detailed examination or estimate of timberland by the strip survey method or the sample area method, is made.

During the field season of 1921, from July 27 until December 15, this three man party, had gone over about 2,389,120 acres of land in eleven southern counties, finding 473,362 acres of this, or an average of 19.8% wooded. The estimated board foot contents for these eleven counties was about one-half billion board feet so that the average was something over 1200 board feet per acre. During the field season of 1922 every county north and west of the Illinois river was surveyed. The finishing up of maps from the field maps and the working up of the data on growth and volume and the plotting of curves of the various sorts is done in the office during the winter season.

Future work in Illinois will depend largely on appropriations from the State. The educational propaganda of the Illinois Forestry Association will also be of great aid in establishing a permanent forest policy for the State of Illinois.
Landing Four Foot Pulpwood
B. A. Chandler

The landing of four foot pulpwood on streams in preparation for driving would look like a simple matter. However, if it is not properly landed the whole drive may be hung. In fact it may be practically impossible to break the landings before the water has entirely run away if this part of the work is not done in a workman-like manner. Even if it is done so that the wood can be driven the cost of piling or the cost of breaking the landings may be excessive, due to the method of piling.

The following simple rules in regard to making of landings of four foot wood combined with the illustrations, may be of value in preventing poor landings:

Rule No. 1. Clean the streams before landings are made. The streams have got to be cleaned sometime, and it is much cheaper the fall before when the snow is not on the ground and before the wood is piled on the banks than after the streams are blocked with both snow and wood. See pictures 2 and 3 of streams which were not cleaned before wood was piled.

Rule No. 2. Clean sufficient area on the banks of the stream so that all the wood can be landed without making excessively high piles or over four piles back from each side of the stream.

Rule No. 3. Do not pile too high. The first pile on the bank of the stream should be piled as high as a man can easily pile wood before the second pile is started. The second
Fig. 2. Wood piled so that stream is clear, but it was not cleared before piling.

tier should then be built up high enough so that it serves as a convenient step for piling wood on to the first tier which

Fig. 3. Wood piled so that stream is clear, but it was not cleared before wood was piled.
should then be built up as high as the wood can be piled easily. The second tier should then be built up in the same manner by the aid of the third tier, and the fourth tier in turn used in that manner.

**Rule No. 4.** Do not pile more than four tiers from the banks of the stream. To do this necessitates too much carry-

![Fig. 4.—Wood properly piled and stream cleaned.](image)

ing of wood in the spring when it is heavily iced and very expensive to handle.

**Rule No. 5.** The wood must be piled so that the channel of the stream is left free for the water; as to trinkle through the piled wood causes it to lose its force before it reaches the bottom of the landings and too much time is wasted waiting for water. Picture No. 1 illustrates wood which was piled too close together. Picture No. 4 illustrates the stream in which the wood was well piled when the stream was well cleaned.
A New Wood Preservative

By Arthur Arent

The world owes much to the pioneers who blazed the way against many obstacles in teaching wood preservation and conservation, and to the Forestry schools that have been established and to there students who carried on and are still carrying on. Not so many years ago the general opinion held that “there was plenty of wood standing for all time.” Today, conservation of wood is a reality and the world is conserving wood. While much has been done and much is yet being done we find the two old enemies of wood, Fire and Decay, taking an enormous annual toll.

The chemical world has tried to keep pace with the requirements needed for wood preservation and all the preservatives used have accomplished much good. True their defects are many and the various water soluble salts that have been used and are being used possess a serious objection in that moisture dissolves the salts and therefore the treatment is removed from wood. Another vital objection to water soluble salt solutions is the difficult in obtaining satisfactory penetration of wood, owing to the grain of some woods and to the waxes, resins, gums and the like which many woods contain and which water will not penetrate. The chief water soluble salt now in use is Zinc Chloride. This salt is also used with creosota-oil.

“Creosote Oil,” obtained from coal tar is also used in large quantities. It usually contains phenol, (carbolic acid) cresol, (cresolic acid) pyridine, naphthalene, and other substances. It must be remembered that these poisonous agents, carbolic acid and cresylic acids are soluble in water and will be removed by moisture. The pyridine is also miscible with water. It is possible that some of the other substances contained in creosote oil may have some toxic lasting effects. The fact that the heavier oil base of creosote oil is insoluble in water and that it eliminates moisture from wood to a certain extent, has brought this product into general use. It was with great interest that the writer read a recent article on “Saving Westminster Hall from ravages of the wood-boring beetle (Anobium domesticum).” Here all the wood, both the new and old was treated with a solution of creosote and an exceedingly poisonous salt. In this case it was evident that England’s wood treating experts did not wish to guess at the final result but used a poisonous salt in connection with creosote. Some disadvantages in connection with creosote oil are viz: It requires heat to obtain a successful penetration.
of wood, the operation is quite lengthy and filthy, it is caustic on the hands of workmen, treated wood is disagreeable to handle, treated wood burns freely, and its color and odor are objectionable in many places, it cannot be painted successfully and in instances certain penetration cannot be had.

United States Department of Agriculture, Farmers' Bulletin, No. 744, states in part as follows: "Decay is not due to the chemical action of the soil or to the fermentation of the sap, but is the result of the action of certain low forms of plant life called fungi. In general, therefore, the most effective method of preventing decay is to poison the food supply."

It was with this thought that the writer started investigations and after years of constant research chose poisonous, insoluble, compounds of Antimony to meet the necessary requirements which were lacking in wood preservatives being used.

What is Antimony? Antimony is a metal. It is not sensibly affected on exposure to the air at the ordinary temperature; its surface becomes slightly tarnished, but does not rust. It is one of the oldest metals known and an account of this metal is found in the writings of Basil Valentine in the year 1460. Antimony is mentioned in the Old Testament. Antimony is used as an ingredient in the construction of alloys such as type metal, Brittania-metal, and pewter plate. It is found generally throughout the world but China probably furnishes the bulk of the world's supply of the ore.

Briefly, these are the properties of Antimony and its compounds. In its chemical properties and its compounds Antimony resembles Arsenic with which the reader is familiar. In the year 1566 the French parliament found it necessary to prohibit the use of Antimony compounds in medicine, which prohibition was not removed until a century later. The Encyclopedia-Britannica, 11th Edition, Vol. 2, page 129 states: "Antimony is one of the Protoplasmic Poisons, directly lethal to all living matter." On this point all authorities are agreed. Webster's dictionary defines Protoplasm as "the essential substance of the cell body and nucleus of cells of animals and plants, regarded as the only form of matter in which life is manifested." All authorities state that all compounds of Antimony are poisonous, and with the exceptions of the compounds of Antimony with some organic acids, as tartaric and citric, (which are not used) all salts of Antimony are decomposed by pure water, and the basic permanent salt of Antimony remains. In reality, a regular "setting process" takes place in wood.

So through the years the writer sought to find and fin-
ally did succeed in obtaining an exceedingly active poisonous Antimony compound which was not soluble in pure water, which would dissolve in creosote oil and insure the same with a permanent poison in practically any desired amount, and so produce a toxic and fire-resisting treatment for wood.

Later we succeeded in obtaining commercial solvents for this Antimony compound, solvents that would dissolve waxes, resins, gums and the like that many woods contain, which prevented water solutions and tarry oils from penetrating wood thoroughly. Here then we had an exceedingly active poisonous, insoluble compound of the Proteplasmic Poison Antimony in actual solution that would penetrate wood far beyond that of other regular preservatives and in much less time. Some of these solvents are volatile and can be recovered in large treating operations. This of course reduces the cost of treatment. No heat is required to secure penetration. Antimony-treated wood is nice to handle and can be painted successfully. Here also, is a much needed treatment for salt-water piling which is destroyed by the teredo and marine borers.

Heartwood of most woods can be impregnated with insoluble Antimony compounds as thoroughly as sapwoods can be penetrated by other treatments. This, however, in most cases must be done by the vacuum and pressure methods now in general use. Sapwood penetration of most woods can be accomplished by the tank method, in which case the tank is kept covered to prevent undue loss of the carrier liquids. It if be desired, an Oil Dye, (insoluble in water) can be used in the treating liquid and the Oil Dye (which is in actual solution—no stirring required) will color the wood the entire depth of the penetration or clear through the wood where vacuum and pressure is used. The expense of dyeing wood in this way is very small and is accomplished without extra work. The dyes will color only new posts or lumber. The colors run chiefly in the reds.

The approximate cost of treating ordinary woods per cubic foot for sapwood penetration from one half inch to one inch, which is a sufficient treatment for all ordinary purposes, will vary from $.062 for merely a toxic preservative treatment (and where it is possible to recover the volatile carrier liquids) to $.137 for both the toxic preservative and fire-resistant treatment. Without recovery of the solvents this will cost from $.17 to $.245. Cost, of course, is always governed by quantities, location, equipment and the like and only cost of material has been figured. In order to obtain the best absorption and penetration of the Antimony compound pre-
servative, posts and timber must be seasoned and lumber should be dry. Owing to the time saved with the Antimony treatment as compared with other treatments, the cost of treatment is very small. It must be remembered that the last price named also produces a real fire-fighting wood. If it be desired, wood can be treated with Antimony compounds to the extent that wood will not flame or carry, merely charring and becoming red hot at the point of contact with fire, like an iron in a forge.

To fortify creosote oil with poisonous insoluble compounds of Antimony would cost approximately $.05 to the gallon of creosote oil.

The record of Antimony and its compounds date back hundreds of years. The poisonous insoluble properties of same were known then and still are known. In obtaining new solvents of record for some of these Antimony compounds it has now been made possible to thoroughly impregnate timbers and woods with these permanent poisonous compounds of Antimony.
A Few Hypotheses on White Pine Losses from Weevil Damage

Perkins Coville
Instructor of Forestry, Iowa State College

Professional foresters as a whole find that the chestnut blight, gypsy moth, locust borer, and white pine blister rust are terms which have a familiar sound and they are more or less acquainted with these various pests or diseases from study or from actual experience. One source of considerable damage to our common white pine (Pinus strobus) is the white pine weevil, known to those who are on intimate terms with it, as Pissodes strobi. I believe the damage from this source has not, as yet, reached the middle west, and those who have not been in the east may not appreciate its character, extent and seriousness. For that reason, a brief description of the insect may help to make the rest of the article more lucid.

Summarizing the life history of the insect as it is given by Graham we have the following general facts:

There is usually one generation, only (in New York). The adults (beetles) appear with the first leaves, feed on the buds, preferring the terminal ones, and soon lay one or two eggs at a time in the inner bark of the white pine leaders. In from six to ten days the larva are hatched and begin to burrow downward. They soon consume all the cambium and inner bark and begin to cut furrows in the wood. When fully grown they usually pupate in the pith, if this is not already taken by other larvae. This takes place some thirty days from hatching and in about two weeks adults are found which stay a week or more before appearing outside. After a period of feeding on the new shoots they seek a place in the litter on the ground and hibernate until spring.

The seriousness of weevil damage is not that it results in the death of the trees, though it may do so, but that it results in the destruction of the main shoot in nearly all cases. Trees that have been weevilled two or three times in successive years often recover, but the weevil has an uncanny way of picking out the leaders of the tree, whether it be the old original leader of the tree as in the first injury, or the tip of one of the side branches which has successfully straightened up to take the place of the original leader.

Probably all are familiar with the result that comes from the loss of a leader. For many years there was a veteran white pine standing on the Cornell University Campus, which showed the result to perfection. It had four or five large side
branches, each of which had become perpendicular, after the injury to the leader, in an attempt, individually, to take the place of the lost member. In most cases of this sort one of the side branches has sufficient advantage to get ahead of the others, but in this case they all seemed to have prospered equally. When this tree was cut down a few years ago the four or five different trunks that it had, were almost a foot through.

If one of the side shoots obtains an advantage over the others so much the better for forest purposes, since in such a case the tree resulting will have the least amount of crook, and have its energies concentrated upon producing one bole or trunk, rather than producing three, four, or five, as in the example given, though it will always show more or less of a "bayoner" trunk.

One of the important features is that the damage is found on the taller and more dominant small trees or those making abnormally good growth during the preceding year, which trees in the case of a plantation, are the ones which one would be most desirous of saving for a stand.

Hence weevil damage in general results in deformity, at least to the trees attacked, production of timber worthless
except for fuel in many cases, and often in the death of some, this all happening in nine cases out of ten to the most promising trees of the stand.

Several studies have been made of the weevil; by S. S. Graham, (See J. of F. XVI, 2, 192, 1918); Dr. E. P. Felt, (Connecticut Agr. Expt. Station Rpt. 1914, 2, 173); and Wal- den, but they are mostly confined to methods of control, per cent of attack for various densities of stand, or to entomolog- ical considerations. The writer in preparing a minor thesis, felt that in addition to these features, some data on the loss of height growth for various densities of stand, and per cents of injury, would be interesting as well as to find whether or not dominant trees were attacked, and whether such trees ever recover their former dominance.

For this study four planted areas and two naturally seed- ed areas were covered and the data here given will be from an average of these six stands. Measurements were taken to show for each tree how many inches it had grown for each of the five individual years from 1915 to 1919 inclusive. The year or years in which trees were weevilled were marked. Af- ter a total of 774 trees was covered the following assumptions could be taken:

I. That the average growth of trees unattacked in any particular year would be as nearly representative of normal growth for that year as any possible data would show. That this is not entirely normal will be due to two factors: (1) Because trees usually make an exceptionally good growth the year before attacked. (This attack seems to be irrespective of comparative total heights and holds true in the case of uneven-aged, naturally seeded areas as well as for plantations). This exceptionally good growth tends to increase the average normal growth we assumed for any year. (2) Trees which have been attacked, say in 1917 and had not been again attacked in 1918, would be averaged in as normal for 1918 but would actually be suffering from injury, hence tending to reduce the normal average. It was assumed that these two factors somewhat balanced each other.

II. That the difference between this normal height growth for any particular year and the growth for that year made by weevilled trees is the approximate loss in height growth due to weevil injury.

III. Graham in the Journal of Forestry, XVI, 2, 190, 1918, showed a curve in which he attempted to show the per cent of weevil damage varied with the density of the stand begin- ning with 100% injury at 500 trees per acre and flattening out to some 2% injury at 8,000 trees per acre.

Graham does not explain how his per cents were obtained
and some but not all of the discrepancies between his results and those shown here can be accounted for by the fact that the two groups undoubtedly were not worked out the same way. However, the result here shown will prove that by no possible juggling could the injury be made to vary for different densities as Graham has shown them.

The method employed in this case was to figure the per cent damages in each of the five years. In some cases by this method, due to heavy injury each year or the injury of some trees 2 or 3 years out of the 5, the total shown is actually more than 100 per cent: for example, if we had 100 trees per acre and we had 2% or 21 trees injured each year for 5 years, the total number of injuries would be 105, which we assume as 105%, although some of the trees could have been injured twice and some possibly have escaped entirely. The better way to put it would be 21% or one-fifth the total as an average per year and this percent is also given in the following table. Column VII. is the total per cent of trees injured, giving the per cent weevilled only once and this is the figure which shows the actual per cent injured, and the one most comparable to Graham’s results in theory. Notice the actual discrepancies, however:

<table>
<thead>
<tr>
<th>Plot No.</th>
<th>Trees per acre</th>
<th>Total per cent injured in 5 years</th>
<th>Average per cent injury per year</th>
<th>Per cent weevilled more than once</th>
<th>Per cent weevilled only once over 5 years</th>
<th>Graham’s figures</th>
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<tr>
<td>No. 1</td>
<td>1210</td>
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<td>20.5</td>
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<td>2722</td>
<td>75.0</td>
<td>15.0</td>
<td>10.0</td>
<td>60.0</td>
<td>36.0 (4)</td>
</tr>
<tr>
<td>No. 5*</td>
<td>8500</td>
<td>71.0</td>
<td>14.2</td>
<td>5.0</td>
<td>66.0</td>
<td>2.0 (5)</td>
</tr>
<tr>
<td>No. 6*</td>
<td>1000</td>
<td>62.3</td>
<td>12.5</td>
<td>6.0</td>
<td>56.3</td>
<td>93.5 (6)</td>
</tr>
</tbody>
</table>

*Naturally seeded-average number per acre on strips that were new.

Other stands are plantations.

So far assumption III, to refer to it again, we can safely say that while varying densities may control the per cent of injury as these densities occur naturally over small areas, they do not control them to such an extent that two areas of
Chart 1. Trees grouped according to years in which injured, and effect of preceding as well as effect upon following growth is shown by comparison with normal.
the same density but of different localities will be injured the same. Graham possibly did not mean to infer this but merely to show the proportion on the particular tracts he studied.

Note the discrepancies between columns VII in the last tables for plots 3-6 inclusive. This should show that where weevil damage is very prevalent, damage seems to occur irrespective of density or spacing of trees. As a result one can say that no change in the accepted spacing for a white pine plantation will do any good in combating the pest directly.

Explanation of the Charts

In figure I the normal growth is shown for the five years. The connecting lines from year to year, i.e., from mark to mark are merely to emphasize the increase or decrease of growth and make them easier to follow through.

For comparison with this are shown the fluctuations in growth for trees weevilled in 1916, 1917, and 1918. Note that in each case our trees made more than our assumed normal growth the year before weevil injury, and were either recovered and dominant again or well on the way within a year or so afterward.

The result for trees weevilled in 1915 and 1919 were peculiar but will not be shown. The trees weevilled in 1915 did not recover well and did not achieve within about five inches of normal growth for the next three years but in 1919 had just barely recovered. All those shown in the chart were normal sooner than that. Trees weevilled in 1919 were less than normal the year before (1918) but were above normal for 1916 and 1917.

There are several ways in which losses of growth can be shown. First we can compare the total five years' growth of normal trees and the total five years' of growth for the groups of trees weevilled in any one year, or all the weevilled trees. This makes the loss even smaller because many trees were of good growth before and after injury and pull up the average. Secondly, we can compare the normal growth, for example, that of 1916, with the growth of trees weevilled that year and along with the growth the latter made when they grew excessively in 1915, the year before, as they always had done. This tends to exaggerate the result of injury perhaps but would bring out the fact that weevilled trees lose, not only what they are behind normal for the year weevilled, but also the amount they might have been superior a second year if left healthy. We cannot say that these trees having grown one inch more than normal in 1915 (see chart) would of necessity have been one inch better than normal the next
Chart 2. Loss in merchantable height when density and percent injury are known.
year if not attacked but we might assume this as possible and even probable.

The following were the percentages of weevil injury per year on the various tract.

<table>
<thead>
<tr>
<th>Year</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915</td>
<td>6.0</td>
<td>5.0</td>
<td>13.0</td>
<td>2.5</td>
<td>3.2</td>
<td>17.7</td>
<td>7.9</td>
</tr>
<tr>
<td>1916</td>
<td>22.0</td>
<td>23.0</td>
<td>23.0</td>
<td>7.5</td>
<td>26.0</td>
<td>11.7</td>
<td>18.8</td>
</tr>
<tr>
<td>1917</td>
<td>39.0</td>
<td>30.0</td>
<td>30.0</td>
<td>37.5</td>
<td>35.5</td>
<td>14.1</td>
<td>31.0</td>
</tr>
<tr>
<td>1918</td>
<td>30.0</td>
<td>25.0</td>
<td>23.0</td>
<td>22.5</td>
<td>6.5</td>
<td>18.8</td>
<td>16.0</td>
</tr>
<tr>
<td>1919</td>
<td>7.7</td>
<td>20.0</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td>6.3</td>
</tr>
<tr>
<td>Aver.</td>
<td>20.5</td>
<td>18.2</td>
<td>22.0</td>
<td>15.0</td>
<td>14.2</td>
<td>12.5</td>
<td>17.9</td>
</tr>
<tr>
<td>Total</td>
<td>102.0</td>
<td>90.7</td>
<td>109.0</td>
<td>75.0</td>
<td>71.2</td>
<td>62.</td>
<td>85.0</td>
</tr>
</tbody>
</table>

Using this for the third method of showing losses, we can say that for any one year of weevil injury that the trees weevilled, say again for 1916, were in this case 5 inches less than normal were 2' 2" less than normal in 1917, 5" again in 1918 and 6" in 1919 or a total of 13 or an average of 3.3 per year over five years. Doing the same for those in 1915 (not shown) 1917 and 1918 we have respectively totals of 25.5", 6.5" and 5.8". The loss for trees injured in 1919 was only 1.7". If we average these total losses we get 10.5" average height total per injury growth lost over these six plots regardless of spacing or per cent of injury during the periods of attack ranging over 1915-1919 inclusive.

We have already shown that spacing seems to have little effect upon per cent of injury. The following table seems to show that the per cent of injury has little effect upon the amount of loss in height.

<table>
<thead>
<tr>
<th>Year</th>
<th>Injury</th>
<th>Height growth lost through injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915</td>
<td>7.9</td>
<td>25.5</td>
</tr>
<tr>
<td>1916</td>
<td>18.8</td>
<td>13.0</td>
</tr>
<tr>
<td>1917</td>
<td>31.0</td>
<td>6.5</td>
</tr>
<tr>
<td>1918</td>
<td>16.0</td>
<td>5.8</td>
</tr>
<tr>
<td>1919</td>
<td>6.3</td>
<td>1.7</td>
</tr>
</tbody>
</table>

We will assume therefore that our average loss during period of attack is at least 10 inches per tree for each attack, provided in case it is attacked more than once, that it recovers between attacks, also that this is a fair average and that it is not apparently influenced one way or another by densities of stand or per cents of injury since it fluctuates back and forth irrespective of them.

So in figure II is given a graph upon which can be found
the feet of height growth lost per period of attack when the per cent of injury and the density of stand are known.

This graph will show that losses are negligible for small per cents of injury but become very large when stands are riddled with the insect.

In conclusion it must be borne in mind that, no doubt, the greatest loss in weevil damage is the merchantability of the lumber due to crooked boles after injury. This study was made to show that there was another factor, the loss in merchantable length which loss as all foresters know is one which will cut down the returns at the end of any rotation. The weevil brings about loss of vitality in the younger trees, upsets our plans of having what would normally have been the most rapid growing and thriftiest trees, reduces final height growth and is usually cutting down the future income of many young white pine stands of today.
Timber Cruising On A Private Operation in The Pacific Northwest

By Neil Welden C. E. ’23

Porteous and Company have evolved a new system of cruising which seems to be gaining favor in the western states. It is a comparatively new system being first tried out experimentally during the fall of 1919 on a job which the Porteous Company had secured in the Gray’s Harbor District mapping and cruising sections. As stated the work was to a great extent experimental and consisted in working out Mr. Porteous’ theory which was an improvement and simplification of the Lacey system. As finally worked out, the cruising system used by Porteous and Company which I shall call the Porteous system, is a three run strip system. That is, there are three cruise lines through each forty, and all the trees on a strip a chain wide are tallied. This is in contrast to the block system, in which the trees on a block of an acre are counted every ten chains. The strip system gives a better average, and the timber is more easily and accurately divided into types.

The cruising is done from a base line, which is usually run through the center of a chain of sections. This may be simply a straight line, run directly down the center line, or it may be the preliminary survey for a logging railroad. The only requirement is that it run from one side of the section to the opposite. It is run accurately, either by transit and chain or stadia, and blazed thoroughly, so that it can be easily picked up. Levels are run over this line with the transit and the traverse plotted by latitudes and departures. From these latitudes and departures, the starting points of the cruise lines, which are four hundred and forty feet apart are figured, and marked on the ground.

The section lines parallel to the base line are then run with a compass, Abney level, and chain and reblazed and stationed to correspond to the stationing of the base line. These lines are called secondary control lines. The elevations taken on these lines are checked in to the base line wherever possible—at least every two miles. It is quite possible for an experienced crew to run an Abney level with an error of less than two feet in elevation to the mile.

After these lines are finished, cruising proper starts. Each cruiser carries a note book, a box compass, a barometer, a diameter tape, and a pace tally. The left hand page of the note book is divided into five columns, the first three of which
are headed "Fir" (Douglas Fir), "Cedar" (Western Red Cedar), and "Hemlock" (Western Hemlock). The heading of the other two columns varies with the locality, but in Western Washington they are usually headed "Spruce" (Sitka Spruce) and "Pine" (Western White Pine). The right hand sheet is cross sectioned ten by ten squares to the inch, with a red line down the center. The right hand column of squares is used for barometer readings.

All trees are divided into diameter classes, as follows—
class "A"—10" to 16": Class "B"—17" to 22": class "C"—23"—26": class "D"—27" to 30": two unit—31" to 35": three unit—35" to 39": four unit—40" to 43": etc.

The cruiser, starting for example from station 1, first checks in his barometer by taking a reading on the station. He then takes a compass shot in the direction of station 1 on the secondary control line. He starts out toward his sighting point, counting paces on his daily register, and counting trees and classifying them. When he has as many trees as he can conveniently remember, he stops and records them in his note book. These notes are made at a distance from the foot of the page corresponding to the distance from the start, figuring a tenth of an inch to ten paces. All trees which come under the unit classification are grouped—for instance, in any problem, 3/11-4-6-2-0 would indicate that, since the last stop, there had been found of that species, three trees with a total of eleven units, possibly two four unit and a three, four trees in class "D," six in class "C," two in class "B," and no "A"s. At every break in grade and every stream crossing, barometer readings are taken and recorded in the proper place. Topography is sketched in along the red line in the center of the right hand sheet. This shows the general slope of the ground, width and direction of flow of streams crossed, rock outcrops, swamps, etc.

On reaching the section line, the cruiser records the distance and direction of the point where he cut the line, from station 1 on this line, and takes a barometer reading on the station. He then proceeds to station 2 on the secondary line, and starts back to station 2 on the base line, using the same method. When he reaches the base line he notes and corrects his error in alignment, and runs to station 2 on the other secondary control line. On reaching this line, he sets over to station 1, and returns to the point on the base line from which he originally started. This makes a total of two miles of cruise line, which is considered a day's work.

That evening, in camp, the cruiser figures the average number of paces taken to the chain, and divides the notes
into types. This last is easily done, as any change in the type sows distinctly in the notes. The next day he does the same thing over again on a different line.

When the total area has been cruised in this manner, the cruisers go to the nearest logging operation, and scale about two hundred trees which have been felled and bucked, but not yarded. Under these conditions it is easy to determine the total volume of any tree in board feet, since the trees are laying as they fell, except for being bucked. This information is used to determine the average number of board feet to a unit. In Douglas Fir this will be about nine hundred board feet.

This concludes the field work. In the office the area is laid out on a scale of sixteen inches to the mile, and the primary and secondary control plotted on this map, with the elevations marked. Then, taking from the notes the starting and finishing point of each cruise line, they are plotted and elevations corrected from the barometer notes in the note books, plotted on them in the proper position. The topography is worked up from this skeleton.

In the meantime the notes in the note books have been divided into forties. This is possible, as the timber is arranged in its proper relative position. The notes for each section are collected on a large sheet, each forty being listed separately. Then using the figures obtained by measuring the felled timber, the volume on the tree cruise lines in each

Packing in canoe used on Thurlow Island lakes.
forty is figured. This amount multiplied by six and two-thirds gives the total volume on the forty. From these notes, the percentage of each species on a forty, and the average volume of each tree is figured. Next the type boundaries are placed on the map, and the stand per acre of each type figured. This data is placed in the form of a table in the corner of the forty it refers to, and the map is traced on a tracing cloth. Prints are made by a black line process on linen. The volume per acre of the various types is indicated by coloring the types with oil colors, red indicating more than one hundred thousand feet to the acre, green, sixty to one hundred thousand, and so forth. The cruise map is now complete, showing the amount of timber on every forty, the distribution of timber in the forty, and the topography of the area.

The application of this system in this form, with a few minor differences was worked out at the Elma job. On this job the crew ran from three to five, not including the cook. It was an excellent location for a tryout of the system, as the ground was rough, and the timber variable. The average was about forty five thousand feet to the acre, but the maximum was a hundred thousand, and the minimum zero. We spent about five weeks on this job, making three camps.

The next place the system was tried was near Eatonville. The advantage of the system is that the office work need not be done by cruisers, as the notes, if properly taken can be read by anyone. Thus when a new job is secured the cruisers can leave their notes and have them drawn up by a draftsman.

At Eatonville seven sections were to be mapped. It was nearly an ideal stand of timber, the trees running of even size, and the distribution uniform. The country was rolling, but not steep, and there was very little underbrush. On this whole area, the timber averaged sixty five thousand to the acre. The only bad feature was that a few trees, in one corner of the area were conky.

The cruising was working in good share by this time, and the crew of three men completed this area in about four weeks.

In Clallan County a check cruise of two sections was made in the settlement of a dispute. Two separate companies made the cruise working in co-operation. No topography was taken, but every tree on the cruise line was measured with the diameter tape and cruise lines were run five chains apart, to insure the highest possible degree of accuracy. The work was done
by one of Porteous' cruisers and one of Clark and Lyford's, working together. This work consumed about two weeks.

Upon completing the above work, a cruise was made at Rock Bay, B. C. The course covered seven or eight limits. In British Columbia, a timber claim, which includes six hundred forty acres, is called a limit. This area was scattered,
pened several times, there was a fall of snow. However, in that country, the winter is not severe, and the snow soon disappeared. The field work was completed about the twentieth of February. Before we had completed this, Mr. Porteous took a contract for the cruising and mapping of twelve limits on Slate Creek, about a hundred and fifty miles north of Vancouver, B. C. On this job, as an experiment, a crew of eight men were employed including an instrument man, five cruisers, a cook and a packer. This proved to be less economical than a crew of three cruisers and a cook. It was decided that if greater speed was necessary than could be obtained with one crew of four men, it would be cheaper and more efficient to place two or more such crews in the field, working separately.

The Slate Creek tract lay in a valley which ran back for a distance of about six miles from the ocean, and varied in width from two miles to about three quarters of a mile from timber line on one side to timber line on the other. The timber was an excellent stand of Fir-Cedar-Hemlock in the valleys, running out to Hemlock scrub on the side hill near timber line. The upper end of the valley was cedar swamp, but the timber was small and crooked. The average for the total timbered area was about forty thousand, but in spots the stand would go as high as one hundred thousand.

On this job, a railroad preliminary was required, and this was run in and used as a base line. It was practically impossible to run a control line at timber line, owing to the roughness of the country. To obtain accurate control therefore, the cruisers worked in pairs, running with clinometer and chain from a control station on the base line to the cliff on the side of the valley, then separating and running back, one on each side of the chained line, to the base line in the valley. This return trip was made with paced distances and barometer elevation, the chained line being accented as control, both for alignment and elevation. Remarkably accurate work was done in this way, considering the steepness and roughness of the country. Otherwise there were no remarkable features on the job, the same system being used in taking and working up notes as on the preceding jobs.

Mr. Porteous took another contract for cruising on Deserted River, which was only about two miles by water from Slate Creek. The topography here was of the same type as that of Slate Creek, that is, a comparatively narrow valley running back from the ocean, but in this case the valley was
branched and much more nearly level than the valley of Slate Creek.

One peculiar point was the fact that the valley ran back nearly a mile with a rise of only about twenty feet. At this point the valley narrowed, closing in on the river. Apparently the ledge ran clear across the stream, causing a fall of about fifty feet high, above which the valley opened out again. The same condition was repeated about a mile further up stream, where there was another fall of about the same height, and above it another valley. These conditions made cruising a little more difficult. It was necessary in some cases to run the cruise lines parallel to the main drainage instead of perpendicular to it, as is usual. Moreover, auxiliary base lines had to be run to control these cruise lines. This, of course, increased the overhead.

The timber on Deserted River was neither as heavy nor as high grade as that on Slate Creek. The lower valley, for a distance of half a mile each side of the river, consisted of a vine maple and devil's club swamp, which was almost impenetrable. There was some fair timber in the second valley, but for the most part, the timber was scrubby, and the whole area would scarcely average thirty thousand feet.

The next conditions on which this system was tried was on land owned by the Milwaukee Land Company which had suffered from the wind storm which devastated parts of the Olympic Peninsula during January, 1921. This work was much different from ordinary cruising. Only one line was run through each forty, and instead of taking the standing timber,
The amount of damage was estimated in percentage of the total original stand, and the percentage of each species making up the down timber.

It was practically impossible to salvage this timber, or any large part of it, owing to the inaccessibility. On one stretch of road a mile long, it was necessary to cut nearly five thousand trees to clear the road, which will give some idea of the devastation. In several places, going across the country, it was possible to travel for as far as a half mile on the down timber without touching the ground.

The timber was rather low grade, being generally a Hemlock-Cedar-Spruce type, running about thirty to thirty-five thousand feet to the acre. This contract covered about fifty thousand acres. This took seven weeks and required six camps. Some time was lost on account of rain, which was almost continuous.

The system has been tried under varying conditions and has made a decided success of itself. As Mr. Porteous claims, it is simple and rapid. Another thing in its favor is its flexibility enabling its use in all conditions and in all parts of the country. As to its general adoption, time will reveal that phase. So far it has been a success wherever it was tried.
Education In Forestry

By
H. J. Andrews
Assistant Professor of Forestry

This article is written with the intention of clearing up some questions that the high school student in Iowa who is considering a Forestry course may have in mind. Possibly it will help answer some such questions as these:

Do forestry schools train men for forestry?

What subjects are necessary for a forester's training?

Are forestry courses of any value simply as a general education?

Does forestry course limit a man only to forest products work or is it of any value in other lines of work? Does it give him any viewpoint that a general education would not?

There are a good many different ideas and opinions as to just what forestry is and of what the education of a forester should consist even among foresters. This is because the jobs and positions listed as pertaining to forestry and foresters range from experts in woods and products to the ranger and guard jobs on the National Forests. With such a wide range it is impossible for a student while in school to become thoroughly trained in every one of these possibilities.

In this article, then, let us consider that the majority of foresters are men interested in the work of raising or handling timber on large enough areas to make their services worthwhile.

The forester is really a land economist. He is allowed to exist professionally because he can show the relative values of land either for agriculture or for timber, and having shown its unfitness for agriculture, he can handle it in timber with a maximum of results and a minimum of expense. This at once suggests the importance of his knowing economics. The complete and proper use of idle land in this country is as much his problem and argument as the vanishing timber supply.

In this kind of work the higher positions are of an executive and administrative nature. A man handling big areas of land has problems of the use of land, land values, construction of improvements, such as roads, trails, etc., recreation, operation, protection, etc. He is dealing with both men and materials and has to balance one thing up against another; to put each thing in its place and give it its proper value.

In order to do this properly he has to have a general grasp of the situation which only a broad general training plus lots of field experience can give. A narrow, strictly technical edu-
cation will not fill the bill. This does not mean that there will not have to be many specialists who know the details; and we will get more and more of this in the future; but the real job in forestry is for the man who takes a big layout and balances all the specialists' details and puts them in their proper place. "A man trained to think upon one line alone will never be a good judge even of that, for he has not the perspective by which to distinguish between the essential and the trivial." A forester, then, should have a broad training.

Can specialization in forestry be gone into in the school? To my mind specialization in forestry is really only obtained after graduation when one is actively on the job, and by lots of experience, and except for a few lines, cannot be properly pursued in school.

Does the average forestry course give a fairly broad education in various subjects with enough of a foundation in forestry and forest products to give a man a start? Take for example, the course at Iowa State College, shown in the following table.

<table>
<thead>
<tr>
<th>Group</th>
<th>Management Credit Hrs.</th>
<th>Lumber Markets Credit Hrs.</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry</td>
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<td>30</td>
<td>34.3</td>
<td>38.6</td>
</tr>
<tr>
<td>Botany</td>
<td>13</td>
<td>31</td>
<td>13.3</td>
<td>13.3</td>
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<tr>
<td>Chemistry</td>
<td>32 1/3</td>
<td>22 1/3</td>
<td>9.6</td>
<td>9.5</td>
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<tr>
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<td>English Composition, Rhetoric</td>
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<td></td>
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<td>12</td>
<td>5.1</td>
<td>5.1</td>
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<tr>
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<td>14 2/3</td>
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<td>6.3</td>
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<tr>
<td>History</td>
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<td>Public Speaking</td>
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<td>3</td>
<td>1.3</td>
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</tr>
<tr>
<td>Mechanical Drawing</td>
<td>3</td>
<td>2</td>
<td>1.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Timber Testing, Mechanical Engineering</td>
<td>3</td>
<td>2</td>
<td>0.9</td>
<td></td>
</tr>
</tbody>
</table>

*The student in his senior year is expected to choose one of two groups of studies, the management group or the lumber markets group.

This schedule includes the subjects taken during the four years at Ames and the twelve weeks spent in the summer camp which is held in the wood in different forest regions each year. This is purely field work in forestry.

If you examine this schedule carefully, does it not appear
to be a broad general education of a scientific rather than a literary or classical nature, but nevertheless fairly broad? The forestry subjects are less than 40 per cent of the course. Twenty-five per cent of the subjects listed as forestry are more in the nature of applied economics and industry than pure forestry. From these on down the list, the course is, as can be easily seen, a general covering of the subjects of natural science, engineering, economics, and English. Possibly there is not enough economics listed but the electives allowed can take care of that and there is really more economics than the figures show because a good many of the subjects listed under other headings have to deal with economics.

This schedule ought to give the man taking it up at least an idea of the scope and importance of the various problems he will meet. Let us take our man in charge of a big area of timberland. He will have to know about soils, climate, botany of trees and plants, land laws, surveying, insects, logging, markets and a host of other subjects besides having the ability to get along with men, speak and write his ideas to them, and have the proper outlook on the relation of his business to the rest of the world. I believe the subjects outlined in the course will at least give him a taste of these things.

Is there anything else that a forestry course offers that possibly some other courses do not? It usually gives the student an outlook and viewpoint on national welfare obtained through his appreciation of the necessity and value of the conservation and wise use of all national resources including land itself.

It usually gives him an appreciation of physical work and a lack of disdain for it which is common among a large number of college graduates, a situation which irritates so many industrial leaders in their relations with college trained men.

The average forestry course does or at least ought to give the student a pretty general viewpoint of science and the scientific method of solving problems. The table shows that he at least comes in contact with nearly every branch of science both natural and exact.

I believe one of the big things that a forestry course does for a young man is to make him observant, especially in summer camp work. He must be observant to amount to anything in the profession. He will be dealing with problems where all the factors cannot be fixed; where what he sees in the woods will need interpretation. That will not be easy. He will see exceptions to the rule and will have to be on the
alert to recognize that there is probably a new rule. He will need "a mind able to perceive large possibilities in little occasions." He will see many little things in the woods and many familiar things that he understands. "No attitude of mind is more practical than that which expects valuable suggestions from any quarter." The same author says, "The man of affairs should take care to prevent himself from falling into the habit of thinking that neglected things have no problems worth considering, or that what is familiar is understood."

At present our knowledge of forestry in this country seems to be at times a mass of rather unrelated data, full of exceptions to the rule, full of many untouched problems, full of accepted facts that are probably untrue. A certain keenness and alertness of mind usually found in connection with the person trained to be observant of natural phenomena, will be needed to solve these problems. Needless to say, if a man can be trained to be observant, this habit will be invaluable to him in forestry or any other line of work. A lot of the subjects in forestry and the work given in the summer camp in the field, at least gets the student started in the right direction.

In the field we often see an effect; timber is tall or short, good or poor, sound or diseased, etc., etc. There are apparently many causes. The actual determination of the minimum number of causes for the effect noted, is the result desired. It demands observation. The same holds true in business. Something has happened (an effect). There are apparently several causes. The man who can lay his hands on the minimum number of causes which produced the situation is valuable. The training of both men is similar.

Lastly, does the training and education received in the forestry course fit a man for any work besides forestry? Whether the training specifically fits him for other jobs or not, I cannot say, but about half the graduates of forestry schools are in other lines of work and are making good at them, so that the training is of at least some general value. A table of occupations of the graduates of two forest schools, the University of Michigan and Iowa State College, will show some of the lines of work that graduates foresters are following. These percentages are figured from the total number of graduates of the two schools which is 422. An average of the two schools shows that the lines of work the graduates have taken up are varied. It would be of interest to have
a word from each graduate now working in lines other than straight forestry as to the general value of his education.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Per cent of graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. Forest Service</td>
<td>24%</td>
</tr>
<tr>
<td>Employed in business other than timber or logging, as oil companies, rubber companies, telephone and telegraph, milling grain, real estate, ranch foreman, sales managers, secretaries and treasurers, chemists, bonds and stocks, nursery, pathologists, etc.</td>
<td>11%</td>
</tr>
<tr>
<td>Logging</td>
<td>7%</td>
</tr>
<tr>
<td>Timber and Wood Using Industries</td>
<td>6%</td>
</tr>
<tr>
<td>Teaching Forestry</td>
<td>4½%</td>
</tr>
<tr>
<td>Teaching Other Subjects</td>
<td>4½%</td>
</tr>
<tr>
<td>City Forestry</td>
<td>3%</td>
</tr>
<tr>
<td>Farming</td>
<td>2%</td>
</tr>
<tr>
<td>Engineering and Survey Work</td>
<td>2%</td>
</tr>
<tr>
<td>Running Own Business (Store Keepers, etc.)</td>
<td>2%</td>
</tr>
<tr>
<td>In Employ of Foreign Governments</td>
<td>2%</td>
</tr>
<tr>
<td>State Forest Work</td>
<td>2%</td>
</tr>
<tr>
<td>U. S. Indian Service, Contracting and Public Works, U. S. Government (Exclusive of Forest Service) Landscaping, Authors, Secretaries, etc.</td>
<td>4%</td>
</tr>
<tr>
<td>Deceased</td>
<td>4%</td>
</tr>
<tr>
<td>Exact Occupation Unknown</td>
<td>22%</td>
</tr>
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</table>
Some Six-Footed Villians and The Elm

W. H. Wellhouse
Assistant Professor of Entomology.

Our title does not refer to the six-footers who slash trees with axes and pruning-hooks, but to the small foes known as insects. The elm is injured by a number of such villains. All kinds of trees have insect enemies whose natural habit is to eat some part of the tree. Occasionally we hear of a tree which no insects will attack. The belief that such trees exist is based on incomplete study of those trees.

Sometimes a species of tree is imported from its native habitat into a new country where it appears to stand out in contrast to native trees as an insect-proof tree. Its natural enemies have been left behind in the old country and the insects in its new home are usually slow to adapt themselves to new trees. Consequently it enjoys a period of immunity from all parasites and we hail it as a most desirable substitute for our native species which are at times difficult to protect from their parasites. The period of immunity of the imported tree in its new home may be long or more probably it may be short. Commerce is continually bringing materials from the tree's old home and if past experience indicates the future, commerce will bring accidentally one or more of the tree's old insect enemies as stowaways. When once established with its natural host plant in a new country the six-footed villain has a softer time than it had in its native home and its host plant has a correspondingly rougher time, because the natural parasites of the villain have been left behind and its progeny can increase at the expense of the tree without much hindrance.

The truth of the matter is that we are very dependent upon natural parasites to control forest insects. Nature maintains a sort of numerical balance between them by using one species of insect to control another. There is a grain of truth expressed in the popular lines:

"Great fleas have little fleas
Upon their backs to bite 'em,
And little fleas have lesser fleas,
And so ad infinitum."

When viewed purely from the entomological standpoint, then, it would seem just as desirable to plant native trees
whose insect pests and their parasites are already present as to plant imported trees which seem to be free of insects.

One of the finest of rapid growing trees is the American elm. Its planting is sometimes discouraged because of its insect enemies. The best list available of insects which attack the elm gives only 96 species. On the other hand there are about 450 species known to attack the apple and 382 the hawthorns while the oaks have a list of over 500 species. The great majority of the insects which attack the elm have never

![The Flat-headed Borer and its Parents](image)

A, boring grub; b, female beetle; c, head of male; d, pupa

as long as men have studied them become so numerous as to be serious pests. A few villains, however, have done widespread damage to our elms.

The most of the elms which have suffered an untimely death or disfigurement due to insect attack are those brought into captivity in our parks or shading our houses and streets. In such locations we must have an unnaturally rapid drainage of rainfall from the ground to make motoring and walking pleasant. Such rapid drainage leaves the trees with long thirsty spells and consequently cuts down their resistance to injury from parasites. Just as the advance of civilization,
changing man's life from that of a natural animal to an artificial, restrained member of society, has necessitated a more careful avoidance of the parasites which prey upon him, so the artificially grown trees must receive greater care. If we are to grow shade trees instead of erecting large awnings sprayed with water as a substitute, we must give the trees more protection from their parasites than they required in their natural habitat.

Recently transplanted elms need more care than well established ones. Their weakness which naturally accompanies transplanting renders them easy prey to the worst of all their parasites—the borers. The most commonly destructive borers in such trees are the Flat-headed borers. They are cream-colored footless grubs with the head end flattened and much wider than the rest of the body. Each grub bores a broad flat channel in the sapwood of the tree's trunk, often completely girdling the trunk of a small tree. The grub is very small at first but when full grown becomes an inch long. Each one continues to eat its way into the wood for nearly a year before it changes into a shining greenish-black beetle nearly one-half an inch long. The beetle cuts an opening through the bark and escapes from the tree. In May or June. The beetles of this kind are fond of sunshine and may be found basking or running about in its warmth on the sunny side of the trees from June to September. The female beetle during this period deposits about 100 tiny yellowish eggs in cracks or wounds in the bark, one egg at a place and usually concealed under the bark. It often happens that one or more females while engaged in egg laying will visit a single opening in the bark several times, resulting in a group of eggs being placed close together. The borers upon hatching from such groups of eggs begin to eat channels away from the center of the group in various directions, and so we may find a large connected series of burrows.

The instinct of the parent beetles to remain in the sunshine affords comparative protection to shaded tree trunks and it will pay to erect a shade of boards or other opaque protection on the sunny sides of the trunks of newly transplanted or otherwise weakened trees. They should be shaded curing the first, and, unless growing vigorously, during the second summer after transplanting.

The flat-headed borers may attack not only transplanted trees but trees which have become weakened by any cause. And the elm is not the only kind of tree attacked. The list of the borer's food plants includes apple, pear, peach, apricot, plum, cherry, quince, currant, walnut, pecan, hickory, poplar,
willow, beech, chestnut, oak, hackberry, sycamore, mountain ash, service berry, hawthorn, redbud, maples, horse-chestnut, linden, persimmon and box elder.

Quite often trees are already infested with borers as secured from nurseries. This is more often true when the nurser-

![Image](image.png)

**The Round-headed Elm Borer**

1, boring grub in its tunnel; 1a, grub removed from tunnel; 2, pupa; 3, tunnel after bark is removed; 4, parent beetle.

erman does not grow his own trees but lines them out to keep them until sold. If he is careful and shades them the trees should not have borers in them.

Another kind of borer sometimes attacks the elms. It is known as the Round-headed elm borer because the boring grub is not so wide and flat across the head as the grub of the preceding species. The difference may be readily seen by comparing the accompanying illustrations. The parent beetle of the round-headed borer is about three-fourths inch long and is gray with reddish or orange stripes on the back.

The life history of this borer may be summed up very briefly. The female beetles deposit their eggs in the crevices of the bark from the middle of May to some time in August. The tiny grubs soon hatching from the eggs, eat their way
under the bark and hollow out winding tunnels in the inner bark and cambium, then later extend the tunnels into the sapwood. The grubs continue to eat the wood for two years before they transform into beetles. The beetles emerge through holes in the bark in May and June and the life cycle is repeated. During its two years of boring a grub may completely girdle a small tree. Large elms are also attacked and as many as a hundred grubs have been cut from a tree trunk twelve inches in diameter. The bark of this trunk had been almost entirely loosened by them and, needless to say, the tree was dead. The presence of the grubs in a tree is usually unsus-
pected until the bark has been cut loose by their eating. There is almost no external evidence of the grubs in older rough-barked trees but in the case of young smooth-barked trees the surface may be seen to become darker and dry over the grubs' tunnels. In the latter case it is possible to cut out the grubs and perhaps save the trees. In the case of older trees this is not practical. The infested trees whose bark is beginning to loosen in patches should be removed and burned or sawed and the bark burned to kill the borers before they come out the next May to attack other trees.

The only practical means of controlling elm borers yet known are preventative measures. The most important means of preventing injury by borers is to keep up a healthy flow of sap in the tree. The young borers soon after hatching from the eggs penetrate the bark, thus reaching the cambium layer and sapwood. If they are met by a good flow of sap they drown instead of becoming established in the tree. If the tree lacks abundant sap during the time of the borer's entry (June to August) serious injury or death may be expected. Where pavements and gutters, sewers, tile drains, or other means are used to carry away the rainfall quickly from the areas where trees are grown, we should provide some means to keep the trees watered. Perhaps on city streets some system might be worked out whereby the flushing of storm sewers could be used to irrigate the subsoil and thus aid the nearby trees in dry weather. In parks, drain tiles might be laid from low spots to the subsoil about trees so that showers would give more water to the trees.

Another less complete but useful preventive of borers is to cover the trunk and bases of branches with a repellent wash. To prepare one of the best washes for this purpose, add to a saturated solution of washing soda enough soap to make a thick paint. Stir in a pint of crude carbolic acid and half pound of Paris green to each ten gallons of the wash. Apply the wash with a whitewash brush, a broom, or a large paint brush. This repellent will need to be replaced a few times between May and late August if the season is rainy.

Strong trees are sometimes weakened and rendered susceptible to borer attacks by the work of other insects such as the cankerworms or other leaf-eating forms. The cankerworms are usually the most numerous of the leaf-eaters and are the most dangerous ones to the elms of the middle West. Cankerworms are also called measuring worms. They travel about a tree by alternately looping the middle of the body upwards then straightening out. When disturbed each one suspends itself characteristically from the branch by a line.
of silk. They are dark green or brown, slender, hairless caterpillars and become about an inch long when full grown in late May. These caterpillars consume the foliage as soon as it appears in the spring. They usually become very abund-

Clearing Cankerworm Moths Off a Tanglefoot Band to Make Room For More

ant in a community for a series of two or three years, then disappear for a number of years leaving only a few scattered individuals to keep the species from extinction during this period. The favorite food of cankerworms are elm and hackberry among shade trees, and the apple group among fruit trees. In "cankerworm years" these trees are apt to be defoliated unless they are given some protection.

The cankerworms hatch out from eggs laid upon the branches by moths which crawl up the trees in late winter. These mother moths are very peculiar creatures. They have no wings and resemble spiders more than other moths, but they have the characteristic powdery scales on their bodies such as other moths possess. The male of the species is a
very common looking gray winged moth which flies to the lights on the first warm nights in late winter and early spring. The bodies of the moths of both sexes measure about one-fourth inch long and are gray resembling the bark of the trees on which they hide during the day. As soon as the ground about the trees where the caterpillars have crawled in the year before, thaws and remains unfrozen for a few days in February or March, these moths begin to come out. The females climb up the trunks to the twigs where the eggs are placed. They continue to emerge from the ground until mid-April.

Protecting the trees from cankerworms may be accomplished either by spraying or by banding. The former is practiced in orchards while the latter is more practical for shade trees and woodlands. Banding means maintaining a band of sticky material about the tree trunk to prevent the ascent of the wingless moths to the branches. A simple method of banding is as follows:

A band of tarred paper is tacked about the trunk at the height of a man's chest and tree tanglefoot is spread upon the band. To make the bands a roll of heavy tarred paper is sawed into rolls 5 or 6 inches wide, this being the width of the complete band around the tree. Since the bark of the trees is usually rough, provision must be made for filling all crevices between the band and the tree so no moths can crawl through. Cotton is used for this purpose. A roll of cotton batting is cut into rolls 3 to 4 inches wide with a pair of shears before unrolling the cotton. The five-inch band of paper is then unrolled to apply a line of glue along the middle and then the four-inch strip of cotton is unrolled over the glue. The band of paper with the cotton stuck to it inside may then be rolled up and is ready to be put on the trees. Rolls 25 feet long are the most convenient to handle. Bands are tightly drawn around the trunk, cut so that the ends overlap a couple inches and tacked with large headed roofing nails. The tanglefoot is applied in a strip around the band with a wooden paddle.

The bands to be entirely successful must be in place by the time the first moths climb the trees in February or early March, and must be kept sticky until mid-April. The surface of the tanglefoot will harden in a few weeks so that moths can cross it unless it is stirred with the paddle or a new coat applied. Also the moths become exceedingly numerous during the week or two of their greatest emergence and their bodies will pile up on the surface so that they form a bridge upon which their sisters can cross over the band. The writer's experiments have shown that by means of a painter's
gasoline blowtorch it is easy to burn off the moths quickly from the tanglefoot and while it is heated, passing a paddle over the surface renews its freshness. No injury to tree or band has been done by the torch and it saves replacing the band or the tanglefoot.

Since cankerworm years are usually few and far between it will surely pay to save the vitality of trees during those few years by proper care.

In addition to the borers and leaf-eaters there is a third group of very small but numerous individuals which oc-

![Image of The European Elm Scale](image)

**5. The European Elm Scale**

10. Young scales on the bark; 11 and 12, Male cocoons; 13, Group of immature females; 14, One of same enlarged; 15, Recently hatched young, much enlarged; 16, Mature female enlarged; 16a, Group of matured females on a twig; 17, Wingless male enlarged; 18, Winged male enlarged. (After Felt).

casionally becomes destructive. This group consists of insects which suck the sap through the thinner bark and from the leaves. Like the cankerworms, they choose healthy trees as well as weak ones. The scale insects are examples of this group. The elm scale shown in the illustration is an imported species which has started the death of young elms in several localities in this country. Wherever it is found the trees should be sprayed in March before growth starts with a miscible oil such as scalecide at the rate of one part to fifteen parts of water. If this is done thoroughly, no trees need suffer from these little villains.
Wood-Using Industries of Iowa

G. B. MacDonald
Professor of Forestry

The following brief report on the wood-using industries of Iowa is based on returns from the various plants which manufacture wood into finished or partially finished products. The investigation does not take into account the large quantity of lumber which is used for rough construction work. Any products which are manufactured further than sawing or which go into a planing mill or sash and door factory are included.

In addition to the lumber which is used in the so-called wood-using industries of the state, there are large quantities of timber used for firewood, poles, posts, mining timbers, railroad ties, etc. It has been recently estimated that the state uses annually between 25 and 30 million wooden fence posts and about two million cords of firewood. Accurate data are not at hand at this time in regard to the number of railroad ties, poles and mine timbers used in the state. Large amounts of rough lumber are used in the state annually. If to this amount is added the total material used in the ties, etc., it will be seen that Iowa ranks well among the states in amount of wood used annually.

The investigation has shown very conclusively that practically all of the lumber and lumber products which are manufactured through the wood-using industries come from outside the state. For a number of years, Iowa has been drawing her supplies of lumber from the north, the west and the southern forests. At the present time there is no striking difference in price between similar grades of southern yellow pine and Douglas fir for building purposes. The difference in freight charges from the various regions is compensated for by a variation in stumpage price.

In making a general survey of the woodworking industries of Iowa it has been noted that a large number of the wood-using industries which are found in other states are represented in Iowa. Naturally, industries serving the general building trade, such as sash, door and millwork factories and those furnishing planing mill products, head the list in amount of material consumed. The following summary of the wood-using industries of Iowa, however, will show that although relatively small amounts of wood are consumed in some industries, on the whole the state makes a creditable
showing with respect to the variety of wood-working industries represented.

**Sash, Doors, Blinds, General Millwork and Planing Mill Products**

The forty-nine establishments coming under the above classification which have reported in this investigation, show that approximately 100,000,000 board feet of various woods are manufactured into general mill work and planing mill products in Iowa each year. Individual establishments report an annual consumption of over 16 million board feet annually. These industries use many kinds of lumber but the most important are the following, listed approximately in the order of importance: Western white pine, western yellow pine, southern yellow pine, sugar pine, Douglas fir, cypress, red oak, spruce, gum, white oak, birch, redwood.

The prices for the different species varied widely but the average price paid for western white pine of $75 per thousand board feet at the mill will serve as an example of the cost. The southern yellow pine used in this industry was secured at an average cost of approximately $70 per thousand board feet.

It is interesting to know that the total amount of lumber consumed in these industries is apparently somewhat less than the amount consumed ten years ago when a similar investigation was made. At that time approximately 120,000,000 board feet were used annually by the planing mills and general millwork factories. This is accounted for by the fact that a number of establishments reported that they had not been running to full capacity during the twelve month period for which the investigation was made. During this same period the average price for the lumber used has increased nearly 100 percent.

**Boxes, Crates and Baskets**

Thirty-five establishments in Iowa have reported using a total of about 12,000,000 board feet of lumber for the manufacture of boxes, crates and baskets. Of this amount, approximately 1,750,000 or 15 percent comes from timber grown in Iowa. The Iowa grown woods which are used largely in these industries are the white elm, cottonwood, soft maple, ash, hackberry and some sycamore. Naturally, the woods from outside the state are those which may be secured at a relatively low cost and include southern yellow pine, red gum, cypress, northern pine, Douglas fir, birch, maple and yellow poplar. Southern yellow pine heads the list in amount used for boxes and crates. The prices paid for the material used
in these industries would average about $30 per thousand board feet although in individual cases as high as $110 was paid for some of the wood used.

The present report indicates that considerably more lumber was consumed in Iowa for boxes and crates ten years ago than at the present time. The average cost for the lumber used in these industries has increased from $13.58 in 1913 to approximately $30 at the present time.

**Tanks and Silos**

Reports received on this industry indicate that at the present time nine firms are engaged in the construction of wooden tanks and silos. Ten years ago nineteen firms reported in connection with this industry. This would indicate that the wood stave silo and the wooden tank have been replaced to a large extent by other types of silos and steel tanks.

The returns from the nine firms reporting in this industry show that about 2,000,000 board feet of lumber are consumed annually in the construction of tanks and silos. Ten years ago nearly 24,000,000 board feet were reported for these industries.

At the present time Douglas fir and cypress head the list in amount used. Smaller amounts of redwood and white pine are reported from some of the manufacturers. The Douglas fir was secured at a price averaging about $65 per thousand board feet, and the cypress at an average price of $85 per thousand. Ten years ago the average price paid for Douglas fir in this industry was $34.89 and for cypress $36.42. This shows that the price of Douglas fir used in tanks and silos has increased 86 percent in the past year period and in the case of cypress, 133 percent in the same time. So far as the reports indicate no wood being manufactured in this industry comes from Iowa.

**Vehicles and Vehicle Parts**

Twenty firms manufacturing vehicles or vehicle parts have reported using a little less than 3,000,000 board feet of lumber. A variety of timber is utilized in this industry. The woods making up the larger amount of material are the red and white oak, southern yellow pine, gum, ash and elm. Smaller amounts of Douglas fir, cottonwood, maple and hickory are used.

Ten years ago the state consumed approximately 17,000,-000 board feet of the various woods in the vehicle industry. At that time hickory headed the list in amount used, making up nearly 20 percent of the total. At the present time the hickory being used by the twenty concerns reporting, amounts
to less than 1 percent of the total wood used in this industry. The reason for this is apparent since each year hickory is becoming harder to secure. The hickory which went into this industry 10 years ago was secured by the Iowa industries at an average cost of $24.94 per thousand board feet. At the present time the average price paid for hickory is about $110 per thousand board feet. Red and white oak which were secured 10 years ago at an average price of $48 per thousand board feet, cost the present manufacturers an average of $80 per thousand board feet. Southern yellow pine which was purchased in 1913 at an average cost of $28 per thousand board feet, was purchased during the past year at an average price of $75 per thousand in this industry.

**Woodenware and Novelties**

For the year 1922, eight firms manufacturing woodenware and novelties reported. Ten years ago 9 firms were listed. At the present time the annual consumption of wood in these industries amounts to only between 2,000,000 and 3,000,000 board feet. Ten years ago the industry reported 17,000,000 board feet. At the present time white ash heads the list among the species in amount of wood consumed, although this species makes up only 20 percent of the total. Ten years ago the ash used for woodenware and novelties in the state made up 93 percent of the total.

The other woods which are used in considerable quantities in this industry are Norway pine, spruce, yellow pine, white oak, walnut, elm, and hard and soft maple. The reports in the present investigation show that the white ash was secured at an average cost of about $60 per thousand board feet. In 1913 in the same industries the ash was secured at an average price of $26.45.

**Agricultural Implements**

Nineteen Iowa firms report various woods used in the manufacture of agricultural implements. The total consumed in this industry amounts to between seven and eight million board feet which is almost identical to the amount used ten years ago. The principal woods reported are southern yellow pine, Douglas fir, and white oak, with small amounts of birch, elm, maple, gum and hickory. A comparison of average prices paid for the different woods shows that in many cases the present price is over 100 percent greater than in 1913 when a similar study was made.

**Furniture**

Seventeen Iowa farms report the manufacture of various items of furniture (not including chairs). A census of this industry taken 10 years ago showed that twenty firms
were engaged in this industry. It is rather surprising to know that at the present time this industry is consuming about fourteen million board feet of lumber in the state while ten years ago the amount consumed was only a little over six million board feet.

The principal manufacturers are now located in the Mississippi River towns in eastern Iowa. A long list of woods find a place in this industry. Among the more important are the red gum, black walnut, the oaks, southern yellow pine, soft maple, as well as a number of less important species. A note on present prices paid for lumber will show the great increase during the past few years. At the present time red gum is purchased at an average price of about $50 per thousand board feet. This same wood was secured in 1913 at $19.44 per thousand. During this same period white oak has increased in price in this industry from $41.00 to an average of about $70.00 per thousand feet and black walnut from an average of $35 per thousand board feet in 1913 to an average of $120 as reported by the present manufacturers. Ten years ago practically no walnut was being used for furniture while at the present time black walnut comes in very prominently in this industry.

Fixtures

Seventeen Iowa firms report the manufacture of fixtures, such as counters, cabinets, partitions and other nonmovable furnishings for rooms and stores. During the past year this industry used between four and five million board feet of lumber. This is a little less than was reported ten years ago. At the present time white and red oak make up a large percent of the total wood used,—in fact a higher percent than they did ten years ago. Other woods which are used to a considerable extent are red gum, black walnut, cypress, mahogany, yellow pine, Douglas fir, birch and basswood. The white oak in this industry was secured at an average price of about $135 per thousand board feet. The same species in 1913 was secured for manufacturing the same equipment at an average price of $58.50 per thousand board feet. This was an increase in price for this wood during the ten-year period of 130 percent. The present investigation shows that there are eleven fewer firms reporting in this industry than there were ten years ago.

Laundry Appliances.

This classification includes a number of power washing machines manufacturers as well as a few other types of manufacturing plants. At the present time thirteen manufacturing establishments have reported, which is four more than
in 1913. The wood used at the present time amounts to about 4,000,000 board feet as against about 5,500,000 in 1913. Of the present amount used nearly 2,500,000 is cypress, indicating clearly the value of this wood in the manufacture of washing machines. Ten years ago this same species made up approximately 90 percent of the total used in this industry. At the present time red gum ranks second in amount of wood used with a total of about 700,000 board feet. Other woods which find a place in this industry are the white ash, soft maple, birch, yellow pine, elm, basswood, white oak, white pine, Douglas fir and sycamore. It is interesting to note the difference in prices paid for the two most important woods in this industry. The cypress ten years ago was purchased by the laundry appliance manufacturers at an average price of $26.40 per thousand board feet. Last year this same wood was purchased at an average cost to the manufacturer of about $70 per thousand board feet. The red gum which was secured in 1913 at a cost of $26.62 per thousand board feet, was purchased last year at an average of $45 per thousand board feet.

Car Construction

Only two firms in Iowa report the use of wood in car construction. These firms, however, report a consumption of nearly 4,000,000 board feet which is slightly less than the amount used ten years ago. Southern yellow pine heads the list in amount consumed, making up a total of nearly 2,000,000 feet. Douglas fir comes second with a total of about 1,600,000 feet. White oak and yellow poplar make up most of the balance. The investigation shows that the yellow pine was secured at an average cost of about $45 per thousand board feet and the Douglas fir at an average price of $54.00.

Casket and Coffins

Eight casket and coffin manufacturers in Iowa reported in connection with this study. This would indicate that the coffin business is on the increase in Iowa since only six firms reported in 1913. The present total consumption of wood in this industry amounts to approximately 7,000,000 board feet as against a total of 5,000,000 board feet in 1913. The principal woods now being used are cypress, western white pine, and red oak with smaller amounts of black walnut, red cedar and basswood. The average price paid for the cypress during the past year was $46 per thousand board feet. This price is relatively low and is accounted for by the fact that a poorer grade of cypress is used in this industry than in many of the others. The western white pine was secured at an average price of approximately $40 per thousand board feet which also
indicates that a low grade of this species finds a market in this industry.

**Refrigerators and Kitchen Cabinets**

The present annual consumption of wood used in the manufacture of refrigerators and kitchen cabinets amounts to about 5,500,000 board feet. This same industry used about 3,500,000 board feet ten years ago, showing a considerable increase in this industry. The number of firms reporting are five which is just half as many as reported in the study made in 1913. This indicates that the smaller manufacturers have either consolidated or gone out of business.

A considerable variety of woods find a place in this industry. Among the more important are the red and white oaks, spruce, southern yellow pine, Douglas fir, hard maple and cypress, with smaller amounts of birch, ash, cottonwood, gum, elm and black walnut. All of the woods used, except a few thousand feet of cottonwood, are shipped in from outside the state.

**Dairymen's, Poulterers' and Apirists' Supplies**

The firms included in this classification are largely those interested in the manufacture of butter tubs, incubators, churns, etc. Ten manufacturers reported for the year 1922, which is an increase of five firms since 1913. The present consumption of wood in these industries amounts to approximately 6,000,000 board feet which is almost twice the amount reported for these same industries ten years ago. Of the total, ash makes up nearly 3,000,000 board feet or approximately 50 percent of the total. This wood was secured ten years ago in this industry at an average of $25 per thousand board feet. At the present time the manufacturers are paying an average of $45.00 per thousand.

Other woods which are used prominently in this industry are the red wood, Douglas fir, yellow pine, western white pine, cypress and cottonwood. All of the wood reported for this industry comes from outside the state.

**Handles**

Seven firms reported manufacturing handles of various kinds during the year 1922. This is an increase of three over the firms reporting in 1913. The reports indicate, however, that only about a million and a half feet of lumber are now being used in handle manufacture in Iowa. Ten years ago the amount of timber going into this industry amounted to over 2,000,000 board feet per year. Hard maple heads the list in amount in this industry, making up a total of about 350,000 board feet. The balance of the amount is fairly equal-
ly distributed between gum, basswood, birch, hickory, ash, white oak, cottonwood, and beech.

An interesting point in connection with this industry is that over 200,000 feet of the wood reported originates in Iowa. This is about 14 percent of the total. The average price paid for the hard maple during 1922 was about $85 per thousand board feet. In 1913 this same wood going into the manufacture of handles was secured at an average price of $24 per thousand board feet. This would indicate an average rise in price during the ten year period of about 250 percent for hard maple. During this same period the average price paid for hickory as reported has increased from $25 per thousand board feet in 1913 to approximately $135 per thousand in 1922. The growing scarcity of the more valuable woods is responsible for this high increase in price. All of the other woods used in this industry also show a relatively high increase in price over the figures of 1913.

Elevators

Two manufacturing establishments report a total consumption of a little over 1,000,000 board feet. This is somewhat less than the amount of 1,775,000 reported ten years ago. The principal woods used are the Douglas fir, white pine, yellow pine, maple and hemlock, which make up 95 percent of the total wood used.

Chairs

Chairs are usually manufactured in establishments making only this one product and for this reason the chair manufacturers are given a separate classification from those making other kinds of furniture. Four firms reported on their operations for 1922 with a total consumption of nearly 1,000,000 board feet. This amount corresponds very closely with the total in this industry during the year 1913. The red oak and red gum, with a total of about 350,000 board feet each make up about three-fourths of the total wood consumed in this industry. The other woods reported are the white oak, elm, walnut and birch. Nearly 200,000 board feet of the total are reported as coming from Iowa sources.

Ships and Boats

Naturally, Iowa is not a large boat building state. However, several firms report using a total of about 100,000 board feet in this industry. These firms are all located in Mississippi River towns. During the past ten years the amount of wood consumed has decreased from about 535,000 board feet to the above amount indicated. The principal woods used are Doug-
las fir, white oak, white pine, and southern yellow pine, which make up over 90 percent of the total used.

**Cigar and Tobacco Boxes**

Five firms reported using approximately 1,000,000 board feet of wood in the cigar and tobacco box industry in Iowa. Tupelo gum heads the list in amount consumed, making up a total of about 500,000 board feet. Red gum comes second in the list with about 250,000 feet. Smaller amounts of yellow poplar, red cedar, Spanish cedar and basswood are used.

**Musical Instruments**

About 8,000,000 board feet are reported by manufacturers of musical instruments. This figure is probably somewhat in excess of the amount of lumber actually going into musical equipment since the firms reporting are probably using some of the lumber in the manufacture of products other than musical instruments. A large amount of the wood in this industry is used in the form of veneers. The principal woods are mahogany, walnut, oak, birch, red gum, hard maple and chestnut.

In the report prepared in 1913, less than 100,000 board feet were reported as being used in the manufacture of musical instruments.

**Miscellaneous**

This classification includes a great variety of products which could not well be classified under other headings or such items being manufactured by only one or two establishments which would not justify listing in a separate classification.

Approximately 1,750,000 board feet are consumed in this miscellaneous class. As might be supposed practically all of the woods used in the different industries are represented. Douglas fir and southern yellow pine head the list in quantity used.

**Summary and Conclusion**

One of the most striking points out in this recent study is the great increase in prices paid for the different kinds of woods entering the various woodworking industries of Iowa. In many instances the increase in price during the past ten year period is well over 100 per cent. Some of the woods which played an important part in the industries over a decade ago have almost dropped out of consideration due to the fact that they are becoming extremely scarce. Another point which has been noted is the replacement of the more valuable timbers by so-called “inferior woods” in some of the industries. It will be noted also that the northern white pine which was still used extensively in 1913 has practically been
replaced in the woodworking industries of Iowa by the western white pine, the sugar pine, and the western yellow pine.

Although the material used in the wood-using industries of Iowa is being received as a general thing from more distant points, yet it is interesting to know that there is practically as much wood used in Iowa in these industries at the present time as there was ten years ago. The records of the past ten years show a high mortality for many wood-using firms especially the smaller operators. However, many of the firms dropping out have been replaced by others and at the present time the state has many wood-using industries which are apparently on a permanent basis.
Summary of State Forest Nursery Operation in the United States.

E. W. Watkins

The increasing interest in reforestation work throughout the States has resulted in the establishment of a number of State Forest Nurseries. In order to carry on an extensive reforestation project it has been found that more rapid progress may be made by securing quantity production at a low cost through the maintenance of State nurseries. Most timber planters realize that it is necessary to keep the initial cost of planting operations down to a minimum in case the planting investment is to show satisfactory returns. This means that trees must be supplied at a very small cost per acre or extensive reforestation will not be attempted.

In many of the States the economy of putting to work idle and waste lands by producing a timber crop has been recognized. The growing scarcity of our valuable timbers and the fact that our merchantable timber supply is becoming further and further removed from the centers of population have brought the people to realize the necessity or at least the advantage of growing new crops of timber close at hand.

Wherever State forest nursery operations have been attempted, for the purpose of supplying trees at a nominal cost to timber planters, these efforts have not only met with general approval in the various states, but in most cases with enthusiasm. In many of the states, forest nursery operations and reforestation work have been started but recently. Where the work has been commenced, it is the usual policy to plan on active reforestation work covering a long period of years. In some States millions of acres should be replanted to timber and this program will best be carried out by distributing the planting operations over a relatively long period of years.

It is the purpose of this article to show in a very brief way what is being done in connection with the State forest nurseries over the country. The data presented is based on investigations carried on during the spring of 1923.

The state of Colorado maintains one State Nursery which has an annual capacity of fifty thousand trees. The trees are used entirely for planting on privately owned lands and are distributed at cost of production. The planting stock is purchased originally from the United States Forest Service and from private nurseries. Any person purchasing trees from the State nursery is required to furnish reports on the success
of the planting operations. The trees are sold at prices ranging from $2.45 to $5.82 per thousand, depending upon the species and the size.

The State of Connecticut has no state nursery at the present time. For a number of years this state has undertaken to grow forest planting stock in order to encourage reforestation work in the state, but has had no special appropriation for the purpose and after a commercial nursery had become well established to supply the need, the state nursery was abandoned. At the present time Connecticut is securing wholesale rates for land owners in the state by placing a large order with the commercial forest nursery a year or so in advance. This year they are securing two-year-old seedlings of red pine and white pine for $3.50 per thousand packed for shipment.

Idaho maintains one state nursery. Its annual capacity is 100,000 trees. All of the trees are planted on privately owned land. All the trees that have been planted have been planted through the state agency. No data was submitted in regard to the acreage planted. The general regulations governing the distribution of planting stock are as follows:

1. Trees shipped under inspection tags.
2. Price F. O. R. Moscow, includes drayage but not express charges.
3. All trees must be shipped by express.
4. Money must accompany all orders.
5. No order of less than 50c can be accepted.

The average cost per thousand for trees is $5.00.

The nursery has received the endorsement of the people generally over the state.

The State of Indiana has just started to maintain a state nursery. Its annual capacity is about 132,000 trees. Seventy-five percent of the trees are planted on state owned land and twenty-five percent of private land. The nursery has just been in operation for two years and the number of trees which have been planted is not known but about 175 acres of land have been re-planted. The price charged for oaks, cherry and black locust is $1.65 per thousand.

Kansas maintains one state nursery which has an annual capacity of 48,000 trees. Approximately seventy-five percent are planted on privately owned land. About 48,000 trees have been planted through the state agency. The trees are sold at a price little below the cost of production. The nursery in Kansas has received the endorsement of the people generally over the state.

The State of Maine maintains one state forest nursery
that has an annual capacity and distribution of 250,000 trees. Seventy-five percent of the trees are planted on privately owned land. Twenty-five percent are planted on corporation lands. Practically no trees are planted on the state owned land. The trees planted so far have covered 1500 to 2500 acres. The prices charged for trees ranges between $5.00 and $10.00 per thousand. The general regulations governing the distribution of planting stock are:

1. The trees purchased shall be used only for the purpose of planting lands in the State of Maine.
2. The trees shall not be resold or offered for sale before being planted by the purchaser or his agents.
3. The trees shall be properly planted with due care not to allow the drying out of the roots.
4. Reports shall be furnished when requested upon the condition and growth of the plantations.
5. Cash, check or money order for the amount of the purchase shall accompany the order or be received before shipment is made.

The nurserymen have raised no objection to the state nurseries which are raising real forest stock. The state nursery has received the endorsement of the people.

Maryland has one state nursery which has an annual distribution of 100,000 forest trees and 5,000 shade trees. Five percent of the trees are planted on state owned land and ninety-five percent on privately owned land. No data was received on the number of trees already planted and acreage covered. The general regulations governing the distribution of planting stock are:

1. To pay the purchase price of the trees to said Board of Forestry within ten days after the granting of this application.
2. That the trees hereby sold shall be used by the undersigned for the purpose of reforesting lands or for roadside planting in the state of Maryland.
3. That the trees secured from the Board of Forestry shall not be sold again, or offered for sale, to any person.

Massachusetts maintains two seed bed and transplant nurseries which have an annual capacity of 4,000,000 four-year-old transplanted trees. Fifty percent of the trees are planted on state owned land, twenty-five percent on private land and twenty-five percent on the town forests or corporation lands. The total number of acres which have been
planted to date is about 34,188 acres. The general regulations governing the distribution of the planting stock are:

1. The trees must be planted within the borders of the state.

2. The trees must not be purchased for resale purposes.

The approximate cost per thousand for raising trees averages $4.50 for three-year transplants and $2.50 for two-year seedlings. The state nursery has been heartily endorsed by the people of the state.

Michigan has one state nursery which has an annual distribution capacity of about 4,000,000 trees. About ninety-eight per cent of the trees are planted on state owned land and two percent on private land. In all, 21,000,000 trees have been planted and the plantings cover 15,000 acres. The general regulations that are followed in distribution are:

1. No order accepted for less than 500 plants and not less than 50 of any class will be sold.

2. Prices are F. O. B. Roscommon, Michigan, including packing and crating and apply to stock to be planted within the state.

3. Advise shipments be made by express.

4. Full purchase price must accompany the order.

The cost of raising the stock per thousand ranges from $5.00 to 10.00 for white pine, $2.00 to 2.50 for Jack pine and $10.00 for Norway pine.

Minnesota has two nurseries for supplying trees for windbreaks and State forest planting. The annual capacity of the Itasca Nursery is about 250,000 per year. About ninety percent are planted on state owned land and ten percent on private lands.

New Hampshire finds that is more economical to have just one small nursery. This nursery has an annual capacity and distribution of 300,000 trees. About two-thirds of the trees are planted on state land and one-third on the privately owned land. Just the reverse was true five years ago. It is hoped in a few years that 1,000,000 tree will be distributed annually. About 1,000 trees are planted to the acre. There have been 1,100,000 trees planted on state land which have covered 1,100 acres and 2,000,000 trees on privately owned land covering about 2,000 acres. The state has turned over orders to commercial nurseries for 1,200,000 trees. The only regulation governing the distribution of stock is that the stock must be planted within the state. The approximate cost per thousand for raising the trees ranges from $7.50 for four-year-old transplants to $7.00 for three-year-old stock and
$4.25 for two-year-old trees. The people of the state recognize the value of a nursery and they heartily support the forestry movement.

Two small nurseries are maintained in New Jersey for the growing of stock which cannot be obtained from commercial nurseries, and this is used for experimental work on State Forests or private lands. The state nursery does not distribute any planting stock. Satisfactory stock can be obtained from commercial nurseries. There are in the state at present 2,500 acres of plantations which have been established by some 250 owners. In the spring of 1923, thirty or forty owners will plant several acres more. Of this area, the state plantation covers about 75 acres.

New York maintains two large nurseries and two small ones. The annual distribution and capacity is about 12,000,000 trees. About seventy-five percent are planted on state owned land and twenty-five percent on private lands. The number planted so far is 31,736,000 trees on state land, 34,992,000 in privately owned land, and in all 74,000 acres. The general regulations for distribution of stock are:

1. Trees furnished free of charge, providing the owner enters into agreement with the commission which provides for continuous forest production upon the land and gives the state the control for cutting thereon.

2. Sold private owners at a price not exceeding the cost of production.

Ohio maintains three nurseries which have an annual capacity for distribution of 300,000 trees. The capacity is being enlarged rapidly through larger appropriations. Applications this year call for nearly 500,000 trees. Twenty percent of the trees are planted on state owned land and eighty percent are planted on privately owned land. The total number of trees planted so far is about 2,500,000 distributed over an area of about 2,750 acres. The trees are distributed without any restrictions whatever. The approximate cost ranges from $1.50 to $6.00 per thousand. The commercial nurserymen in this state as a rule, do not carry stock suitable for forest planting and the price charged is prohibitive. The forest nursery as a whole has been endorsed by all the people in the state.

Pennsylvania has three large nurseries for the growing of forest planting stock. Two small nurseries are for producing shade and ornamental trees and seedlings, and also transplants for reforestation. The annual capacity and distribution is 8,000,000 trees. In 1924 it is predicted that 12,000,000
trees will be used and in 1925, 20,000,000 trees. About eighty percent of the trees are planted on state owned land while twenty-five percent are planted on private land. In all 54,586,022 trees have been planted on 44,000 acres. The general regulations governing the distribution of the planting stock are:

1. To pay the cost of boxing, hauling and transportation as soon as the purchaser receives the stock.
2. That purchaser must use the stock in Pennsylvania only.
3. They must not be offered for sale or sold.
4. The trees shall be planted in accordance with instructions furnished by the Department of Forestry.
5. The purchaser must furnish a report on the planting when requested.
6. The planted areas are to be protected from trespass, fire, and grazing so far as lies in the purchaser's power.

The cost of stock ranges from $1.50 to $8.00 per thousand, depending on the age and class of stock. The movement has received the endorsement of most of the people.

Vermont maintains two state nurseries which have an annual capacity for distribution of 1,000,000 trees. One-twentieth of them are planted on state owned land and the remainder on privately owned land. Ten to twelve million trees have been planted, covering 10,000 acres. The general regulations governing the distribution of planting stock are:

1. To enclose one dollar to cover the cost of entering order.
2. To make full payment for the trees in April prior to shipment.
3. To use the trees for the sole purpose of reforestation on lands owned by applicant within state of Vermont.
4. To furnish the State Forester from time to time upon request, a report upon the condition of the plantation.

The cost of raising stock ranges from $5.00 to $10.00 per thousand depending on the stock.

The State of Virginia maintains one state nursery which has an annual capacity and distribution of 50,000 trees. Sixty percent of them are planted on state owned land and the remainder on privately owned land. Approximately 50,000 trees
have been planted on 40 or 50 acres. The regulations governing distribution of stock are:

1. No charge made except for transportation for trees to be used on public lands while private applicants have to pay full price.
2. Plants inspected before ordering.
3. An order for less than 50c not accepted.
4. Must not sell or offer to sell stock received.
5. Letter of planting instructions to accompany the order.

Wisconsin maintains one nursery and has an annual capacity for distribution of 1,000,000 trees. Approximately eighty percent of the trees are planted on the state or public lands and twenty percent are used on privately owned land. In all about 2,400 acres have been planted. The cost of stock ranges from $1.00 to 6.00 per thousand depending on the class.

States Attempting to Secure Legislation

In Kentucky, two forest nurseries have been established, one at Louisville and one at Frankfort.

A number of states have not yet established State Nurseries. The following states either do not have nurseries or did not reply to the inquiry sent out in connection with State Forest Nursery operations. Alabama, Arkansas, Delaware, Georgia, Illinois, Louisiana, Mississippi, Montana, Nevada, New Mexico, North and South Carolina, North and South Dakota, Oklahoma, Oregon, Rhode Island, Tennessee, Washington, West Virginia, Wyoming and Iowa.

In many of the states, however, where state forest nursery operations have been attempted, there is growing interest in the possibility of state owned nurseries. It is probable that during the next few years a much larger percent of the states will be actually engaged in forestry nursery operations.
Foresters Forever

By Prof. Samuel N. Spring, Cornell University

Forests forever, well, hardly ever unless we go about it systematically and persistently with broad vision ahead. All we need is a little imagination like the kind we had as boys. Some of those dreams came true because we set to work with the vision in mind. Can't do much without an imagination—wouldn't get far! In 1856 old man D—settled in New York State on wild land around a little lake. He was young then. Most of the original forest had been burned. His dream was to have a nice big farm, raise his crops and his children and make a good home. Scarcely anybody outside that little section has ever heard of him. He was a great man though with a vision ahead, had rotation of crops before agricultural colleges existed; decided to use the land for what it was best suited. Wise old fellow, he was! A good stock, too, and strong, for he cleared up the land and planted crops, mostly by his own hand, I suppose.

His old farm record book kept from 1857-1894 tells the story. Careful, painstaking notations, a complete record of arrangement of the fields, and of the crops grown are to be found in it. The Cornell graduate student who wrote about this farm and saw it, says: "After being farmed for fifteen or twenty years, the soil on the tops of the sandy ridges and knolls bordering the northern shore of the lake became too poor to produce satisfactory crops. It was then that Mr. D—brought tree seeds and young trees from Germany and began the work of reforesting these areas, which could no longer be farmed at a profit." Doesn't that sound prosaic? What a man this farmer was! He did not stop to say, "There is all the timber in the United States we will ever need" or, "I can't afford to put money into that poor soil, let it lie idle." He just went ahead and planted trees. They're useful now—not a big area, but his white pine will run nearly 40 M ft. B.M. per acre. From 1860 to 1869 he planted groups of trees on the steep lake shore. What for? Oh, just to beautify it! Here's a man who clears up a farm and runs it for commercial production and does not forget to put something of his soul into it.

This man didn't have any forestry extension specialist to tell him what trees to plant on light soil. Today these same kinds are being recommended for planting and the New York State Conservation Commission grows millions of them yearly to sell at cost to people. Mr. D—, the earliest planter
Just take a look at a partial reproduction of some of his sketches.

Sketch map of D—— farm showing crops raised and arrangement of fields in 1859.

Sketch map of D—— farm showing crops raised, arrangement of fields, and area planted to trees in 1870.
Sketch map of D— farm showing crops raised, arrangement of fields, and area seeded to forest tree seeds in 1874.

Sketch map of D— farm showing areas planted to trees in 1882 and location of all the older plantations on the farm.
of forests in New York State of whom I know, got his education about trees in a foreign country. If our boys settled in another country would they thriftily plant trees to make unprofitable land useful or would they take a profit once by cutting down all there were on the farmstead? Education, the right sort, is worth while.

Nature does a lot and all we need to do is to make the start. Whether farmers plant a protective belt of trees, or an unprofitable corner of the farm, or set out a good sized plantation, the increased production will be enormous in the aggregate if the majority do it. These forests will be right at our door, so to speak, and immensely valuable when ripe for the axe, at a time when good timber is scarce or far away. Twenty-five years ago anyone who talked of reforestation of millions of trees would have been adjudged unbalanced. Today it is a fact that trees are being raised and planted by the million.

Ex-President Hadley of Yale once said, "it isn't that figures won't lie, but that liars will figure". However, here are some figures on New York State progress. Forest planting in the state includes the renewing of forest on denuded state lands, planting by cities, towns and villages, by the forest individuals.

<table>
<thead>
<tr>
<th>Twenty Years of Planting in New York State</th>
<th>1901 - 1921</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State Institutions</td>
</tr>
<tr>
<td></td>
<td>6,002,175</td>
</tr>
</tbody>
</table>

The highest number in any one year is approximately seven and one-half million trees. The present state nurseries contain approximately 20 million trees of which over half are ready for planting this year, 1923. Trees have been sold at cost and six million distributed free of charge except for transport and packing costs.

<table>
<thead>
<tr>
<th>Planting by Forests Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>1918</td>
</tr>
<tr>
<td>1919</td>
</tr>
<tr>
<td>1920</td>
</tr>
<tr>
<td>1921</td>
</tr>
<tr>
<td>1922</td>
</tr>
<tr>
<td>Totals</td>
</tr>
</tbody>
</table>
That's a sample of what New York is doing and there are plenty of states that are up and coming on this reforestation business. Think of a little state like Connecticut asking for $500,000 for forestry work for one year. There must be something real about this situation or somebody is crazy.

If they are then the asylums are going to be full, for people in all of the New England States are talking reforestation and fire protection like the kind, pretty nearly, that we have in cities.

**Eleventh Annual Report**

Lumber from the south and west costs a lot with the big freight bill. It is a good thing to grow it at the doorstep. Maybe the shoe pinches some now, anyway there are a lot of people interested and it is more than just the beginning. Perhaps they're getting nervous! Here's some Pennsylvania
figures* fresh off the press and that they are talking about now in every back country store, I suppose, by this time.

**Total and Per Capita Lumber Production**

**Pennsylvania**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Lumber Production (Board Feet)</th>
<th>Per Capita Lumber Production (Board Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1890</td>
<td>2,113,267,000</td>
<td>420</td>
</tr>
<tr>
<td>1900</td>
<td>2,321,284,000</td>
<td>387</td>
</tr>
<tr>
<td>1910</td>
<td>1,241,199,000</td>
<td>162</td>
</tr>
<tr>
<td>1918</td>
<td>530,000,000</td>
<td>63</td>
</tr>
<tr>
<td>1921</td>
<td>510,000,000</td>
<td>58</td>
</tr>
</tbody>
</table>

Here's another on what they expect to do to their forests by care and good treatment.

**Forecast of Pennsylvania Forest Growth**

<table>
<thead>
<tr>
<th>Decade</th>
<th>Average Annual Growth Per Acre (Cords)</th>
<th>Growth per Acre During Decade (Cords)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922-1932</td>
<td>0.25</td>
<td>2.5</td>
</tr>
<tr>
<td>1932-1942</td>
<td>0.50</td>
<td>5.0</td>
</tr>
<tr>
<td>1942-1952</td>
<td>0.75</td>
<td>7.5</td>
</tr>
<tr>
<td>1952-1962</td>
<td>0.90</td>
<td>9.0</td>
</tr>
<tr>
<td>1962-1972</td>
<td>1.00</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>Total, 34 cords</td>
<td></td>
</tr>
</tbody>
</table>


But don't fail to take note that Pennsylvania likewise banks heavily on forest planting too.

In one decade 1912-1921 the number of trees planted jumped from 66,854 to 3,041,710 and almost 15 million trees have been distributed by the State since the year 1915, at cost only of packing and transportation. The State means to use every facility, natural and artificial to restore its forest-producing power and grow its home timber.

New England people may take a leaf out of history. Years ago New England boys grubbed out pines till their backs ached to keep poor pasture lots open for grazing. Nature won out in many cases and in other instances poor soils were abandoned and returned to forest. Today New England's cut of second growth from these lands is an astonish-
ing figure. Looks as if the crop of timber gave the biggest return after all! All of this was the gift of good Mother Nature. Perhaps New Englanders have taken a lesson from those "queer people" who years ago set cut trees to make a forest. Not so very queer when we see the results as recorded by various writers.

"A white pine plantation near Keene, N. H., planted in 1871, and measured in 1915, contained approximately 30,000 board feet of wood per acre. Near South Lancaster, Mass., is a plantation of white pine that is laying on wood at a rate of more than 1,000 board feet per acre per year. Another Massachusetts white pine plantation at the age of 60 years contained 400 trees to the acre, and yielded 41,000 board feet per acre. A 46-year-old plantation of white pine located near West Monponsett, Mass., was cut a few years ago and yielded 30,000 board feet per acre. The site was an old farm abandoned shortly after the Civil War. The only care ever given to the tract was the removal of dead trees."

What every citizen needs to do in this forestry situation is to sit down and think this thing straight through to the end and decide what he can do to help.

Two big problems in forestry face the United States to-
day. One is to handle present forest areas so as to maintain and increase their production in quantity and quality. The other is to put to work lands wasting their energy in idleness, by planting them to forest. These are commonplaces that everyone hears these days when conservation turns to the means of meeting rapid depletion of our nation's timber supply. How else can it be done excepting by these two ways or by stinting themselves in the use of a material so necessary for our shelter, our comfort and our industrial development?
Activities of a Large Pulp Company
and a Forest Engineer’s Relation Thereto

W. J. Damtoft, Forest Engineer

The Champion Fibre Company, manufacturers primarily of all kinds of chemical wood pulp, and also makers on a large scale of paper, container board, and tannin extract, operates the largest mill of its kind in the world. The daily consumption of raw material is 650 cords of wood, and 70,000 board feet of saw-timber, which is equivalent to the yield of an average 70* acres of the section from which it draws its supplies. The location of the plant is such that it can tap a wide territory, heavily timbered and within reasonable freight haul.

The mill is located at Canton, N. C., eighteen miles from Asheville. It is on the Murphy Branch of the Southern Railway, a road which runs from Asheville 120 miles westward between, and paralleling the Pisgah and Great Smoky Ranges, crossing over the Balsam and Nantahala Mountains at high altitudes, and terminating at Murphy, N. C. Tributary to this railroad are some of the largest and finest boundaries of mountain hardwoods, hemlock and spruce to be found in the South, including over 100,000 virgin acres owned by The Champion Fibre Company itself, and from which it draws a certain amount of its raw material.

The species of wood used in the manufacture of pulp and paper, by the Company, in order of quantity consumed, are Chestnut (Castanea dentata), Spruce (Picea rubra), Balsam (Abies Fraseri), Hemlock (Tsuga canadensis), Pine (Pinus echinata, palustris and taeda), Yellow poplar (Liriodendron tulipifera), Gum( (Nyssa sylvatica, Nyssa aquatica and Liquidambar styraciflura), Cucumber (Magnolia acuminta), Maple, Beech and Buckeye. Of these the principal ones used and the respective daily consumption of each are: Chestnut (300 cords), Spruce and Hemlock (250 cords), Pine and Poplar (100 cords). All these species are found in large quantities in the nearby mountains, except pine and gum, which two species are obtained principally from the lower

*Such an average includes cut-over and poorly timbered lands. It must not be overlooked that the yield from virgin timber lands of the region is greatly in excess of this figure.
Piedmont and Coastal sections of North and South Carolina and Georgia.

Lumber manufacturing by the Company is rather incidental to its own pulpwood operations. In the purchase of timberlands, for the supply of pulpwood, it was necessary to corral large areas which contain a considerable quantity of hardwood peculiar to the Southern Appalachian region, of such size and quality as to make it more advisable to convert them into lumber than into pulpwood. For this reason two saw mills have been installed upon these lands, manufacturing lumber of the following species: Ash, basswood, beech, birch, black gum, box elder, buckeye, cherry, chestnut, hemlock, maple, oak, poplar, spruce and yellow pine.

Although the Company has some 300,000 acres of timber lands, either owned by it in fee or controlled by it through subsidies or contracts, its policy is to draw but a limited quantity of raw material from them in order that it may hold them in reserve as long as possible. Therefore, it looks to the following three sources for its greater supplies of wood:

(a) Custom wood, or wood purchased f. o. b. cars, from farmers, small operators and other individuals.
(b) Contracted wood, or wood from operations subsidized or financed by the Company.
(c) Saw mill refuse, i.e. slabs, edgings, trimmings and other odds and ends from lumber mills.

Three chemical processes for the manufacture of pulp are used, to-wit: Sulphite, soda and sulphate. The species treated by these various processes are as follows:

Sulphite Process—Spruce and hemlock.
Soda Process—Chestnut, poplar and other hardwoods.
Sulphate Process—The yellow pines.

The sulphite process of converting wood chips into pulp was developed by B. C. Tilgham about fifty years ago. This pulp, originally made from spruce, and in more recent years from hemlock also, took the place of rags in the manufacture of paper, its long fibre giving the necessary strength. Pulp made by this process is, in unbleached condition, mixed with about nine times the quantity of “Ground wood pulp” (i.e. pulp made by the mechanical tearing of fibre from wood pressed against large stone wheels) for the manufacture of “News print” and is also used in larger proportions for the making of “Bag” and “Wrapping”. Bleached pulp made by this process is mixed with pulp of shorter fibre, such e.g. as is produced from species reduced by the soda process, for the
Diagrammatic Representation of Products Manufactured and of Processes and Raw Materials Employed by The Champion Fibre Co.

Spruce
  Sulphite Pulp
  Bleached pulp

Hemlock
  Sulphite Pulp
  "Bindex" liquor

Bond paper
  Postcard (with 50% soda pulp)

Book paper
  (with 25% soda pulp and 25% sulphate pulp)

Screenings used in making container board

Tannic Acid

Chestnut
  Bleached Soda Pulp

Book paper
  with 25% sulphate and 50% sulphite pulp

Postcard (with 50% sulphite pulp)

Poplar and other hardwoods

Unbleached
  Book paper

Sulphate pulp
  (with 25% soda and 50% sulphite pulp)

Kraft paper
  (75% pine—25% hemlock)

Container board

Bleached

Pine

Turpentine

Chlorine

Salt by electrolysis

Hydrogen

Caustic Soda
making of “Book” paper, and an excellent grade of “Bond”. A by-product of this sulphite process is marketed as “Bindex.”

Bindex is a ligno-sulphite liquor, obtained as a by-product from the cooking of spruce and hemlock wood (from which the bark has been removed) in the preparation of cellulose (wood pulp). The wood is digested with a solution of Calcium polysulphites prepared by passing sulfur dioxide gas into milk of lime. The digestion is carried on under pressure in large autoclaves. The cellulose fiber (pulp) is removed and the remaining liquor is employed for the preparation of Bindex, principally by concentration. Bindex contains the original resins of the wood, glucose and ligneous matter, which consists principally of embryo cellulose matter, besides the sulphite of Calcium. Bindex is freely soluble in water in all proportions. According to Dr. Joseph Hyde Pratt of The North Carolina Geological and Economic Survey, Bindex extract actually enters into intimate chemical combination with sand and clay, forming a bond which becomes permanent in time, and for this reason it is especially adaptable for binding the surfaces of sand and gravel clay roads.

The soda process of pulp manufacture produces a “short fibre” which is used in mixture with sulphite pulp for making a high-grade paper. It insures a strong, well-closed sheet, with a surface well adapted for coating or supercalendering for the highest class printing.

Tannin extract is obtained from the chestnut wood previous to the pulping of this species. Owing to the very large quantity of chestnut used by the plant, this industry is a very important part of The Champion Fibre Company’s activities, and its daily production of tannin exceeds that of any plant in the country, not excepting those which are devoted exclusively to this one product.

The sulphate process of pulp making is a comparatively recent development, and is well adapted to the treatment of pine wood, or wood too rich in resinous matter to yield readily to the other methods. It is by this process that the “kraft” (German for “strong”) papers are made. This pulp, in its unbleached state, is converted into “wrapping” paper, and high-grade container board, its special value being in its strength. The problem of bleaching sulphate pulp economically, has only recently been solved. It is interesting to note that in connection with the operation of reducing pine chips by this process, turpentine is secured as a by-product.

The agent employed in the bleaching of the pulps from all the processes is chlorine, which is produced by the elec-
trolysis of Na Cl (salt). A by-product of this process, caustic soda, is marketed in considerable quantity.

The foregoing gives a general outline of The Champion Fibre Company's activities, and its requirements in the way of raw-material. The responsibility of meeting these requirements lies with two departments within the organization, namely, the "Wood Department" and the "Wood Buying Department". The former has charge of the Company's timberlands, their purchase, sale and development, including opera-

Portion of the great Smoky Mountains, North Carolina

tions both for pulp wood and saw-timber. The latter is responsible for keeping up the current supply for the pulp mill by outside purchases, contracts, etc., for the amounts required in addition to that supplied from the Company's own operations.

The central organization of the "Woods Department" consists of an Operating Superintendent and a Forest Engineer. The former has the entire supervision of the Department, but, as a matter of fact, devotes the greater amount of his attention to the operating and production end, delegating to the Forest Engineer most matters of other nature.

In this arrangement the field of the Forest Engineer includes:

(a) Keeping alert for favorable purchases and sales of timber lands.
Making timber estimates, valuation examinations and surveys.
Investigating titles (co-operating with Company Attorney).
Keeping up status map and record of transactions.
Compiling records pertaining to timberlands.

(b) Making timber estimates and preliminary railroad surveys to assist Operating Superintendent in determining best methods of development.

(e) Keeping informed as to available supplies of various species, both on Company owned, and on other lands within shipping distance of the mill.

(d) Inspecting cutting operations with view to advising on best method of handling various types.

(e) Supervision of forest nursery and planting operations.

(f) Protection of Company owned lands from trespass, fire, insects, etc.

(g) General forestry activities, such as utilization investigations, co-operating with various public agencies devoted to forestry matters, keeping posted on forestry and land legislation, etc.

This field is large, and one which will not be entirely covered for several years to come, owing to certain of the activities being of more urgent nature, temporarily, than oth-

A splendid stand of Chestnut, Oaks and Poplar in the Southern Appalachians.
most entirely directed to current operations, to making preliminary railroad surveys, securing rights of way, estimating minor watersheds, etc.

The current woods operations of the Company are many, and diversified as to character. Three of them involve rather extensive railroad development, with steam machinery, and two of them are principally fluming propositions, although the combination of both these methods of transportation prevails on all the operations. Considerable preliminary work is necessary in determining which method or the extent of the combination of these methods is most economical for the various units. The factors to be considered are quantity of timber, character of timber, grades, available water, character of ground, etc. Much time must be devoted to this work when as many as five operations are under way at one time, and plans are always being made for beginning new ones.

As time goes on, however, purchase work and attendant title work should diminish, thus permitting attention to be centered upon operating and silvicultural problems. A very great amount of work will be necessary in order to get complete data upon which to base plans for getting the Company owned lands in the best condition to meet the future needs of the mill. Complete timber inventories must be obtained, growth studies made, requirements figured, amount of available wood from outside sources estimated, etc.

The problem of handling any considerable forest area in the Southern Appalachians to greatest advantage for future production is a difficult one. Even within the Company owned boundaries are found more than fifty species of commercial trees, occurring in a great variety of combinations (types) over a wide altitudinal range, with diversified topographical features. To determine the silvicultural requirements of these many types is difficult, and after this shall have been done there will arise the problem of making the method of cutting and skidding the timber to conform to these requirements, e.g., in the spruce type it is probably most advisable from a silvicultural standpoint to cut the trees to a diameter limit, leaving young saplings and poles for second growth. However, the only economical methods thus far found for operating in this type employs large overhead steam skidders which, in snaking or pulling in the logs, do great damage to the trees which have been left standing.

The question of utilization is also a broad one. With the many different tree species of the Southern Appalachians, and the many products that can be obtained from them, it will probably be at a very distant date that the ultimate in utiliza-
Possibilities are continually presenting themselves in the way of new industries or in the raw material which might be employed in existing industries. Then there is also a large field for the Forest Engineer in determining the best plan of management of the Company owned lands, which are suitable for other purposes than tree growth, or which have upon or within them, merchantable products other than timber. There are always within large timber boundaries of the Southern Appalachians, areas which make splendid farms, areas which afford a good stock range, areas which are well adapted to grass, areas which give indications of valuable mineral deposits, and last but not always of least consideration, areas splendidly adapted for game and fish preserves, which are in demand by clubs. It is not always an easy matter to determine how or when these various areas should be developed, and much study is required in connection with this problem. To completely enumerate the phases of the work of a Forest Engineer, to a large pulp and lumber company, owning an extensive area of mountain land, is almost impossible. The number of activities which will receive his attention are limited mostly by his knowledge, ability and energy.
The Great Basin Experiment Station

R. J. Becraft, Former Grazing Examiner

The Great Basin Experiment Station is unique in its position as a prominent station devoted to the solving of range problems. Because it features an important phase of Forest Service work, it is of interest to foresters generally.

Scientific research in range management was commenced by the United States Forest Service in 1907, and the investigators worked in several of the far western states. It was felt that headquarters should be provided where intensive studies might be carried on, and in 1913 a grazing experiment station was established. A location was sought among the “grazing forests,” and intermediate in climatic and vegetative conditions between the Northwest and Southwest. The selection was made on the Manti National Forest of central Utah, where an abundance of representative range problems may be met first hand.

The Manti is typical of Utah’s “Forests,” and practically its whole area is grazed by live stock. Being centrally located as to agricultural development and also desert winter ranges, it has always been in great demand as a summer grazing ground. The very excellence of its native forage led to early abuse, since its abundant high range furnishes first class succulent feed even in late summer. Thus prior to Forest Service regulation, many a broad, high ridge and productive canyon were partly or even totally stripped of vegetation. Some of these areas have been greatly improved under Forest Ser-
vice administration, and many may be recognized at a glance as capable of much higher forage production.

Likewise, if demand be a criterion of range value, here, indeed, is a worthy place to begin range investigation. The valleys on either side are well utilized as hay and grain farms and their occupants have created the maximum demand known for National Forest grazing privilege. It was said a few years ago that nearly one-fourth of all National Forest grazing permits were issued on this one Forest alone. The average cattle permit was about twenty-five head and the average sheep permit about two hundred head, this on a forest of some three quarters million acres and carrying over 20,000 cattle and horses and 140,000 sheep for the summer grazing season. With such demand for range, we naturally find intensive utilization which presents ample grazing problems.

The Experiment Station is located some seven miles southeast of the town of Ephraim, and on an auto road connecting the two valleys. It occupies a picturesque site in an aspen grove at 8000 feet elevation, with a bold steep slope of a thousand feet as a near background. The location is intermediate as to elevation; and from the valley floor, slightly over 5,000 feet above sea level, to the summit of nearly 11,000 feet may be encountered the sagebrush, rabbit-brush, oak-brush, aspen-fir associations, each with its variations in types.

The upper slopes were the most seriously damaged formerly and probably present the most difficult problems. At 10,000 feet elevation has been established an Alpine substation where many of the important experiments are conducted. Here is located the erosion experimental plots with settling tanks for measuring water runoff and accompanying sediment, a novel experiment and productive of startling results. Preventive methods under observation include terracing with tree and shrub planting to check erosion. Other revegetation experiments are in operation with both native and cultivated species. Methods for eradicating poisonous plants, as also stages in plant succession are studied at these higher elevations, and climatological data accumulated are especially valuable.

In the recent activity of the Station the projects of plant vigor and browse study are especially interesting and promising. The former involves a detailed study of the effects on forage plants of various harvesting systems, and has given us already some valuable facts, part of which are reported on a chart, "The Effect of Grazing on Bunchgrass Range." Though oak and other browse species cover a great percentage of foothill range, we have no definite information as to
carrying capacity, adaptability to sheep or cattle, and fattening value of various species and mixtures of species. An experiment on the Dixie National Forest in southwestern Utah is in progress and will help in solving these questions.

A few words as to personnel are considered appropriate. Every year a force of five or six men are employed for the field season. These and many other Forest Service officials have contributed more or less directly to the success of the Great Basin Station. But the two outstanding figures have been Dr. Arthur W. Sampson, former Forest Service Ecologist and director of the station since its establishment, and James T. Jardine, formerly in charge of Forest Service Grazing Studies. It is to be regretted that our government bureaus fail to retain such capable and experienced men in their employ. The latter named resigned some three years ago to become Director of the Oregon Agricultural Experiment Station, and the former last autumn accepted an associate professorship at the University of California. The affairs of the station are now directly in charge of Clarence L. Forsling, for several years director of the Jornada Range Reserve in New Mexico and whose training and experience qualify him excellently for the work. We may, then, continue to look for leading data in range management from the Great Basin Experiment Station.
The Summer of ’22

N. K. C.

When Prof. Jeffers, the other day in Seminar instructed the men who have not been in summer camp to make plans going this year I had to stop a second in order to really realize that it had been a year since that same announcement had been made to us who are now Sophomores. When Jeffers suggested that the camp might be in the same locality this year I couldn’t help but view the whole trip.

When the spring quarter was over last year we were ordered to be in Pisgah Forest by June 19 ready to go to work not later than June 21. We arrived in Asheville, N. C. by different routes and means of transportation. All but two arrived in Asheville on June 18; those two we learned had already arrived, they having left Ames ahead of the rest and incidentally establishing their eligibility for Quo Vadis. The plan was to leave Asheville for Pisgah Forest the next morning. The next morning the watch-dogs of the Southern railroad happened to see the corner of a tent-fly sticking out of “Red” Koubas trunk. They promptly put him down for fourteen dollars excess baggage. Before they got through there was an excess charge of sixty-four dollars against the baggage of the camp. After much arguing and some harsh words we decided to call Prof. Andrews at Pisgah Forest for advice as to what to do. Andrews had gone on ahead to pick out a camp site and get things in readiness for coming. We waited for a week that one day for Andrews to come, and finally he showed up bringing with him still more rain. In some way or other he got things straightened around and the next noon we started for Pisgah Forest via auto.

In Pisgah Forest every convenience awaited us, namely a squeaky wagon for hauling our baggage out to camp and a half submerged barn for a dressing room while we changed into our hiking clothes. Some of the boys managed to get time to look over the town. Some saw more than the town; in fact some of them in the very few minutes we were in town had their plans all laid for spending their first week-end. Then the training period started, with Prof. Andrews in the lead and this lead lasted for four miles.

Five of the boys, with Andrews, had already spent a day in camp and had things started. We spent the rest of the afternoon in getting tents up for the night and after a supper of Ling’s famous “slum-gulion” we turned in or rather lay
down for the night. There wasn't anything particularly soft about that North Carolina soil.

The next two days we spent in getting the camp fixed up and waiting for Prof. Jeffers. "Jeff" had left Ames a week ahead of us in one of Henry Ford's best with Mrs. Jeffers and the two youngsters as ballast. When he left, it was his intentions to go overland, but from all accounts he must have
gone under, and through a good part of the country. Jeffers had been the proud owner of his Ford only for a short time, and he learned a great deal about gasoline propelled vehicles in that trip.

The day after "Jeff" arrived the summer-camp started in earnest with a silviculture trip for a starter, and from then on it was one continual round of silviculture, wood chopping, inspection trips and rain. The nice part of the rain was that it usually held off until about four-thirty in the afternoon and then quit about midnight, but very seldom failed to start about noon on Saturdays and continue most all day Sunday.

The first six weeks of camp we spent in silviculture and logging, with camp technique sprinkled in every day and all Saturday morning. The silviculture consisted of trips cross-country with no definite place to get to except back, but managing to cover most all the different sites and conditions that
would be interesting and instructive. The first thing that confronted us was the great number of new trees we found and which we had to get used to recognizing. It was on one of these trips that someone thoughtlessly turned the mountain around after we had gone past, which resulted in differences of opinion and a rather prolonged stroll; also some rather hard things being said about the next "saddle."

During the first part of the first six weeks Mr. Korstian of the Appalachian Experiment Station paid us a visit. We spent one morning with him on a dendrology trip which surely did give us a great deal of good information on the many trees that were so foreign to us.

Our days were not run on a set schedule. The only thing we knew about what was going to happen for sure was getting up and our meals. Andrews did the alarm-clock act and he was always on time and that was—early. We never really knew what we were going to do from day to day until perhaps the night before, when someone would get the dope that "Jeff" would have us the next day, or perhaps "Andy" would take us out for a little exercise. In that way we always knew we had something coming but never really knew what it was. If it were "Jeff's" day we could depend on one of those long "saddle" hikes and some "silver-culture." We certainly did a consistent job of crabbing about those hikes. We never quite forgave "Jeff" for that first trip although later on we took hikes that were twice as long and hard. On that first trip the most of us had him flunked in silviculture before the trip was half over.

When we were under "Andy's" guiding it meant a trip up Avery's Creek and some logging to inspect. The only difficulty on these trips was all the figures we had to remember, such as the length of the haul, the amount cut per this and that, the size of the cable and other things too numerous to mention. We saw everything in the logging line that that section of the country offered, everything from skidding with oxen to over-head lines. We certainly got a wonderful opportunity to see the hardwood logging. The fact that the only virgin chestnuts that have not been touched by the blight are found in this section is a thing that can not be overlooked. Between Jeffers and Andrews time did not hang the least bit heavily on our hands.

On these long hikes we always had a good feed to look forward to when we hit camp. There were vacancies of considerable size that were not filled by the peanut-butter and rhubarb sandwiches of our belt lunch. There was usually time for a swim before the "mess cook" gave out the wel-
come "come and get it!" and those swims I don't believe will ever be forgotten. We swam in the Davidson River and that same river is beyond a doubt the coldest in the south. Some of the boys got so enthusiastic over their cold plunges that they got into the habit of indulging in a refreshing dip every morning at six o'clock. Some of us however kept ourselves more safe and sane. After supper there was usually

a baseball game or a game of horse-shoes or both. One of those exciting baseball games nearly cost "Charlie" Towne his grade in silviculture. "Jeff" happened to be holding down second base at the time, and in an effort to stop a man at second it became necessary for 'Charlie" to peg one at a rather high rate of speed. "Jeff" thought for a few minutes that he had stopped a comet.

One of the big features of our summer was the trip to Suncrest. It was a twenty mile hike. We were carrying bedding and clothes for a week's stay. Those packs did get most awful heavy and how high some of those mountains were. We spent five days on this trip, inspecting the logging in the spruce-fir type and helping collect some data on the reproduction after the different kinds, and the differences in the reproduction after fires. The main reproduction seemed to be blackberries and fire cherry. Some rather harsh things were said about the pewee job. It took a couple of nights for everyone to get used to the rather different sleeping conditions. Some of us slept on sacks of oats; others were lucky enough to sleep three in a bed. "Jack" Hogan and "Allahwishus" slept with the horses. They said it was a mighty

Hiking back from the visit to the spruce operation
good place to sleep but there was one horse that was so very playful that she kept the rest of them awake most of the night. We spent our evenings listening to tales of forestry in San Domingo,— "Status Quo." The trip back was one, never to be forgotten. The trip up over Pilot Knob was fine even if "Jeff" did nearly get electrocuted and "Allah-wishus" nearly did have a run-away.

We made trips to the saw mill at Pisgah Forest and saw the very latest thing in the way of flooring machinery. Then there were trips to Rosmond where we inspected the extracting plant. On the way back we were treated to a trip through the tannery at Brevard. There were a number of other small utilization plants which we visited that day. It was on that memorable day the camp got the name of "Tessie McGookin."

The week-ends were spent in a variety of ways. Some went to Brevard and hired horses to walk around the streets with. One of the boys used to spend his Sunday evenings on a certain porch or rather one certain side of the porch. "Red" Kouba usually spent his Sundays looking for Indian relics. It wasn't an uncommon thing for some of the more
industrious ones to spend the day washing clothes and standing guard over them so the cows wouldn't eat them up. Paul Bunyun's blue ox didn't have a thing on those cattle. They would eat most anything. Soap was their favorite fruit, and they seemed to get an unusual amount of kick out of soap suds. I have heard of people of whom it was said they would drink anything, but I never did know before that cows would drink soap suds and especially when the suds happened to be off "Pete" Downey's clothes. One good looking Jersey went so far as to eat or rather swallow a whole sack of "Andy's"

Durham, sack, tag, tobacco and all. Rather a case of "dog eat dog."

The last six weeks we started in on our mapping and cruising. I don't believe any of us will ever forget old B-traverse. We did not, however, spend all the time cruising. There was an occasional sprinkling of silviculture here and there by way of variety.

We finished our cruising and then broke camp and started for Asheville. Some of the boys took a good supply of the
“Southerns” spikes away with them. Of course “Jack” Hogan got the blame for that.

In Asheville we put up at the New Commercial hotel. Every morning we made our trip out to the Biltmore estate where we saw the rest of the silviculture which we had missed at Pisgah Forest. From Asheville we made side trips to Canton, spending the day going through the Champion Fiber Mills. This pulp mill is one of the largest in the world and I believe I am correct in saying it is the only pulp mill where all three processes are used in the making of paper. These people were mighty fine to us and did everything to make the trip through the mill interesting. The trip there had its thrills. “Stan” Haw proved the old theory about the camel and the needle’s eye to be all a mistake when he drove a Dodge car between the curb and the back of the car Max Wright was driving, when there really wasn’t room for a motorcycle to get by.

About the time we were ready to leave the “Land of the Sky” the railroad strike was in full swing. It looked as though we were going to spend the winter in the south.

There is no question about the 1922 summer camp being a success. It was that and more, too. To begin with, we had as nearly a perfect camp-site as could be asked for. The camp was located in the Pisgah National Forest, four miles from the town of Pisgah Forest, on the Mt. Pisgah road. We were camped on a grassy slope, the scene of the famous 1916 landslide. It was close to the road and yet screened from the road and away from the dust. A small creek ran through the camp from which we got our wash water. Just above the camp was a good strong spring which furnished our drinking water. The cook tent was pitched on a low flat down near the swamp and close to the creek. Just beyond the swamp was the logging railroad which gave us easy transportation up into the hills. This swamp was the source of a nightly concert. Again Paul Bunyun had to take a back seat. Those frogs were nearly as large as his blue ox, and how they could sing. The frogs kept the air alive with harmony until shortly before daylight and then the chimes began. The chimes were played by the belled milk cows of the man who had a grazing permit on the land where we were camped.

We had everything we had come to summer camp to get, there within easy reach. The Carr operation was only a short way up in the hills. At Pisgah Forest the saw mill, at Rosmon the extracting plant, up at Suncrest the spruce-fir operations, and all around us lay wonderful opportunities for work in silviculture and we certainly did take advantage
of those opportunities. The topography was such that we had no difficulties in our mapping, and there were occasional rattlesnakes to keep one from going to sleep on the job. We always had company while in camp. There were plenty of bugs. Entirely harmless of course but there were plenty of them. One of them lost his bearings one night and got in Heinie's ear which resulted in considerable excitement in camp.

Another thing that made the camp a success was the presence of Mrs. Jeffers, Betty Jo, and "Buddy." Mrs. "Jeff" was always ready with a smile even though it did rain continually, and the cows tried to eat up her stove and everything else that wasn't nailed down or put out of reach.

Betty Jo succeeded in vamping everyone in camp but kept them at a safe distance all summer, by taking refuge behind her mother's skirts whenever anyone took a step in her direction.

There is no question about the location for this year's camp being a good one if it is located anywhere near where it was last year. Everyone came from camp having had a good summer and a good time. Everyone came away without losing any of his fraternity jewelry, although they did accuse me of trying to annex a grocery store.
Paul Bunyon

By C. W. Martin

The hush of evening quieted the restless waters of Pelican lake. The sweetly melancholy song of the Hermit Thrush far away in the deep green of pine and balsam, drifted faintly across the rice covered bay announcing the angelus hour of the forest. I ceased my paddling and sat in silent reverence gazing on the flaming crimson of the western sky which silhouetted the slender cathedral spires of the spruces. Suddenly a loud halloo disturbed my reverie and turning quickly I saw a grizzled man of enormous stature standing on the rocky shore.

I paddled swiftly to where he stood and, leaping out, I prepared to beach the canoe. Before I could do this the stranger picked up the canoe and set it down on the beach. Then seeing my evident consternation at this feat of strength he laughed heartily showing a set of white teeth beneath a heavy, wiry, moustache which resembled two gray whisk brooms set handle to handle. "Don't you know me?" he said. "I am Paul Bunyon." Shades of Baron Munchausen! So this huge man with the kindly blue eyes and weather-beaten face was the great Paul Bunyon. I meekly introduced myself and asked him to share my cabin with me.

I led the way and Paul crawled through the door and sat down before the fireplace while I cooked dinner. When dinner was ready I asked Paul to dine, but he refused, saying that he had some food with him. Then reaching in his pocket, he pulled out a prune about the size of a Hubbard squash.

"This is my meal," he said. "I produced this by crossing a California prune with a native son. As a result this prune is as full of energy as a native son is full of wind. So you see I am always well supplied with energy."

After the meal Paul stowed away 4 plugs of Peerless in his cheek and we started in to discuss Paul's work and his associates.

"Where's Brimstone Bill and the blue ox Babe?"

"Oh, they are down in Virginia, Minnesota. You see Prout has opened up another iron mine there and we're hoping there will be enough ore to make the old Babe a complete set of shoes. The last one only had enough ore for three shoes."

To me this seemed a bit incredulous but noting the honest look in Paul's eyes, I had no other alternative than to believe him.

Suddenly a terrible noise supplemented by a terrific blast of wind caused me to leap to my feet.
"What was that?"

"That's Bill, friend, and he blew his horn to let me know that he is on his way. I am sorry to have to leave you so quickly but I must be up in Alaska tomorrow morning to supervise the cutting of a crop of totem poles. We're logging them up where the Little Gumboot flows into the Big Golosh."

In vain I protested Paul's early departure.

"No, I must go, but there is a little biography that a fella writ for me. It is accurate and fairly up to date."

Paul reached in his vest pocket and pulled out a book which was slightly larger than a Webster dictionary. Putting this on the table he opened the door and disappeared into the night leaving me staring after him. The last glimpse of him showed him headed towards the north where frequent flashes like northern lights illuminating the sky showed that Bill was swinging along with his lantern and the old blue ox.

I closed the door, threw a big log on the fire and set down to read the biography. I opened the book and there in bold type was the author's name—Dr. Frank Hough B. V. D. Q. E. D.

Here are a few extracts from that notable biography.

Until this biography was written the antecedents and personal history of Paul Bunyon has been shrouded in mystery except for a few incidents of common knowledge such as the logging off of North Dakota by Paul and the seven axemen of the Red River. This was known not only from the lack of trees there at present, but from the personal testimony of old timers who were there and saw it done.

Paul Bunyon was born in northern Maine in February, 1732. His father, Joe Bunyon, was a direct descendent of the Bunyon who forested the garden of Eden in the year one and who latter logged off the garden for lumber for Noah's ark. Paul also had an uncle John who wrote "Pilgrims Progress," Paul did not think much of John, however, because of the latter's prison record.

When Paul was able to play about, his father brought him a blue calf which Paul named Babe. The two grew up together and when at the age of 18 Paul set out to make his mark, his father gave him the now full grown ox.

Babe was Paul's assets and liabilities. He could pull anything that had two ends. Babe at the time of his maturity was seven axe handles and a plug of Peerless between the eyes and stronger than a totemaster's breath. He could pull a section of timber into the mill without any noticeable effort, and to pull the kinks out of crooked log roads afforded him mild
amusement. Such prodigious strength was necessarily accompanied by a great appetite. Babe would eat a mere fifty bales of hay at each meal and he was not particular about eating it wire and all. Paul used to keep four men with pickaroons to pick the wire out of the ox’s teeth.

When Paul’s business grew so large that he could no longer take care of Babe and his numerous other duties, he turned him over to the care of Brimstone Bill. Bill was the man that wrote the skinner’s dictionary, a sort of hand book for teamsters. The book is a standard in all schools that appreciate Bill’s mastery of forceful English. Bill’s early religious training explains the many references made of religious names and places.

Babe used to be a source of continual worry to Bill because of his playful nature. Old Babe liked to sneak off and roam around by himself for a day or two. Sometimes he used to ramble up into Minnesota where the soft ground caused him to sink in up to his stomach. This left very deep holes in the ground. Just how deep these holes were is immaterial, suffice it to say that a settler fell into one with his wife and baby boy. Forty nine years yater the “boy” managed to get out and report the happenings. Fortunately most of these holes have filled up with water and this particular region is known as the “land of the sky blue waters” or “the thousand lakes country.”

The author of this biography thinks that it would be an injustice to Paul to leave out some incidents as to how Paul ran his camps. The first item of importance was the way the men were cared for.

Paul had an excellent cook called “Sourdough” Pete. He made everything but coffee out of sourdough. Sourdough had only one leg and one arm, the other leg and arm having been blown off in an explosion of the sourdough barrel. Pete was unusually skillful at making pan cakes of which the lumbejakes were very fond. To fry his sourdough pancakes in sufficient quantities to satisfy the crew, Pete had big Ole the blacksmith make him a griddle. This griddle was so large that Pete had two colored boys with hams on their feet to roller skate around the griddle and keep it greased.

Space does not permit the publishing of the many other feats of Paul Bunyon and his crew. The facts about big Ole’s dinner horn, Babe’s buckskin harness, the doings of Pawl’s squirrel, axehandleson, etc, will probably be published in some future edition of the Ames Forester.
Here and There With Ames Foresters

The officers of the Forestry Club for this year are as follows:

First half—
President.......................................................E. W. Watkins
Vice-President..................................................Dewey Berkhan
Secretary-Treasurer...........................................C. W. Martin

Second half—
President.......................................................F. B. Trenk
Vice-President..................................................C. W. Martin
Secretary-Treasurer...........................................R. M. Jackson
Forestry Club Notes

This Club for this year has followed the plan of having a good speaker at all the meetings. A regular committee arranged these meetings and the speakers were selected with the view of getting for the members all the information on subjects of interest to the Forestry profession.

The first speaker of the year was Dr. McKahn who gave the club a talk on first aid with special problems liable to come up when one is in the woods. Resuscitation and the problem of rescuing drowning persons was stressed.

Prof. A. B. Caine of the Animal Husbandry Department spoke to the club on the Selection of Saddle Horses Suitable for Use in the Forestry work. Prof. Caine told how the western horse came from Spain and ran over the prairies for many years. He said that a good weight for a saddle horse for Range work would be about 900 pounds to 1,200 pounds, the weight depending upon the amount the horse was to carry.

As a Forester has occasion to use a gun quite often the committee thought it would be only right to get some one that was an expert on the subject of fire arms. Major J. K. Boles of the United States army who was a member of the U. S. Rifle team that won the world's championship last fall in open competition in Rome, Italy, was secured as speaker. He gave the club a very interesting talk on the selection of rifles and pistols; the care of the rifle and pistol; the cleaning and the shooting of the rifle and pistol. He also gave some very interesting side lights on the Rifle Matches in Italy.

Prof. H. E. Bemis of the Veterinary faculty was the next speaker and he brought to us the subject, Endurance Tests for Horses. Prof. Bemis was one of the judges in a recent Endurance Contest for Saddle Horses. He brought out the marvelous way horses can travel and the time they can make when traveling steadily for many days. He also indicated the defects which will hinder a horse in such a contest and the way some of these defects are overcome.

The next speaker was Dr. Dill of Iowa University. His talk was on the Birds of Layson Island. His talk was illustrated with lantern slides. He told of the work being done in the protection of wild fowl and the many migratory birds which nest on the Island.
OUR CHANGING FACULTY

Prof. G. C. Morbeck is on a leave of absence this year, doing special field work for the Forest Products Laboratory at Madison. Recent letters tell us he is in the Southland among the Colonels. We have greatly missed Prof. and his Paul Bunyun stories, and a hearty welcome is awaiting him on his return.

Perkins Coville, a graduate of Cornell, came to us last fall to take charge of the Wood Technology, Wood Preservation, Woods of Commerce and a few of the Farm Forestry courses. Before coming to Ames Coville had practical experience in Eastern Canada, Louisiana, and on the Pacific Coast.

"Deed" Poshusta returned last fall to continue his M. S. work, and to handle a few Farm Forestry classes. Poshusta has been located on the Gallatin National Forest in the grazing reconnaissance work, and is now on a leave of absence from the service.

WEN MING LING

Ling is our only Chinese Forester. He received his M. S. in June, 1922, and then went with the fellows to North Carolina. When camp broke up Ling left for a tour of Europe, the Mediterranean and India. Late in the fall he reached his native province of Fukien. At present he is superintendent of the Fukien Industrial Mission School, Fukien, China. Now we can say that the sun never sets on Ames Foresters.

I. A. F. C. NEWS

The annual convention of the Intercollegiate Association of Forestry Clubs was held at Missoula, Montana this year. William Nagle, class of '14, represented the local club. It was with real joy that a telegram was received the morning of March 10th advising us that we had been elected the President Club for 1924. Ames Foresters greatly appreciate the honor which has thus come to them, and already the present officers are making plans for the next convention, the date of which will probably be sometime in the first week of March. "Brother Forestry Clubs—meet us in Ames in 1924."
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NATIONAL WOOD WORKS
SIoux City, IOWA
In the summer of 1921 a Forestry Extension Service was organized, with Prof. I. T. Bode, then Assistant Professor, in charge. In an interview regarding the progress of his work, he gave us the following notes:

The work of the department is divided into three parts, namely:

1. Wood preservation.
2. Farm forestry service.
3. Planting.
   (a) Shelter belts and windbreaks.
   (b) Woodlots and waste areas.

Wood preservation.
The objectives of the department are:

(1) To conduct at least two demonstrations in the county to show how to set up and operate a farm creosoting plant.
(2) To have the co-operators keep a check on costs and increased durability so that the actual saving can be observed.
(3) To get three other users of preferably native species of posts and timbers to start treating work.
(4) To furnish additional information on post and timber treating work through meetings, conferences and illustrated talks.

The work is planned to do the farmers the greatest amount of good. The demonstration work is confined to the period from October to February when the farmers can best spare the time. Two days are allowed for each demonstration. An effort is made to organize the farmers so as to have community plants.

The object of the farm forestry service project is to provide forestry advice, especially in problems of woodlot management. This work can be carried on any time of year, with the exception of the months of March, April, and May when planting is carried on. Three to five days are allowed for the work. The work allows for a week of miscellaneous forestry work:

(a) Consultations in tree work and care of woodlots, (removal of woodlot crops, regeneration of woodlots, thinnings).
(b) Plans for shelterbelts.
(c) Meetings on woodlots, tree planting, wood preservation and general forestry subjects.

The shelterbelt and tree planting demonstrations are ar-
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ranged to establish demonstration shelterbelts on woodlots, either as new plantings or as renewals for existing plantings or woodlots. To discuss methods of setting trees, kind of trees, spacing, etc., and to furnish tree planting information through meetings, conferences and illustrated talks. The planting is started about the end of March or the first of April and lasts until the middle of May. The work requires that the farmers organize to make the work easy and have all things ready for the expert sent by the college.

Several rather outstanding facts were brought out by this program:

1. That the forestry program is even larger than expected in Iowa.
2. That the farmers are beginning to appreciate its close relationship to the farm.
3. That the interest in planting new trees for shelterbelts and woodlots has increased with a bound and that it will make real strides forward as soon as tree planting stock can be made available for the planter at a reasonable cost.

Seminar Notes

The plan of the Department has been to so arrange the seminar programs as to have a speaker on one week and moving pictures on the next week. The speakers for the most part have been members of the student body and their talks were generally about their experiences in the practice of Forestry. The moving pictures were secured through the Department of Agriculture, and dealt chiefly with forestry topics.

To give an idea of what the men spoke upon and the diversity of subjects, mention will be made of a few of the speakers.

Poch, who is now forest assistant on the Black Hills forest, S. Dakota, spoke on the subject of fire fighting. He explained the use of the Osborne Fire Finder, a new instrument being used for the location of fires from look-outs. Poch worked on the Pagette Forest in Idaho.

The next speaker, Edward Pohle, at present in New Mexico on Timber sales work, spoke of his experience on a timber sale in New Mexico. The methods of cruising and working the areas were given in detail. This timber sale was made to a subsidiary company of the Sante Fe R. R. The scaling methods were also explained.

Palmer and Morris, two men in the grazing game, the
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latter a grazing assistant, told of their experiences on grazing reconnaissance in New Mexico. The method of organizing the crew for such work was brought out; the methods and purposes of the work were discussed. The men showed how data were gathered and recorded. These were two of the very interesting talks of the year.

Allan Miller spoke on the system of fire fighting used on the forests in Idaho and also how topography influences fires and the methods of combating them.

Martin also spoke at this seminar, telling of his experiences on the Modoc National Forest of California. Martin told of the game found on the forest. He also told of the system of reconnaissance used in that section of the country. Martin was on a timber reconnaissance crew and his work took him up into the high spots of California.

McDowell spent his summer working in one of the Weyerhauser Mills at Cloquet. He managed to get into many of the departments of the mill and gained some valuable experience especially in grading and the methods of filling orders and shipping lumber.

E. W. Watkins spoke of his work in Montana. He told of the trouble with cattlemen and sheep herders. He was stationed on the Gallatin Forest. His talk brought out the problems met by rangers and men in charge of forest administration.

Dr. Gilman of the Plant Pathology department gave us an interesting lecture on Plant Diseases, and emphasized the methods science has developed in fighting diseases of trees.

The moving pictures were of special interest. Pictures showing control methods in the eradication of the gypsy and the browntail moths were given. Movies of logging operations in all parts of the world were also given. Several reels of pictures taken on various game refuges brought attention to the work of the government in that line of endeavor. Some of the pictures were special ones taken by the Forest Service to show the recreation possibilities of the different forests. A picture which brought much praise from the foresters was of the Round-up at Bozeman, Montana, especially those who attended the 1920 Summer Camp, as all the fellows that summer "took in" the Bozeman Round-up.
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1904
Merritt, Melvin L., Juneau, Alaska, Asst. District Forester, U. S. F. S.

1907
Kupfer, Carl A., 811 Santa Barbara Road, Berkeley, Calif. Salesman for North Coast Dry Kiln Company.

1908

1909
Allen, Shirley W., U. S. Forest Service, Los Angeles, Calif.

1911
Freeman, F. G., Santa Ana, Calif. Fruit business.
Park, L. S., Box 235, Chandler, Arizona. Teaching Vocational Agriculture.
Smith, P. T., Redfield, South Dakota. County Agent.
Whitham, J. C., Forest Supervisor, U. S. F. S., Miles City, Montana.

1912
Lessel, L. R., Forest Supervisor, U. S. F. S., Holbrook, Ariz.
O’Banion, A. C., Park Rapids, Minn., County agent.
Olmstead, R. A., Dundee, Oregon. Prune and walnut ranch.
Richmond, H. H., Cass Lake, Minn. Private business.
Smith, W. A.
Truax, T. R., Forest Products Laboratory, Madison, Wis.

1913
Clark, H. B., 1701 Paxton St., Sioux City, Iowa. Sioux White Motor Co.
Hensel, R. L., Kansas State College, Manhattan, Kansas. Teaching.
Ringheim, H. I., Elrose, Sask., Canada, Monarch Lbr. Co. Traveling Supt.
Steffen, E. H., Head of Forestry Dept., State College of Washington, Pullman.
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1914
Hassel, W. C., Supt. of Schools, Box 7, Salem, Iowa.
Nagel, W. M., U. S. Forest Service, Hamilton, Montana
Wolven, R. M., Newport Road, Santa Ana, Calif. Rancher.

1915
Bode, I. T., Extension Professor in Forestry, Iowa State College, Ames, Ia.
Hansel, H. E., Drainage Engineer, Bloomfield, Iowa.
Hicks, L. E., 1692 Seward Ave., Detroit, Michigan.
Smith, R. P.

1916
Cornell, H. H., Iowa State College, Ames, Iowa. Landscape extension work.
Plagge, N. O., Barrington, Illinois. Men's furnishing store.
McCarthy, C. C., 125 Ash Avenue, Ames, Iowa.

1917
Hartman, G. B., In care of Long-Bell Lumber Co., De Ridder, Louisiana.
Henry, A. S., Sioux City, Iowa, 419 6th St.
Stokes, R. R., Coeur d'Alene, Idaho, Rutledge Lumber Co.

1918
Davis, E. M., Forest Products Laboratory, Madison, Wis.
Hadlock, F. D., 4748 N. Springfield Ave., Chicago, Illinois.
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Rehmann, T. W., 431 Flynn Bldg., Des Moines, Iowa. Real Estate Business.

1919

1920
Deming, Milo, U. S. F. S., Ogden, Utah.
Fletcher, R. A., Eureka, Calif.
Loy, E. C., 4516 N. 39th St., Omaha, Neb. Drawing instructor South High School.
Moorehead, John W.
Wall, L. A., Research work in Forestry Department, Iowa State College. Fellowship.

1921
Cormany, C. P., 208 S. La Salle St., Chicago, Ill. Weyerhaeuser Sales Co. Lumbering.
Fisk, V. C., 219 Natural History Bldg., Urbana, Ill. State forestry work.
Ling, Wen Ming, Industrial Mission, Pagoda Anchorage, Foochow, China. In a recent letter to Professor Mac-Donald, Ling stated that he had married before he came to the states and has a family of two children, a boy seven years old and a girl five years old. This was a surprise to the Ames Foresters who knew Ling.
Patrick, O. K., Long-Bell Lumber Co., DeRidder, La. Creosoting work.
Munson, H. F., Manchester, Ia. Engineering work.

1922
Eggers, Wm. C., In care of Long-Bell Lumber Co., Shreveport, La.
Fennell, Robt. E., 1814 Colby Ave., Everett, Washington. Lumbering.
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PROSPECTS FOR THE 1923 SUMMER CAMP

Although the Forestry faculty has not as yet decided definitely where the Summer Camp of 1923 will be held, Professor MacDonald is inclined to feel that the highly successful camp of last year in the Appalachian region of North Carolina warrants serious consideration of the same general locality for this season's camp. According to those in charge, no single region yet visited has afforded the combined advantages of a great wealth of dendrological and silvicultural material, topographical conditions, and field operations of logging and lumbering as has the country in and about the Pisgah National Forest.

As the Annual goes to press no information is available as to who will make up the personnel of the faculty in charge, nor of the number of students who will attend; but judging from the interest being shown by the Freshmen, all indications are that it will be the largest summer camp ever held.

A LUMBER ROMANCE

He used to board at Mary's house, and she was trim and neat.
He used to plank his money down for stakes she served to eat.
He often used to beam on her, and girder as he kissed her.
And she would shutter lips real tight, and swear she'd be his sister.
She used to column down sometimes when he would start to stringer.
She didn't truss him very far, although she was a clinger.
He used to stair-rail hard at her until she started scolding.
And then his love grew cold; in fact it started molding.
Now, when she wears her pretty sash, his heart no longer tingles
And, in the end she'll shake him flat, because he has the shingles.

(American Lumberman, Feb. 26, 1921)

IA. CONSERVATION ASSOCIATION CONVENTION

The annual convention of the Iowa Conversation Association was held in Ames February 27 and 28. Ames Foresters were given a splendid opportunity to get first-hand information concerning the progressive work this organization is doing in Iowa. The evening of the 28th the Forestry Club attended in a body, the lecture "The Birds of Layson Island," by Prof. Homer R. Dill, of Iowa University.

Prof. G. B. MacDonald was re-elected Secretary of the Association.
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