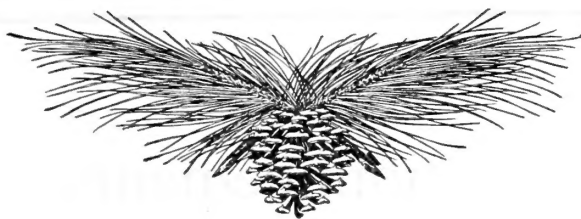
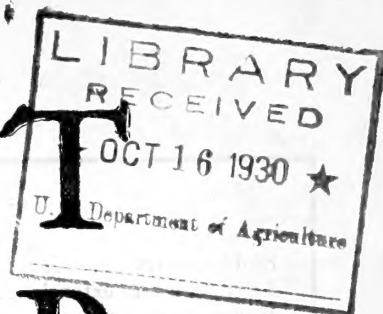


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FOREST WORKER



September, 1930

Issued bimonthly by the FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

	Page
State forestry	1
Education and extension	4
Forest Service notes	7
General forest news	12
Foreign notes	18
Personals	22
Bibliography	25

Announcements

Society of American Foresters to Meet in Washington, D. C.

The Society of American Foresters will hold its annual meeting of 1930 at the Wardman Park Hotel, Washington, D. C., December 29-31. It is planned to have William B. Greeley and Secretary of the Interior Wilbur lead a discussion of the public-land policy of the United States. Other speakers will describe progress in private forestry enterprises. A full day will be devoted to technical papers. It is planned to have reports on findings from erosion and flood-control studies in California and in the Mississippi Valley. The society's thirtieth anniversary will be celebrated with a birthday banquet.

Special railroad rates have been granted under the certificate plan for those attending this meeting.

Inquiries in regard to arrangements for the meeting should be addressed to the society's executive secretary, W. R. Hine, 1523 L Street, NW., Washington, D. C.

Information Desired as to Suspected Cases of Dutch Elm Disease

Plant pathologists endeavoring to determine the present distribution in this country of the Dutch elm disease have requested that information about any deaths of elms suspected to have been caused by this disease and short sections of limbs of any elms showing symptoms of it be sent to the Department of Botany and Plant Pathology, Agricultural Experiment Station, Wooster, Ohio. Symptoms of the disease are described by Dr. Haven Metcalf on page 12 of this number of the Forest Worker.

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Because the free edition is necessarily limited, this periodical can be distributed without charge outside of the Government service only to such persons and organizations as State forestry and conservation officials, State agricultural extension directors, faculties and libraries of forest schools, and forestry associations. Others desiring to obtain copies of the FOREST WORKER can do so by sending 5 cents for a single copy or 25 cents for a year's subscription to the Superintendent of Documents, Government Printing Office, Washington, D. C. Foreign subscriptions: Yearly, 35 cents; single copies, 7 cents.

FOREST WORKER

Washington, D. C.

SEPTEMBER, 1930

Vol. 6, No. 5

State Forestry

Kentucky Makes Fire Patrol of Timberlands Compulsory

A law of Kentucky approved this year requires that timberland be patrolled during the forest fire season. If the owner does not provide patrol, through membership in a fire-protective association or otherwise, the State may provide it at the owner's expense. The amount that may be charged by the State against a timberland owner for patrolling his land is limited to 1 cent per acre per year. Timberland is defined as any land on which timber or woody brush is present in sufficient quantity to constitute a fire menace to the land itself or to adjoining land. If a property is not more than 100 acres in extent, residence of the owner or lessee on the property is held to constitute adequate protection.

This act also empowers the governor, upon recommendation of the State forest service, to accept gifts of land for State forest reserve purposes, and extends the State forester's term of office from two to four years. It makes the setting of woods fires resulting in damage to the property of another punishable by a fine of from \$10 to \$100, imprisonment for from 10 days to 6 months, or both fine and imprisonment, and establishes the same penalties for setting fire to grass, straw, or anything else capable of spreading fire on land.

California Division of Forestry Creates Branch Organization

The California Division of Forestry now has a branch organization in the southern part of the State, with headquarters at Pasadena. Walter H. Coupe, for three years State forest inspector in southern California, has been made deputy State forester in charge of the new branch. He will be assisted by Jess A. Graves, formerly of the Los Angeles County forester's office. Mr. Graves will act as fire chief for San Bernardino, Riverside, Orange, and San Diego Counties, and as liaison officer between the State forestry division and the county forestry organizations of Los Angeles, Ventura, and Santa Barbara Counties.

A new fire-protection district has been organized, consisting of San Bernardino, Riverside, and Orange

Counties. These three counties form a natural fire-protection district, State Forester Pratt explains, all obtaining their water supply from the San Bernardino Mountains. State Forest Ranger E. W. Nelander will be in charge of the new district, with headquarters at San Bernardino. Charles Van Fleet, formerly assistant ranger at San Jacinto, will succeed Ranger Nelander as State forest ranger for Riverside County.

Colorado Highway Forces to Cooperate in Protecting National Forests

The Colorado Highway Department recently entered into an agreement with the United States Forest Service providing that when employees of the department discover fire on national forest land adjacent to rights of way where they are working they will report the fire to forest officers and will take immediate action to suppress it. The expense of such suppression work will be borne by the department if its employees are responsible for causing the fire, otherwise by the Forest Service. When the department enters into contracts for the construction of public works through national forest areas it will require contractors and their employees to take all practicable measures to prevent and suppress fires adjacent to rights of way and camps.

Michigan Prepares for Forest Fire Studies

The Michigan Department of Conservation has prepared a forest area of about 1,700 acres in Roscommon County for use as a forest fire experiment station. With the cooperation of the United States Forest Service, the department plans to study fire weather, fire damage, control methods, improvement of equipment, and cost and maintenance of fire lines. Plots of 1 or 2 acres each, surrounded with fire lines, are to be subjected to controlled burning. G. I. Stewart has been made supervisor of the station.

Virginia's appropriation for its State forest service, which has been about \$33,000 for each of the past few years, was increased this year to \$50,000.

Forest Fires of 1929

A summing up of forest fire reports made by State forestry officials and national forest officers indicates that fires of the calendar year 1929 covered 46,230,120 acres of land in the United States.¹ The total area needing protection from forest fires in that year was officially estimated at 589,809,240 acres; the total area for which such protection was provided was 398,918,960 acres. The year's fires covered 4,876,320 acres of the protected area and 41,353,800 acres of the unprotected area. Thus the fire toll was about 1 acre in 5 of unprotected land and a little more than 1 acre in 100 of protected land.

Fire damage was officially estimated at \$87,916,850 on unprotected land and \$14,135,550 on protected land.

The fires reported total 134,895. Of this number 44,076 occurred on protected and 90,819 on unprotected areas.

Smokers again figured in the reports as the leading cause of forest fires on protected lands in the United States, being held responsible for 21.6 per cent of the fires. Incendiaries took second place with 17 per cent. The burning of debris was reported to have caused 12.4 per cent, lightning 9.8 per cent, campers 8.7 per cent, railroads 8.3 per cent, and lumbering 3.9 per cent. In 1929 as in 1928, fires of unknown origin made up 7.9 per cent of the total on protected areas.

In percentage of protected area burned four groups of States bettered their averages for the preceding three years. These were the Northeastern States (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, and New York), the Middle Atlantic States (New Jersey, Pennsylvania, Delaware, and Maryland), the Southeastern States (Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida), and the Central States (Ohio, Indiana, Illinois, Kentucky, Tennessee, and Missouri). The proportion of protected area burned over was 0.12 per cent in the Northeastern States, 0.45 per cent in the Middle Atlantic States, 0.85 per cent in the Southeastern States, and 0.94 per cent in the Central States. These four groups also lowered their 3-year records as to average area burned over per fire on protected land, with the following averages for 1929: Northeastern States, 16.3 acres; Middle Atlantic States, 22.6 acres; Southeastern States, 66.3 acres; and Central States, 63 acres. For other groups the proportion of protected area burned over was as follows: Gulf States (Alabama, Louisiana, Mississippi, Texas, Arkansas, and Oklahoma), 4.02 per cent; Lake States (Michigan, Wisconsin, and Minnesota), 1.01 per cent; Rocky Mountain States (Montana, Idaho, Wyoming, South Dakota, Colorado, Arizona, New Mexico, Nevada, and Utah), 0.48 per cent; and Pacific States (Washington, Oregon, and

California), 2.24 per cent. For all groups the percentage of protected area burned was 1.22 and the average area burned over per fire on protected land was 110.6 acres.

Fire Truck Given to Hillsboro, N. H.

The New Hampshire town of Hillsboro has acquired a specially constructed forest-fire truck as a gift from Caroline A. Fox, of Arlington, Mass. Ralph L. Morgan, of Richmond, N. H., designed the truck and had it assembled. It has rear steps, a cab, a capstan rear hub enabling it to pull itself out of mudholes by its own power, a water tank of 400 gallons capacity, and a pump, attached to the front end, which can be operated while the truck is in motion. The tank can be refilled through suction connection in about five minutes. In addition to its stationary equipment the truck carries a 4-cylinder portable forest-fire pump with 1,000 feet of hose, several 5-gallon hand water pumps, and a supply of other small fire-fighting tools.

Connecticut Forest Work Camp

An experimental "forest work camp" in which inexperienced woods workers were offered three weeks' maintenance and a wage of \$1 for each of 15 working days was opened August 4 on the People's State Forest, Litchfield County, Conn. The age minimum for admission was 18 years; other requirements were good health and ability to do manual work. Each man was required to work seven hours daily five days a week. State Forester Hawes, who had charge of the camp, planned to use the temporary labor thus obtained in cutting fire lines, cleaning out woods roads, weeding forest plantations, and carrying out blister-rust control and forest nursery activities. The cost of the camp was divided equally between the Connecticut Forestry Department and the Connecticut Forest and Park Association. Applications received exceeded the capacity of the camp.

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A "conservation map" of New York has been prepared by the State conservation department for distribution to tourists. This is an up-to-date highway map on which are marked and listed all parks, public camp grounds, and other lands under the department's jurisdiction, fire observation towers, and points of historic interest.

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Marine Corps flying forces at Quantico, Va., have cooperated with the Virginia Forest Service this season by making two flights daily over Prince William County and adjoining counties for the purpose of detecting forest fires. Fires were reported by the fliers to forest wardens, whose locations were indicated by whitewashed V markers made of 16-foot boards.

¹ Figures given in this article are for private and State-owned forest land and national forests in continental United States exclusive of Alaska. Those for unprotected areas are necessarily rough approximations.

Wisconsin Commission Proposes State Forest Purchase Program

The Wisconsin Conservation Commission recently made a state-wide survey with the purpose of locating areas that are suitable for State forests and that could easily be acquired by the State without excessive expenditure. As a result the commission has proposed the establishment of six State forest purchase areas comprising more than 1,000,000 acres of forest land. In four of these areas a considerable proportion of the land is already in State ownership; and the State land commission, which has jurisdiction over such portions of the State-owned land as are not under the control of the conservation commission, is willing to have them put to forestry use. The six proposed purchase units, their total areas, and the areas of State-owned land they include, are as follows:

1. The Brule River forest, in eastern Douglas County; 92,000 acres, 5,600 acres State owned.
2. The Flambeau River district, in Sawyer County; approximately 100,000 acres, 4,800 acres State owned.
3. The district north of Rhinelander, in Vilas and Oneida Counties, including Northern Forest State Park and the American Legion Memorial State Park and Forest Preserve; 265,000 acres, about 140,000 acres State owned.
4. The Thunder Mountain district, in Marinette and Oconto Counties; 190,000 acres, 4,000 acres State owned.
5. The central counties district, embracing parts of Jackson, Clark, Monroe, Wood, and Juneau Counties; 350,000 acres, comparatively little State owned.
6. The Kettle Moraine district, in Fond du Lac and Sheboygan Counties; 50,000 acres.

With the exception of the sixth, much of which is now in farms, all these areas are now protected from fire under the supervision of the conservation commission.

It is expected that about \$80,000 of the money raised this year by the one-twentieth mill forestry tax levied by the last legislature will be available for land purchase if the purchase project is approved by the governor.

Oklahoma State Forest Nursery Enlarged

In order to meet a steadily increasing demand for forest trees to be planted on farms the Oklahoma Forest Service has enlarged its nursery by 4 acres. The extension, like the 4-acre area originally developed by the service as a nursery, is part of the grounds of the Oklahoma Agricultural College. Overhead irrigation has been provided for a portion of the added area. As a result of the enlargement the number of little trees available for distribution in the fall of 1930 and the spring of 1931 is 275,000.

Chinese elm continues to be most in demand. Other species popular with Oklahoma farmers are black walnut, green ash, American elm, silver maple, jack pine, Scotch pine, and western yellow pine.

In spite of unfavorable weather in the summer of 1929, survival has been satisfactory in plantations established with Oklahoma State nursery trees in the spring of that year.

Rhode Island Towns Must Appoint Tree Wardens

Under a 1930 amendment to the tree warden law of Rhode Island the appointment of tree wardens by towns and cities, previously optional, becomes mandatory. Appointments are subject to the approval of the chief of the State bureau of forestry. The State law authorizes and requires the wardens to supervise the care and protection of public shade trees.

An association of Rhode Island tree wardens has been formed this year, and already includes representatives of 15 towns and cities.

Forestry Lectures in the Kentucky Mountains

The Kentucky Forest Service employs F. W. Nichols, a graduate of the Pennsylvania State Forest School, as a forestry lecturer. Mr. Nichols began last fall to visit mountain districts of the State, lecturing at all the public schools in each county visited. The work was resumed in the spring and again when the schools reopened in the summer. Mr. Nichols travels on horseback, with his stereopticon, slides, and other equipment loaded on a second horse. Up to August 1 he had lectured at 216 mountain schools before audiences totaling 14,020 persons.



New Jersey State forests were enlarged by 6,922 acres in the year ending June 30, 1930. The Bass River and Belleplain State Forests were more than doubled in area by additions of 4,585 and 1,706 acres, respectively. The average cost per acre of the land purchased was \$7.05. The seven New Jersey State forests now have a total area of 33,637 acres.



Fifteen Vermont municipalities reported forest planting in the spring of 1930. The village of Lyndonville began reforesting a 100-acre area under the management of its electric-light department. The municipalities planted a total of 223,300 trees. In the fall of 1929 and the spring of 1930, 14 counties of Vermont planted about 1,833,338 trees.

Delaware Erects Nursery House at Small Expense

The Delaware Forestry Department is erecting at its forest nursery near Milford, Del., a 2-story frame nursery building 35 feet by 20 feet 8 inches for which the contract price, without extras, was \$1,840. The building is being constructed mainly of Douglas fir, and has wood shingles on sides and roof. It is set on a concrete foundation and will have a 5-inch concrete lower floor. W. S. Taber, Delaware State forester, at Dover, offers to send a copy of the plans for the nursery house to any forestry department desiring one.



The Michigan Conservation Commission has voted to purchase 12,000 acres of land in northwestern Schoolcraft County, in the Upper Peninsula, for a game refuge

and public hunting grounds. The property includes the Cusino Swamp. A 1-mile belt of hunting grounds will surround the game refuge. The State is paying \$130,000 for the property and is setting aside \$10,000 for its organization and current administration.



A 200-acre forest has been given to the town of Dunbarton, N. H., by the children of Francis and Harriet P. Winslow, in memory of their ancestors Gen. John Stark and Maj. Caleb Stark.



In an effort to stop the encroachment of sand dunes on the grounds of the Empire radio station, near Empire, Oreg., 10,000 maritime pine transplants provided by the Oregon Forest Nursery have been planted on the coast side of the grounds.

Education and Extension

Information on Local Timber Market Made Available to New York Farmers

Extension Forester J. A. Cope, of New York, has in his office a card index that enables him to give any farmer in Broome, Chemung, or Tioga County definite information as to local markets for various kinds of lumber and as to the kinds and grades of material desired by individual local wood-using industries. His information is based on a survey made in 1928-29 by Charles A. Gillett, then assistant extension forester for New York, at the expense of the New York State committee on wood utilization and Cornell University's department of forestry. In the course of this survey Mr. Gillett visited 66 wood-using industries operating in the three counties. He also called on sawmill owners to determine their views on utilization problems and obtain data on manufacturing and marketing costs, visited woods operations to get information on logging methods and stumpage costs, and obtained from local railway agents information as to quantities of forest products shipped out of the counties.

The 66 wood-using industries reported that they had used 90,204,000 board feet of lumber in 1927, of which 10,330,000 board feet came from woodlands within the three counties. In addition 10,709,235 cubic feet of local timber had been used locally for cordwood, ties, posts, and mine timbers. During the year 305 carloads of lumber averaging 18,000 board feet each had been shipped out of the three-county area for use elsewhere. The managers of the wood-using industries signified that they were willing to use 20,361,000 board feet of local wood in 1929, a quantity very much greater than Mr. Gillett's estimate of the annual yield of the farm woodlands existing in the three counties.

Tables were compiled showing for each commercial timber species growing in the locality what local industries used it and what quantities were used locally. Tables were prepared also to enable the farmer to determine the value of his own stumpage. A 50-acre tract conveniently located was chosen for a timber-marketing demonstration, the expense of which was borne by the owner. After marking the trees to be cut Mr. Gillett prepared a letter indicating the location of the tract and the number of trees, by diameter classes, offered for sale, and sent it to wood-using industries that had expressed willingness to buy the species represented. He prepared a valuation sheet for the use of the owner, showing the estimated board-foot contents of the trees to be cut and the stumpage value of each species, and also a timber-sale contract. Other possibilities for educational use of the data obtained in the study include sawmill schools at which operators of portable sawmills may learn to avoid mistakes which, according to data obtained from the wood-using industries, reduce the desirability of local sawmill products.



The agriculture class of the Little Valley High School, Cattaraugus County, N. Y., planted 7,000 spruce and 5,000 pines and larches this year on a 5-acre plot that had been given to the school. Ten years from now, they expect, the school can harvest a crop of Christmas trees by removing three-fourths of the spruce, in from 15 to 25 years the larches can be cut for fence posts and telephone poles, and about 1980 the final cutting will have a noticeable effect on taxes of the school district.

School Forests for Michigan

By R. F. KROODSMA, Extension Forester for Michigan

This year has seen a new phase of planting introduced into the State of Michigan—the school forest. This idea came to Michigan via Australia and Wisconsin. Northern Michigan presents a different problem in forestry from the portions of the State that were settled earlier; there is still a land-clearing problem, the foreign element is large, and much land is held by large corporations such as mining and lumber companies. This means a special need for forestry educational work. In order to interest the public schools in forestry, the forestry department of the Michigan State College offered to give enough trees for the planting of 5 acres to each school that would start such a project. The school-forest idea appealed to school superintendents because they realized its educational possibilities. There was a wide interest among large landowners, also, and in every case in which a forest was started a tract of from 40 to 160 acres was donated by some organization such as the Ford Motor Co., the Cleveland Cliffs Iron Co., or the Charcoal Iron Co. These donations of land simplified matters a great deal, since Michigan law does not provide for the purchase of land by school boards. The United States Forest Service assisted with the planting.

Twelve township schools took advantage of the offer of free trees and land to start their forests. The schools, and the areas acquired as school forests, are as follows:

Township	County	Area (acres)
Ironwood.....	Gogebic.....	160
Baraga.....	Baraga.....	40
L'Anse.....	do.....	40
Kenton.....	Houghton.....	160
Inwood.....	Schoolcraft.....	40
Gladstone.....	Delta.....	40
North Lake.....	Marquette.....	40
Negaunee.....	do.....	40
Republic.....	do.....	40
Felsh.....	Dickinson.....	40
Pentland.....	Luce.....	40
Newberry.....	do.....	40

Most of the plantings were put in by the furrow method and consisted in a mixture of northern white pine and white spruce, both of which are native to the section. Each forest was provided with a 4 by 6 foot sign, which was placed in a prominent position near the highway. Plantings were made during the first two weeks in May and dedication exercises were held in the last two weeks of the month. These exercises included the presentation of the deed to the land, formal presentation of the trees, and talks on forest conservation and the purpose of school forests by representatives of the State and Federal forestry

organizations, the extension service, and the State university. The dedication was by Dean J. F. Cox, of the Michigan State College of Agriculture, and George Bishop, of the Upper Peninsula Development Bureau. C. A. Rood, assistant State club leader, charged the pupils with the duty of caring for the forest.

These 12 school forests are intended to serve as outdoor laboratories for nature study in all its phases. Scattered as they are over the entire Upper Peninsula, they can not help but create a forest consciousness among the boys and girls directly interested and among their fathers and mothers and other adults as well. In time the plantings should also afford a revenue to the schools, the spruce as Christmas trees and pulpwood and the pine as sawlogs.

It is expected that additional school forests will be established this fall in Ontonagon and Menominee Counties.

Duke University Announces Forestry Program

Duke University, Durham, N. C., plans to initiate forestry work in the fall of 1930. Clarence F. Korstian, senior silviculturist of the Appalachian Forest Experiment Station, will go to Durham in September to take charge of the Duke Forest, an area of about 5,100 acres adjoining the university campus. The area is forested with second-growth shortleaf pine, loblolly pine, and hardwoods, and is said to be representative of forests of the lower Piedmont region. When a survey and inventory of the forest have been made a preliminary management plan will be drawn up, providing for demonstration and research work. Later, after a study to determine what forestry educational needs the university may best undertake to fill, it is planned to establish a school of forestry.

Doctor Korstian holds the M. F. degree from the University of Nebraska and the Ph. D. degree from Yale University. He joined the United States Forest Service in 1912 and had experience in forest research work in the southwestern and intermountain regions before he was assigned to the Appalachian station in 1921. His title at Duke University will be director of the Duke Forest and professor of silviculture.



New Hampshire 4-H club members planted 361,000 trees on cut-over lands and abandoned fields in the State during the spring months of 1930, writes Extension Forester Barraclough. Vocational agricultural schools planted 36,750. Children of Cheshire County alone planted 115,000 trees, 55,000 of which were given to them by the Keene Forestry Associates and Ralph L. Morgan. Walpole High School completed a 15-acre plantation, planting 5 acres for the third successive year.

Selection Cutting on New Hampshire Woodlot

H. H. Rice and James Perry, owners of woodland in the town of Rindge, N. H., are experimenting with selection cutting, reports Extension Forester K. E. Barraclough. Both partners have an interest in a sawmill. After buying a wood lot in the town of Rindge a year or so ago they abandoned their original plan of clear cutting the timber, on the theory that if only the larger logs were brought into the mill the increase in the cost of logging would be offset by the saving in cost of manufacture. Accordingly hardwoods less than 9 inches in diameter and spruce, hemlock, and pine less than 12 inches in diameter were left to grow. Most of the hardwood, spruce, and pine was cut, and an excellent stand of hemlock 20 to 40 feet high was left on the lot. At the mill where the logs were sawn hemlock is practically as valuable as the other softwoods, being used locally in the manufacture of such articles as candy boxes and fig boxes. The owners estimate that selection cutting increased their cost of logging by about 75 cents per 1,000 board feet but that it reduced the cost of manufacture by about \$1 per 1,000 with very little reduction in the quantity of good material obtained. Receipts from the 570 cords of lumber and 320 cords of wood obtained have more than paid for the lot, and the leaving of 200 cords of growing timber has brought the next harvest from the lot at least 25 years nearer, Mr. Barraclough says.

Girl Scouts of Capital Establish Permanent Camp on Shenandoah Forest

Girl Scouts of the District of Columbia camped this summer, and expect to camp again many times, on a site on the Shenandoah National Forest, in Virginia. A committee including Mrs. Herbert Hoover visited the forest last winter in search of a suitable permanent camp site for the girls, and found what they wanted at the North River Gap, 26 miles southwest of Harrisonburg, Va. At this point the Forest Service maintained a public camp ground. The service consented to give the Girl Scout organization a 25-year lease on the area of 5 acres which they needed for permanent camp buildings and a yearly lease on a surrounding area of 41 acres. A substitute camp ground for the general public is being developed on Hone Quarry.

A gift of \$10,000 from Mrs. Henry H. Flather, for whom the camp has been named, and other contributions from several sources, have made possible the construction of four units of camp buildings housing in all 96 girls. Cabins have been constructed of logs and slabs, and each unit has been completed with a troop house, a wash house, and an outdoor kitchen. A main lodge or recreation hall is now under construction.

The North River, on both sides of which the camp buildings are situated, has been bridged in two places. Unnecessary clearing away of underbrush has been avoided and the camp is so well hidden by trees as to be invisible at a distance of 50 yards.

Two miles up the river in a grove of northern white pine are "pioneer" camps where girls who have mastered certain points in woodcraft live in primitive fashion. Ten Adirondack lean-to's built of slabs shelter two girls each. Provisions are procured at a storeroom by a system of barter. Unusual plants found by the girls figure in the trading.

With the summer season divided into four periods of two weeks each it is expected that about 500 girls will be able to use the camp each summer. Some winter camping is planned.

Southern Forestry Educational Project Loses One Cooperator and Gains One

The State of Georgia has withdrawn from participation in the southern forestry educational project in which several States are cooperating with the American Forestry Association, and South Carolina has taken its place. The South Carolina State Forestry Board has agreed to spend \$6,500 on the project during the present fiscal year, having obtained that amount partly through contributions by large timberland owners. Two lecturers, and two trucks equipped with motion-picture projectors, films, and exhibits, have been transferred from Georgia to South Carolina, and a third lecturer is in action in South Carolina using a similar truck owned by the State. It is hoped that by June 30, 1931, forestry lectures will have been made and forestry motion pictures shown in practically every South Carolina public school.

W. C. McCormick, regional director of the southern educational project, has moved his office from Thomasville, Ga., to Lake City, Fla.

A 1-semester course in forestry will hereafter be required of students of agriculture in the University of Arkansas as a part of the work of the sophomore year

A wood-utilization exhibit was shown by the National Committee on Wood Utilization at the American Fair held in the Atlantic City Auditorium July 14-August 27. Six hundred square feet of space was allotted to the committee. Posters, charts, and models illustrated the committee's principal projects, showing among other things approved methods of residence construction, the use of treated lumber to avoid decay and insect injury, utilization of second-hand containers and odd pieces of lumber, and the advantages of grade-marking lumber.

Forest Service Notes

A Pulpwood Industry in the Rockies

By E. E. CARTER, United States Forest Service

The regional forester at Denver has awarded two sales of national forest pulpwood, aggregating more than 2,000,000 cords, to the Trans-Mississippi Development Co., a new subsidiary of the International Paper Co. Back of this announcement are years of work and hope on the part of foresters of the Rocky Mountain region. There are at least 15,000,000,000 board feet of Engelmann spruce and alpine fir on the national forests of Colorado alone, and heretofore there has been little market for these species. The railroads did not want them for ties; house builders wanted pine lumber, not spruce, and still less the nondurable alpine fir. They have been the local "despised species" which Doctor Schenck advised all foresters to watch. They were known to be excellent woods for reduction to pulp form by the mechanical or sulphite processes, but there were no pulp mills in Colorado or within such distance that the haul was thought practicable. The foresters were confident that sometime a pulpwood market would develop; but meanwhile their silvicultural practices in the mixtures of pines, spruces, and true firs were hampered and the older spruce stands were left in storage, with the ground unproductive because growth was balanced by decay, windfall, and other causes of loss.

Finally a Wisconsin paper-making firm became interested in the possibility of getting its wood in Colorado. The areas offering the best chances for large-scale production were cruised. The timber on two units on opposite sides of the Continental Divide, one on the Rio Grande Forest and one on the San Juan, was found to be sufficient to supply a good-sized pulp mill for at least 20 years. It was appraised at \$1 per cord on the more accessible unit, that on the Rio Grande Forest, and at \$0.75 per cord on the San Juan unit. Widespread advertisement was started. The results surprised the foresters. Three bids for both units came from reputable paper-manufacturing companies. The high bidders offered \$3.03 per cord for the Rio Grande pulpwood and \$1.77 per cord for that on the San Juan. Good spruce pulpwood is in demand, and apparently all that was needed was evidence that it was available in sufficient quantities to constitute a dependable supply behind the heavy investment necessary for paper making.

Colorado will have a pulpwood industry. It is certain that, once such an industry is established, the operators will want to buy odd lots of spruce and true fir that can be brought to a railroad shipping point by other lumbermen who are getting out lodgepole pine

ties as their chief product. It may confidently be expected that these sales will result in a market for pulpwood throughout the region, thus leading to better silviculture and closer utilization on the forests and to the growth of more prosperous communities of forest workers.

National System of Experimental Forests and Ranges Inaugurated

By L. F. KNEIPP, United States Forest Service

On August 7, 1930, the Acting Secretary of Agriculture approved a national-forest regulation which marks a new epoch in the forest-research work of the United States. The regulation is as follows:

The Forester shall determine, define, and permanently record a series of areas of national-forest land to be known as experimental forests, sufficient in number and extent adequately to provide for the experimental work necessary as a basis for forest production or forest and range production in each forest region, these areas to be dedicated to and used for research; also where necessary a supplemental series of areas for range investigations to be known as experimental ranges; and a series to be known as natural areas sufficient in number and extent adequately to illustrate or typify virgin conditions of forest or range growth in each forest or range region, to be retained in a virgin or unmodified condition for purposes of science, research, and education; and a series of areas to be known as primitive areas within which will be maintained primitive conditions of environment, transportation, habitation, and subsistence, with a view to conserving the value of such areas for purposes of public education and recreation. Within any areas so designated, except for permanent improvements needed in experimental forests and ranges, no occupancy under special use permit shall be allowed, or the construction of permanent improvements by any public agency be permitted, except as authorized by the Forester or the Secretary.

The purpose of the experimental forests is to make permanently available, for silvicultural, range, products, and other related forest research, areas as fully representative as possible of conditions in important parts of forest regions and large enough to meet present and foreseeable needs. In essence these areas are to be field laboratories for intensive investigative work. A secondary but hardly less important purpose is to provide for the demonstration of results, favorable or otherwise, of widely varying silvicultural and other forest practices. Each experimental forest is to be chosen on the basis that it adequately represents the subregion in which it is located as to forest types and sites and the conditions which underlie types and sites

(such as soils, climatic variations, and altitudinal range). Wherever possible each experimental forest is to include a "natural area" on which are to be preserved in an unmodified condition examples of the virgin growth of each forest or other vegetative type within each forest region, to the end that the region's characteristic plant and animal life and soil conditions shall continue to be available for scientific and educational purposes.

So far as can now be foreseen, from 5 to 10 experimental forests will be required within each of the 12 or 13 forest regions specified in the McSweeney-McNary Forest Research Act. Their areas will range from about 1,500 acres to about 5,000 acres, averaging about 3,500 acres, exclusive of the lands to be reserved as natural areas. They will not be so large as to impose any unnecessary burden of administration. Size will be governed primarily by the complexity of the type and by the growth rate of the tree species. The simpler the type and the higher the growth rate the smaller the area that will be required. In a subregion where it is not possible to find a satisfactorily representative single area it may be preferable to establish, as one unit, two or even three separate areas within easy working distance of the same headquarters.

For a natural area 1,000 acres is regarded as the minimum desirable under average conditions. The acreage will vary with the type of forest involved or, possibly, with climatic and topographic conditions. About a dozen such areas will be required in each forest region.

Where areas suitable for experimental forests or natural areas can not be found on existing national forests, consideration will be given to the possibility of acquiring suitable areas by gift or exchange, or, as a last resort, by purchase.

Experimental ranges will be established under the same principles as experimental forests.

On the experimental areas scientific and educational uses are to be dominant, commercial utilization and public occupancy subordinate. On natural areas commercial use will be prohibited and public use will be restricted as far as practicable. For convenience of administration and protection the areas will remain essential parts of the national forests on which they are situated, but responsibility for their management and use will rest wholly with the directors of the forest experiment stations. The boundaries of the natural areas and the principles to govern their management are to be established by the Forester and are not to be modified except with his approval.

While natural areas will be established primarily to meet the needs of the Forest Service, their use by other research or educational agencies for purposes which do not conflict with Forest Service projects will be allowed under appropriate cooperative agreements approved by the Forester.

The readiness with which title to lands can be established under certain of the public-land laws gives rise to some uncertainty at present as to the ability of the Forest Service to safeguard the integrity of the

experimental forests and ranges and the natural areas from adverse occupancy and use; but it is believed that as soon as the system has taken definite form and its vital importance to public welfare is established and recognized Congress will make legislative provision for preserving the areas permanently.

The reference in the regulation to primitive areas repeats the language of an earlier regulation under which a comprehensive system of primitive areas is now taking form on the national forests.

Intermountain Forest and Range Experiment Station Established

On July 1 the Great Basin Range Experiment Station, Ogden, Utah, became the Intermountain Forest and Range Experiment Station. Increased appropriations for the fiscal year 1931 made possible the addition of silvicultural investigations to the range experiments carried on by the Forest Service in the intermountain region. C. L. Forsling, since 1922 director of the Great Basin station, is director of the enlarged station. Lyle F. Watts, who was assigned to the Great Basin station in 1929 as senior silviculturist, is in charge of the silvicultural section. Headquarters are at Ogden.

Experimental Area Set Aside on Allegheny Forest

A tract of about 1,800 acres within the Allegheny National Forest, Pa., has been dedicated to research purposes and will be used by the Allegheny Forest Experiment Station, Philadelphia, for experiments principally in methods of cutting. The area is about 4 miles south of Kane, Pa., on the road from Lamont to Wilcox. Its forest growth is believed to be representative of the northern hardwoods type as the type occurs in western Pennsylvania, and includes an excellent representation of size classes. More than one-third of the area bears trees merchantable at least for chemical wood and pulpwood. A portion of the cut-over land has been badly burned. The location is easily accessible and is unusually advantageous with respect to markets.

Ocala Game Refuge Created

A presidential proclamation of July 24 created a game refuge of about 70,000 acres in the southern part of the Ocala National Forest, Fla. The wild life of the locality includes a strain of the white-tailed deer that is peculiar to Florida. Ancient sand dunes compose the soil of the newly established refuge. Its timber is of the Florida scrub type, consisting primarily of sand pine and, as an understory to the pine, a heavy growth of live oak and other evergreen oaks. Lakes are numerous, but because of the sandy nature of the soil there are very few flowing streams.

Girdling Unmerchantable Hardwoods Stimulates Growth of Associated Pulpwood Species

By M. WESTVELD, United States Forest Service

That pulpwood production on lands supporting a mixed growth of spruce and hardwoods can be increased from 3 to 5 fold through girdling of the hardwoods is indicated by results on a series of experimental plots established by the Forest Service at Corbin Park, N. H., in 1905.

On plot 1 more than 90 per cent of the hardwood timber was girdled; on plot 2, 50 per cent. Plot 3 was left undisturbed. The material released was spruce reproduction from 2 to 6 feet in height. Re-measurement in 1927 showed that on plot 1 the volume of spruce per acre was 902 cubic feet, or approximately 10 cords, whereas on plot 3 it was 158 cubic feet, or less than 2 cords. (The spruce was not yet large enough to be merchantable as pulpwood.) The average annual growth of spruce on the heavily girdled plot was one-fourth cord per acre during the period 1905-1920; in the period 1925-1927, it was a full cord per acre. Between the same two periods the average annual growth per acre of spruce on the moderately girdled plot rose from one-sixth cord to one-half cord. In 1927 the ungirdled plot was producing less than one-tenth cord of spruce per acre per year.

At the present rate of growth it is estimated that in 1945, 40 years after treatment, the heavily girdled area will yield about 30 cords of spruce per acre, which at \$4 per cord represents a stumpage value of \$120 per acre, and that at that time the volume of spruce on the untreated area will be only 4 cords, worth \$16, per acre. Girdling charges at 5 per cent compound interest over this period will amount to \$14.76, leaving a net gain on the girdled area of approximately \$105 per acre.

Much of the pulpwood in the Northeast is obtained from stands in which spruce is growing in mixture with hardwoods that owing to their low quality and inaccessibility are not merchantable. When the merchantable spruce and fir have been cut the development of young growth of pulpwood species is hindered by the oppressive shade of the hardwoods. Girdling, at costs ranging from \$1 to \$2 per acre, is an effective and inexpensive method of correcting this condition. In general, girdling should be restricted to hardwoods of poor form or quality and to trees that are suppressing growth of pulpwood species. Younger, more thrifty hardwoods should not be girdled except on areas where the prospects of a profitable future market for hardwoods are decidedly remote.

The earliest and largest returns, of course, will be obtained by girdling worthless hardwoods that are overtopping trees already of merchantable size.

The plots at Corbin Park were established in a stand of the class offering the least attractive prospects as to financial returns from girdling. In such stands from 40 to 50 years must elapse before the pulpwood crop can be harvested and returns on the investment realized. That a profit from girdling hardwoods in stands of this character may be expected at the end of some such period is clearly demonstrated by the results shown on the plots at the end of 22 years.

Practical Instrument Devised for Measuring Moisture Content of Wood

An electrical instrument suitable for industrial use for measuring the moisture content of wood has been designed and constructed by the Forest Products Laboratory. For four years the laboratory has been endeavoring to produce a simple device of moderate cost that would facilitate producing, distributing, and installing lumber in the desired conditions as to moisture content.

To distinguish it from others the laboratory designates the new instrument the "blinker" machine. The indicator consists of two neon bulbs, of which one flashes at a standard rate and the other flashes at a rate determined by the moisture content of the wood being tested. The second bulb flashes more frequently than the first if the wood is more moist than the standard for which the instrument is set, and less frequently than the first if the wood is drier than the standard. Contact with the wood is made by means of needle points built into a driving hammer. The machine is practically instantaneous in its operation. Head phones giving a gentle click may be substituted for either or both neon bulbs. Not only does the machine make it possible to sort lumber according to whether its moisture content is above or below a selected standard, but by dialing the test flash into approximate time with the standard flash it is possible to determine definitely what the moisture content is. The "blinker" instrument's range is approximately from 8 per cent to 24 per cent moisture content. It is accurate to about 1 per cent moisture content. The instrument has the merits of compactness and portability.

A 15-year study of Douglas fir seed production on the Pike National Forest, Colo., concluded in 1927, indicated that the average annual production of good seed was about 43,000 per acre. Heavy crops occurred approximately every three years.

In a recent sale of 1,000 cedar poles on the Kootenai National Forest, Mont., poles 35 feet long or longer brought 6.3 cents per linear foot. In a sale of 5,400 poles with a hauling distance of about 15 miles, poles 35 feet long or longer brought 5½ cents per linear foot.

Federal Forestry Appropriation Increases for 1931

Appropriations available to the Forest Service in the year beginning July 1, 1930, exclusive of the forest road and trail appropriations, receipt funds, and special items, total \$15,859,230. This represents an increase of \$2,734,950 over the appropriations for the preceding fiscal year. Forest fire protection claims most of the increase; \$1,500,000 is added to the improvement appropriation for constructing and maintaining fire-protection roads and trails, \$306,000 to that for constructing other fire-protection improvements on the national forests, and \$295,000 to the fund to be allotted among the States cooperating with the Federal Government in protecting State and privately owned forest lands from fire. In addition an increase of \$25,000 has been made in the special appropriation for fire-protection improvements on four national forests in southern California. An increase of \$188,500 is made in the amount available for employing additional forest guards and procuring fire-fighting equipment. Increases in other national-forest administrative allowances are as follows: \$15,000 for constructing and maintaining range improvements; \$25,000 for control of forest insects; \$25,000 for control of white-pine blister rust in northern Idaho; \$20,500 for administering timber-sale business; \$15,000 for forest planting; and \$20,000 for administering and protecting lands being purchased for national-forest purposes. A \$10,000 increase has been made in the amount available for allotment to States cooperating with the Federal Government in the production and distribution of forest planting stock.

For forest road and trail construction and maintenance in 1931 the regular appropriation act provided \$7,500,000. The second deficiency act of 1930 provided an additional \$3,500,000 for such use during 1931. (Permission to obligate during 1931 for national forest road construction the additional \$5,000,000 authorized by the Colton-Oddie Act was also included in the second deficiency act.)

For Forest Service research projects authorized by the McNary-McSweeney Act an increase of \$258,500 has been allowed, distributed as follows:

Forest management research:

California Forest Experiment Station—

Determination of best methods of preventing and suppressing forest fires.....	\$20,000
Determination of best methods of cutting and of reforestation for California redwoods.....	10,000

Intermountain Forest and Range Experiment Station—

Study of methods of cutting in western yellow pine type.....	10,000
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Forest management research—Continued.

Southern Forest Experiment Station—

Investigation of relationship between fire and resin yield in naval-stores operations.....	\$10,000
Investigation of methods of cutting to insure natural reforestation in second-growth southern yellow pine stands.....	10,000
Investigations concerning southern hardwood forests.....	10,500

Appalachian Forest Experiment Station—

Forest research in northern Georgia.....	5,000
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Range investigations:

Southwestern Forest and Range Experiment Station—

Study of water requirements of range livestock and relation of stock watering to western yellow pine reproduction.....	8,000
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Intermountain Forest and Range Experiment Station—

Study of problems of restoring depleted winter or desert ranges....	10,000
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Forest products investigations:

Naval-stores research looking to increase in yields and reduction in costs of production.....	15,000
Development of processes for producing light-colored papers from Douglas fir and other western species.....	10,000
Investigation of chemical and physical properties of lignin.....	10,000
Investigations at Forest Products Laboratory of pulp-production possibilities of softwoods.....	15,000

Forest survey:

Extension of work in Pacific Northwest, as part of activities of Northwestern Forest Experiment Station, on survey of present and future requirements for forest products, present and potential timber growth, volume and quality of existing timber, and area and condition of forest lands.....	50,000
Initiation of survey in southern hardwood regions, particularly in lower Mississippi bottom lands.....	25,000
Cooperative assignments with outstanding, closely related State surveys....	10,000

Forest economics:

Investigations of practical measures for furthering the practice of forestry on privately owned lands and stopping forest devastation.....	25,000
Extension of forest taxation inquiry.....	5,000

A special item in the appropriation act provides \$100,000 for constructing and equipping buildings for

the Forest Products Laboratory and authorizes the Secretary of Agriculture to incur obligations not to exceed \$800,000 for this purpose.

Appropriations for 1931 give the Bureau of Biological Survey an increase of \$29,597 for control of injurious rodents, mainly on the national forests, and one of \$10,000 for studies of the occurrence, distribution, and habits of wild life in their relation to forest production. The Bureau of Entomology has an increase of \$10,210 for enlarging investigations in the control of bark beetles in the Western States, and the Bureau of Plant Industry has one of \$10,000 for forest pathological work at the Allegheny Forest Experiment Station, including studies of root diseases and decay fungi. For the operation of the National Arboretum in 1931 an appropriation of \$30,000 is available.

Young Douglas Fir Forest Shows Gain from Thinning

Ten years after an experimental thinning operation on a plot of young Douglas fir forest at Stabler, Wash., in the Wind River Valley, trees more than 4 inches in diameter were two and one-half times as numerous on the thinned plot as on a neighboring plot that was not thinned. The thinning operation was carried out in the fall of 1919 by foresters of the Pacific Northwest Forest Experiment Station in a stand that originated in 1910 after a spring slash burn. It left only dominant trees, spaced approximately 8 by 8 feet. In the fall of 1929 the average diameter of the trees was one-half inch greater on the thinned than on the unthinned plot, and the basal area of the thinned stand had increased from 41 per cent to 58 per cent of that of the unthinned stand. The average height of the trees that had been liberated by thinning was close to that of the tallest 500 trees in the unthinned stand.

On a third plot, thinned in 1919 to an exact 8 by 8 foot spacing regardless of dominance, diameters showed hardly any superiority to those of the best 500 trees on the check plot in 1929, and average height was not far from the average height of all the trees in the unthinned stand. The basal area on this plot had increased from 15 per cent to 30 per cent of that on the check plot.

These plots include approximately 0.75 acre each.

The favorable effect of thinning on growth was partly offset by increased limb development of trees on the thinned plots.



The California Forest Experiment Station has moved into Giannini Hall, the building newly erected on the campus of the University of California, at Berkeley, Calif., with funds from an endowment created by A. P. Giannini. The station was formerly quartered in the university's Hilgard Hall.

Soils Studied on Old-Growth Hardwood Areas

Examining 26 hardwood forest areas in Ohio that have remained in a virgin condition or have been only slightly disturbed, J. T. Auten, silviculturist of the Central States Forest Experiment Station, found no forest litter more than an inch deep. In all cases, litter of the third year preceding the examination had disintegrated into fine particles. Another condition noted was the porosity of the lower horizons. Close examination showed that this was due to root penetration; in many soil samples tubes formed by the outer cortex of deep-striking rootlets were found intact. On one site the soil was found to be porous at a depth of 72 inches. Comparison of the upper 9 inches of mineral soil on two forest sites with the soil of adjacent cultivated fields showed that the former was in one case 9 per cent and in the other case 14 per cent more porous than the latter.

Northern White Pine Seed Germinates Better After Exposure to Low Temperatures

Northern white pine seed can be sown in the spring as advantageously as in the fall if it is subjected to cold and moisture for a few weeks before sowing, according to the results of tests carried out by the Lake States Forest Experiment Station. If sown in the spring without special treatment, seed of this species germinates slowly and irregularly, some of the seedlings deferring their appearance until late summer or even until the second year. Fall sowing, although it results in less irregular germination, involves greater danger of the seed being eaten by rodents. For the low-temperature cycle preparatory to spring sowing the station recommends that the seed be mixed with slightly moist screened sand or sawdust and subjected for 30 days to temperatures between 32° and 50° F. When sawdust is used it is less difficult to separate the seed for sowing. The seed is separated from the stratifying medium by means of a screen. Before this separation is attempted the mixture may be slightly dried, if the seed is to be sown immediately.

These recommendations are based entirely on laboratory tests, no properly executed nursery test having as yet been made by the station.

In the fall of 1928 the station gave several different kinds of treatment to lots of freshly collected northern white pine seed that had been extracted with the utmost care. None of these lots germinated more than 40 per cent, and in all cases germination was slow and straggling. Samples of the same seed that were stored for one year (until December 9, 1929), then soaked overnight in 0.2 per cent sulphuric acid and sown immediately, germinated nearly 56 per cent in the first 44 days after sowing, and 58 per cent within 72 days. No

definite distinction as to superiority in germination could be made among lots of seed that were sealed in bottles and stored at an even temperature of 32° F., in a cellar with a yearly temperature range of about 30° to 60° F., and in a shed with a temperature range of about 20° to 100° F. Seed stored in the shed without being sealed air-tight was about 10 per cent inferior to the other lots. Seed stored with a moisture content of 7 per cent gave better results than seed stored with a moisture content either greater or less.

The storage conditions described as having given good results in these tests may not represent the best conditions for storage for periods of more than one year; they may have been more effective in making the seed ready for germination at the end of a single year than in preparing it to retain its vitality beyond that period.

Irrigation Greatly Increases Growth Rate of Florida Pines

In experimental plots of longleaf pine on the Choctawhatchee National Forest, Fla., irrigated trees and trees both irrigated and fertilized have shown an average increase of 104 per cent in rate of growth in the three-year period 1927-1929 as compared with the three-year period before irrigation and fertilizing were begun in the spring of 1927. The growth-rate increases of individual trees in the test plots ranged from 5 per cent to 504 per cent. In the check plot the growth-rate increase in 1927-1929 averaged 18 per cent, the change in growth rates of individual trees ranging from -10 to +27 per cent. Application of both water and fertilizer did not result in greater increase of growth rate than the application of water alone. This is thought to be accounted for by the sandy nature of the soil, which, according to soil analyses, is very unretentive of the fertilizer applied. The average

increase in rate of growth of summerwood was 158.3 per cent for irrigated trees and trees that were both irrigated and fertilized, as compared with 18.9 per cent for trees in the check plot.

"Forest or Wasteland" Film Released

A three-reel Forest Service motion picture has recently been released under the title "Forest or Wasteland." The film illustrates the widespread reduction of forest lands to an unproductive condition through fire and other causes and shows methods by which forest land may be restored to productivity. It includes unusual "shots" of primitive forest areas and of forest fires. The film may be borrowed through the Forest Service or directly from the Office of Motion Pictures, United States Department of Agriculture, Washington, D. C., the borrower paying transportation charges.

Data on second-growth chestnut oak (*Quercus montana*) collected by several of the Federal forest experiment stations indicate that a 5-inch tree commonly has 30 per cent of its volume in bark. When the tree has grown to a diameter of 20 inches bark may compose 15 to 20 per cent of its total unpeeled volume. These figures are for the stem exclusive of branches.

The name "Charlton Flat" has been given by the United States Geographic Board to an open area within the Angeles National Forest, Calif., in memory of the late R. H. Charlton, who was supervisor of the Angeles Forest from 1905 to 1925. The area is in the southeast part of T. 3 N., R. 11 W., near Pine Mountain.

General Forest News

Dutch Elm Disease Found in America

By HAVEN METCALF, United States Bureau of Plant Industry

The Dutch elm disease was found in the United States this summer for the first time. Curtis May, of the department of botany and plant pathology of the Ohio Agricultural Experiment Station, at Wooster, Ohio, isolated *Graphium ulmi*, the fungus causing this disease, from four wilting American elm trees at Cleveland and from one at Cincinnati. Christine Buisman, a visiting plant pathologist from Holland who has worked for some years on this disease in Europe, also identified as *Graphium ulmi* the cultures she made from one of these trees. The Office of Forest Pathology, Bureau of Plant Industry, is cooperating with

the Ohio State authorities in the identification work at Wooster and in scouting. So far no common center has been found from which the disease has spread in this country.

The Dutch elm disease was first observed in Holland in 1919 and has since been found in England, France, Belgium, Germany, Austria, and Norway. *Graphium ulmi* develops principally in the sapwood. Wilting and dying of the leaves of one or more branches or of the entire tree, and dark streaks in the sapwood, constitute the characteristic field symptoms of the disease. The disease strikingly resembles the well-known *Vorticillium* wilt of maple. Scouting for it presents many difficulties because of the wilting of elms from other causes. The affected trees sometimes

die quickly, but usually last for two or three years after the first wilting is observed.

In Europe the Dutch elm disease is considered very destructive. It is, of course, impossible to predict how it will behave in the United States. Probably all American species of elms are susceptible; the valuable *Ulmus americana* certainly is.

Forest Management Pays its Way on Property of Bates College

To R. E. Rendall, of Alfred, Me., goes the credit for having made forest management pay for itself on 12,000 acres of poorly stocked forest land belonging to Bates College. This land, scattered over 11 towns in York County, was bequeathed to the college by B. C. Jordan in 1912. In the next few years much of it was logged. By 1921, when Mr. Rendall was employed as manager, its timber resources were badly depleted. The cruise with which he began his management of the forest disclosed only about 11,000,000 board feet of merchantable pine and about 2,000,000 board feet of hardwood, mostly oak.

Besides this merchantable timber there were considerable quantities of inferior hardwoods. To this largely neglected resource Mr. Rendall, a forester trained in the University of Maine and in the Yale School of Forestry, gave particular attention. By careful study he discovered markets for fuel wood to be used for domestic purposes and in brick kilns, which enabled him to sell the inferior wood for from \$1.50 to \$4 a cord. In the same markets he disposed of much of the slash produced by his saw-timber operations, thereby removing a fire menace without expense and in some instances with financial profit.

The trustees of the college wished the forest to pay its own expenses from the start, but agreed not to expect any net revenue in the first 10 years. The charges, including taxes, protection and improvement costs, Mr. Rendall's salary, and an annuity payable to one of the donor's heirs, amount to \$1 per acre per year. In the eight years since Mr. Rendall became manager of the forest these charges have been met from forest receipts.

The marketing of inferior hardwoods that has been the secret of financial success in this forest-management project has helped also to make the project a technical success, since it has resulted in liberating pine and other valuable softwoods. A very moderate cutting of pine timber has resulted in desirable thinning. Other features of management are improvement cuttings, pruning, and planting. (Mr. Rendall raises pine planting stock in a small nursery on the property and in some years has made money by selling nursery stock.) In eight years' time these measures, together with fire protection, have had a marked effect on the forest's condition and prospects. A second cruise

made in 1928 showed that the merchantable stand had increased by 2,500,000 feet.

Four men are steadily employed on the forest and additional help is employed temporarily.

Unlike the usual college forest, the Bates Forest is not dedicated to educational or research purposes but is simply a piece of college property from which an income is expected. It nevertheless constitutes a striking demonstration of the possibilities of practical forest management.

Hummel-Ross Corporation Encourages Farm Forestry

By W. L. GOOCH, Forester, Hummel-Ross Fibre Corporation

The Hummel-Ross Fibre Corporation, Hopewell, Va., is buying from farmers and small landowners upwards of 40,000 cords of loblolly and shortleaf pine pulpwood per year. This wood comes from within a 40-mile radius of Hopewell and is delivered to the plant by wagon or truck. Any quantity of wood from one cord up is accepted, and payment is in cash. This cash market for pulpwood has been a great help to farmers in their present rather bad economic situation. If a farmer has a bit of trading to do in town he brings in a load of wood, gets his cash, and then does his buying. As for the company's side of it, this farm-cut wood is cheap wood; the cost of transportation has been eliminated, also the cost of field supervision and the contractor's bonus formerly paid when wood was bought through agents 50 to 100 miles from Hopewell and shipped in by rail.

The company is interested in keeping near-by forest lands growing pine. Other things being equal, in the years to come the wood cut from these near-by forest lands should be the cheapest wood available, since the transportation factor is largely absent. So the company, through its forestry department, is offering the farmers in the vicinity advice on right methods of cutting pine for pulpwood and demonstrations of such methods. These farmers are learning the value of leaving seed trees and some of them are systematically thinning their pine stands, removing the poorer trees where these are suitable for pulpwood and otherwise improving the growing condition of the better trees in the stand. The company feels that this service given to landowners in the vicinity of Hopewell will in a measure obviate the necessity of its purchasing and owning larger areas of timberland in order to assure its raw material requirements in the years to come. It now owns some 8,000 acres. If the same kind of forest and land management is given to the other privately owned forest lands in the vicinity of the plant as the company gives to the lands it owns, much the same results will be realized years hence in the way of having cheap pulpwood available without the necessity of the company's tying up working capital in an extensive land-purchase program.

Southern Pacific Helps Fight Forest Fires

By H. POLLARD, General Fire Inspector, Southern Pacific Co.

A considerable portion of the Southern Pacific Co.'s 9,000 miles of railroad lines on the Pacific coast operate through heavily timbered country in the Sierra Nevada, Cascade, Siskiyou, and Tillamook Mountains of California and Oregon. To cooperate with the Forest Service in protecting these forests, as well as to safeguard its own property, the railroad maintains an extensive fire fighting organization. Fire chiefs, fire brigades, and fire companies are located at principal points in the six western States through which the railroad operates. In addition to extinguishing fires it is the duty of this organization to see that shop, yard, and track forces practice "good housekeeping" and that the premises are kept clear of rubbish and inflammable materials. The men charged with the responsibility of holding fire losses to a minimum act on the theory that it is better to prevent a fire than to fight one.

All locomotives operating through the timber country are equipped with devices for preventing the escape of sparks from smokestacks. In addition each locomotive is equipped with an inspirator and 100 feet of 2-inch rubber-lined hose, thus becoming a fire-fighting unit. Fire guards 6 feet wide are plowed on each side of the track, and at the approach of summer the remainder of the right of way is cleared of dry grass by burning, under the watch of section gangs. On the heavy mountain grades, where hard application of brakes is necessary, a close watch is kept for fires due to sparks created by friction, although these sparks seldom cause damage. Through the forest country a man on a motor car, equipped with a pack tank full of water, follows close behind each train. He can quickly extinguish any small blaze. When his motor car falls far behind the fast-moving train another watchman picks up the "trail."

Cooperating further with the Forest Service, the Southern Pacific instructs all its train and engine crews and other employees working in the timber country to be constantly on the lookout for signs of fires, and by means of placards conspicuously posted in all trains warns its passengers of the danger of throwing matches or burning tobacco from car windows and observation platforms.

The most unusual feature of the railroad's activity in fire protection has been the establishing of a lookout station on the top of Red Mountain in the Sierra Nevada, where a watch is maintained night and day during the summer months. A stone cabin on this peak commands a view of several hundred miles of the Sierra region. The primary function of the lookout is to detect fires in or adjacent to the 18 miles of wooden snowsheds which cover the railroad tracks at their highest elevation. These expensive sheds provide the means of keeping the tracks clear of snow during

the winter, but in the summer they are constantly subject to damage by fires due to the operation of trains through them. Installed in the lookout cabin on Red Mountain is an ingenious device that enables the observer to determine within 100 feet the location of any column of smoke that he may detect, even if the smoke is 4 or 5 miles away. To an ordinary engineer's transit is rigidly attached an aluminum indicator that moves over a circular chart on which is etched, in copper, a line representing the exact outline of the snowsheds. On the chart is shown also the location, in relation to the sheds, of all stations, mile posts, and fire-alarm and telegraph boxes. When the observer sees smoke he is able, by means of the telescope transit and the etched chart, to determine whether the fire is in the sheds or in the forest and what is the nearest point from which fire-fighting equipment can be dispatched to it. Telephone connections enable the lookout to send out the alarm to railroad and Forest Service forces.

For the immediate protection of the snowsheds four specially equipped fire trains are stationed at strategic points along the railroad line in the mountains. The locomotives of these trains are equipped with duplex pumps having a capacity of 300 gallons per minute. To each locomotive are attached two tank cars with a combined capacity of 12,500 gallons. Each train is equipped also with 1,000 feet of 2½-inch standard fire hose, two chemical extinguishers, two fire ladders, a portable telephone, and a large supply of brush hooks, axes, shovels, saws, and lanterns. The long hose makes it possible to fight fires in timber at a considerable distance from the tracks. Two movable nozzles are attached to the front of the locomotive, and each train can throw four streams of water at one time. The engines are equipped with sirens. These trains are kept constantly under steam during the summer months and require only from two to five minutes to get under way. While on the way to fires they are given full right of way over other traffic. Fire trains can be sent from two directions, so that a fire may be fought from both ends. It is the proud record of the fire-train crews that they have never yet had to back away from a blaze, and the losses have been measured only by the time required to get the trains to the scene of the fire.

To insure further against fire in the wooded country the company has 50 tank cars distributed at strategic locations on spur tracks. These cars are specially equipped for emergency use. They are tested once a week. Piping of each car is arranged so that a duplex pump can be operated with steam furnished by the locomotive. Each car has 500 feet or more of 2½-inch hose and is fully equipped with fire-fighting tools.

The Southern Pacific has more than \$120,000 invested in its fire trains, lookout station, electric alarm systems, and other fire-protection facilities in the timber country, aside from its equipment for combatting fires at its terminal plants, general shops, and water-front properties.

American Tree Planters Reforest 111,175 Acres in 1929

In the calendar year 1929 tree planters of various classes reforested 111,175 acres of land in the United States, according to figures compiled by the United States Forest Service. This total includes 2,084 acres of land in Hawaii and 1,534 acres in Porto Rico. Plantations established during the year by States and Territories totaled 31,430 acres, and those established by the Federal Forest Service totaled 18,207 acres. Totals for other agencies were as follows: farmers, 24,825 acres; other individuals, 3,650 acres; municipalities, 5,920 acres; schools and colleges, 539 acres; industrial organizations, 25,088 acres; and other organizations, 1,516 acres. Of the total area planted by industrial organizations 10,060 acres is credited to pulp and paper companies, 8,732 acres to lumber companies, 3,189 acres to water and power companies, 1,561 acres to mining companies, 100 acres to railroad companies, and 1,446 acres to other organizations.

The largest total area reported to have been planted during the year in any one State was the 27,820 acres planted by various agencies within the boundaries of Michigan. For New York the year's total was 21,135 acres; for Louisiana, 10,583 acres; for Pennsylvania, 6,318 acres; for Washington, 4,400 acres; and for Massachusetts, 3,938 acres. In Ohio and in California the total acreage planted during the year was more than 3,000.

At the end of 1929 the cumulative total of the forest plantings in the United States of which the Forest Service has record was 1,653,308 acres. This includes 274,385 acres of national forest land planted by the Federal Government, 200,553 acres of land planted by States and Territories, 46,282 acres planted by municipalities, 193,262 acres planted by industrial organizations, 917,276 acres planted by farmers and other individuals, and 5,215 acres planted by schools and colleges.

Pulpwood Cutting Tests on Finch-Pruyn Land

At the request of Finch, Pruyn & Co. the Northeastern Forest Experiment Station is cooperating in the establishment of a series of plots on land owned by the company near Newcomb, N. Y., on the banks of the Hudson River, for experiments in methods of cutting pulpwood. The purpose of the experiments is to determine the feasibility of making the interval between successive cuts of pulpwood on a given area short enough to permit utilization of all the growth and to eliminate the loss from windfall and decay that is inevitable when a period of 50 years or more intervenes between cutting operations. Each of the experimental plots will be 30 acres in area. The series will consist of five plots, including a check. The Cornell University forestry department, which maintains its

summer camp on lands owned by Finch, Pruyn & Co., will cooperate in tallying sapling growth and reproduction and in sampling soil and making studies of soil changes following cutting.

Relation Between Soil Acidity and Root Diseases of Forest Trees

By CARL HARTLEY, United States Bureau of Plant Industry

Continued observations and further experiments with soil treatments have confirmed for pines, spruces, and Douglas fir the theory stated in United States Department of Agriculture Bulletin 934, published in 1921, that soil acidity is unfavorable to damping off. While there are some exceptions, in general it has been found that the forest nurseries in which damping off is most troublesome are those in which the soil is least acid. It is presumably for this reason that damping off has been more troublesome in the drier parts of the West than in the more humid East and South. Application of lime increases the liability to damping off, while at most nurseries strong acids and aluminum sulphate (which is an acidifying material) help to prevent it.

Damping off, the group of diseases which result in rapid decay of succulent young seedlings or soft cuttings, is essentially a root rot. Even in attacking the youngest seedlings it usually enters through the root. Some of the damping-off fungi are able to continue to injure the root caps of trees when the trees have become too old to be killed by them. This sort of injury is known to extend at least through the third year in the nursery, and the killing of root tips in the forest has been observed frequently enough to lead to the supposition that the damping-off fungi work to a greater or less degree on the youngest roots of trees of all ages. Much remains to be learned both as to the prevalence of this rootlet rot and as to its effect on growth rate and drought resistance. For Douglas fir at least it has been shown that rootlet rot can dwarf nursery trees so as to make them of little value for planting purposes, and that this acute injury is related to lack of acidity in much the same way as damping off.

So far as I know no study has been made in this country of the relation of soil acidity to the wood-destroying types of root-rot fungi; but Doctor Hesselman has informed me that in Sweden *Fomes annosus* is more active in the less acid soils.

A study of the relation between soil acidity and root troubles is now being made by L. W. R. Jackson at the Allegheny Forest Experiment Station. In the meantime it seems reasonable to suppose that much of the disease loss in forest nurseries, including loss primarily due to root fungi and also loss primarily due to drought, has been incurred by growing forest trees on agricultural rather than forest soils, under conditions which are abnormal because the soil is less acid and the stand more dense than in natural reproduction in the forest.

Federal Purchase of Bird Refuge Areas Approved

Government purchase of a 32,555-acre tract in South Carolina and a tract of 5,180 acres in Colorado as migratory-bird refuges has been approved by the Migratory Bird Conservation Commission. These areas will constitute the first refuges acquired by purchase under the Federal migratory bird conservation act of 1929, by which Congress authorized the expenditure of nearly \$8,000,000 for surveys and acquisition of lands for bird refuges. The commission's action was based on recommendations of the Bureau of Biological Survey, which had examined the areas and found them especially well adapted to serve as bird refuges.

The South Carolina unit is in the Cape Romain region, Charleston County, on the Atlantic seaboard; the Colorado unit is in the San Luis Lake region, Alamosa County. South Carolina has facilitated acquisition of the Cape Romain unit by granting to the Federal Government control of all State lands in the proposed refuge that are between the high and low water marks.

The average price approved by the commission for these lands is \$1.13 per acre.

Wood Preservative Industry Grows in 1929

In 1929 the number of plants in active operation in the United States giving preservative treatment to wood increased by 10, and the quantities both of wood treated and of preservatives used by such plants were greater than in any preceding year. The number of plants in operation was 203, including 131 of the pressure cylinder type, 56 of the nonpressure (open-tank) type, and 16 equipped for both pressure and nonpressure treatment. The total number in existence was 213, of which 150 were commercial plants treating wood for sale or by contract, 33 were owned and operated by railroads, and 30 were the property of public utility corporations, mining companies, or Government agencies.

Information furnished by all the plants to the American Wood-Preservers' Association and the United States Forest Service has been compiled by R. K. Helphenstine, jr., for the twenty-first annual report published by these agencies on the quantities of wood treated and preservatives used in the United States.

The total quantity of wood treated in 1929 was 362,009,047 cubic feet, or nearly 8 per cent more than was treated in 1928. Of this total 90 per cent was treated by pressure processes. Poles showed a larger increase in quantity treated than any other class of material, 12,828,341 cubic feet. Piles registered the next largest increase, 3,461,400 cubic feet. Wood blocks and crossties showed increases of 3,175,818 cubic feet and 2,726,094 cubic feet, respectively. The quantities of materials of different classes treated by the

plants and of preservatives used by them during the years 1928 and 1929 were as follows:

	1928	1929
Material treated:		
Crossties—		
Hewed (number)-----	38, 323, 854	39, 538, 193
Sawed (number)-----	31, 790, 551	31, 484, 910
Total (number)-----	70, 114, 405	71, 023, 103
Switch ties (board feet)-----		
Piles (linear feet)---	174, 401, 401	173, 107, 698
Poles (number)-----	20, 206, 112	25, 324, 255
Wood blocks (square yards)-----	3, 654, 885	4, 383, 768
Construction timbers (board feet)---	1, 400, 500	2, 610, 335
Cross arms (number)-----	241, 892, 969	242, 445, 744
Miscellaneous (board feet)-----	1, 948, 228	3, 158, 165
Miscellaneous (board feet)-----	96, 129, 282	134, 635, 355
Preservatives used:		
Creosote—		
Domestic ¹ (gallons)-----	140, 671, 196	134, 063, 664
Imported (gallons)-----	82, 154, 731	92, 310, 563
Total (gallons)-----	222, 825, 927	226, 374, 227
Petroleum (gallons)-----	25, 075, 903	29, 656, 181
Zinc chloride (pounds)-----	23, 524, 340	19, 848, 813
Miscellaneous—		
Salts (pounds)---	443, 308	1, 188, 148
Liquids (gallons)---	417, 953	38, 410

¹ Including 57,914,236 gallons of distillate coal-tar creosote, 74,828,267 gallons of creosote coal-tar solution, 569,491 gallons of water-gas tar, and 751,670 gallons of water-gas tar solution.

Of the crossties treated by the plants in 1929, 33.7 per cent were oak, 24.8 per cent were southern pine, and 10.8 per cent were Douglas fir. More than 64 per cent of the crossties were adzed or bored or both before treatment.

In general, lower prices were paid for preservatives in 1929 than in 1928.

Reports to the Bureau of the Census indicate a decrease of one-half of 1 per cent in the 1929 lumber cut of 732 mills which in 1928 sawed 51.5 per cent of the total lumber cut reported to the bureau for that year. The 1929 cut of these mills, each of which sawed 5,000,000 board feet or more either in 1928 or in 1929, totaled 17,498,274,000 board feet.

Tree Planting to Honor George Washington

The George Washington Bicentennial Commission has made the planting of memorial trees and forests a feature of the program for celebrating in 1932 the two hundredth anniversary of the birth of George Washington. This phase of the program has been entrusted by the commission to the American Tree Association. The association suggests that the trees be planted this fall or next spring, so that they may become firmly rooted before the time for their dedication arrives. A copy of a Bicentennial Tree Planting Book containing planting advice will be mailed to anyone who sends a request for it to the American Tree Association, 1214 Sixteenth Street NW., Washington, D. C.

Fire-Protection Results on Georgia Timberlands

The Georgia Forest Service attributes to H. M. Wilson, vice president, Baldwin-Lewis-Pace Co., Jacksonville, Fla., the following statement in regard to the company's management of 15,000 acres of land near Stockton, Ga.:

In the fall of 1926, after looking over several tracts of flat woods land that had been protected from fire for from two to four years, I became convinced that all that was needed to establish a second growth of slash timber on our place near Stockton, Ga., was protection from fire. After consulting with my associates we decided to place our tract of approximately 15,000 acres under fire protection.

We immediately began construction of fire lines, and supplied ourselves with one-man water tanks, torches, etc., for fire fighting.

We were working at that time 15 crops of faces on part of this tract and as we wanted to establish new growth on the land on which these faces were being worked, we decided to protect this land also and not rake the boxes at all.

We have not raked a tree for the past four winters and in that time we have had not more than 50 faces burned out of an average of 16 crops per year worked on the place. In this connection we acknowledge with sincere appreciation the community cooperation we have enjoyed.

The average cost of raking being \$75 per crop, we saved approximately \$4,800 during the four years, and the total cost of our reforestation work on the entire 15,000 acres, including tractor and thinning, has not exceeded \$5,000 to date.

The problem now facing us for economical solution is how best to thin the heavy growth of slash pine now on practically the entire tract.

This concern's holdings show slash pine 9½ inches and 10 inches in diameter 4½ feet from the ground, showing 11 and 12 ring growth, with density of stand 14 to 15 feet between trees, or approximately 200 trees per acre.

Bonnell H. Stone, forester of the Pfister & Vogel Land Co., which owns approximately 66,000 acres of land in Union and Towns Counties, Ga., is quoted by the service as follows:

The company employed a trained forester in 1913 and a definite policy of protection was established in 1915. A report made by timber cruisers had convinced the owners that 65 to 75 per cent of its lands were being burned annually, so the first lookout towers and telephone patrol system of the South were constructed on these lands in 1915-16, rangers and patrolmen being employed to direct the tenant fire wardens. A good tenant system was used instead of paid fire fighters, and free range privileges were included with other concessions in order to secure cooperation in the prevention of forest fires. As a result of these methods the average burned area per year has been less than one-tenth of 1 per cent from 1915 to the present time (1930). The owners are satisfied with this work as a paying investment, and are convinced that values in new growth more than offset the cost of protection and all carrying charges on the property.

Much-Thinned Pine Stand Superior in Volume

A 47-year-old stand of northern white pine at Durham, N. H., that has been thinned annually for the last 18 years now has a greater volume than a comparable unthinned stand containing more than twice as many trees, writes K. W. Woodward, forester of the University of New Hampshire. The first thinning removed about half the trees and later thinnings have been at the rate of 1 cord per acre per year. In 12 years the thinned plot increased 102 per cent in volume while the unthinned plot increased but 72 per cent. Average annual diameter growth is twice as great in the thinned as in the unthinned stand and the trees are taller, of better quality, and more thrifty.

Cresoted Piling Installed for 'Third Time After 38 Years' Service

Cresoted Douglas fir piling that had given 38 years' service in two installations on the California coast was installed this year for the third time when the Los Angeles Playground Commission rebuilt Sunset Pier, says the Wood Preserving News. The piling was pressure treated at the San Pedro plant of the Southern Pacific Co. in 1889. A pure coal-tar distillate was used and the piling was treated to refusal, with a final average retention of 14.17 pounds of preservative per cubic foot. It was used in 1891 and 1892 in building the Southern Pacific's long wharf at Santa Monica. In Santa Monica Bay the life of untreated or improperly treated timber is frequently a matter of months only, says the News. Marine borers are extremely active in the waters of the Pacific. Santa Monica Bay is not protected by irregularity of coast line, its mouth is wide, and the full force of heavy winter storms is felt along its shores. Yet when the wharf was dismantled in 1916 a very large percentage of the piling was found to be in excellent condition.

A number of the old piles were used in the foundations of one wing of Sunset Pier in the town of Venice,

which is now within the corporate limits of Los Angeles. In 1929, when the Los Angeles Playground Commission rebuilt a section of this pier, some 60 of the old salvaged piles were removed. All but one of these proved sound and serviceable and were placed in the remodeled pier.



W. S. Taber, State forester of Delaware, writes that the *Alnus maritima* (seaside alder), the range of which within Delaware is given in Department of Agricul-

ture Miscellaneous Circular 92, Check List of the Forest Trees of the United States, as "Nanticoke River near Seaford, Del.," is found in great abundance on most of the water courses in the lower half of the State. He adds that the *Pinus rigida serotina* (pond pine), the range of which is given in the check list as the coast region from the vicinity of Cape May and southeastern Virginia to Florida, occurs sparingly in Delaware from Lewes southward throughout the water courses of Rehoboth and Indian River bays and tributaries.

Foreign Notes

Maté an Important Product of Brazil

Brazil produces each year about 200,000 metric tons of maté, the dried leaves of certain *Ilex* species used for making tea, according to a report by C. R. Cameron, American consul at Sao Paulo. In 1928 the Brazilian exports of maté were valued at \$13,748,323, being exceeded in value only by exports of coffee, of hides, and of cacao. Argentina produces about 20,000 tons of maté annually, Paraguay about 12,000 or 15,000 tons. The drink prepared from maté leaves is used by many millions of South Americans and is now being introduced into the United States. It is mildly stimulating and contains a much smaller quantity of tannic substances than the tea of China.

About 20 of the 60 species of maté found in Brazil serve more or less satisfactorily for beverage purposes. The one most favored is *Ilex paraguariensis*, found principally in the basin of the River Plate from 18° south to about 30° south. In the forest this species attains a height of 50 or 60 feet. Usually the maté tree is absent from a belt 10 to 30 miles wide along any large river. It prefers depressions in the foothills and mountains and an altitude of from 1,500 to 2,500 feet. It is frequently associated with the Parana pine. At present important commercial forests of *Ilex paraguariensis* are found in southern Matto Grosso, central and western Parana, western Santa Catharina, and north-western Rio Grande do Sul, all in Brazil. Others are found in eastern Paraguay.

The fully developed leaf of maté is preferred for harvesting, and the harvest usually takes place during the fall and winter, that is, from May to October. Cutting at intervals of 3 years is thought to result in a superior grade of the commercial product. The cut branches of green leaves are first toasted over an open wood fire and then thoroughly dried, usually on a framework of poles to which hot air is conducted through a subterranean canal from a fire built some distance away. The dried leaves are threshed and

then, according to the best practice, are allowed to season for a few months.

Brazil has not yet developed commercial plantations of maté. The Argentine Territory of Misiones, however, is developing such plantations on a large scale. One of the great difficulties in establishing plantations is to obtain seedlings; the seed, being inclosed in a gelatinous covering and a stout epidermis, sprout very slowly. In Argentina the seed are scattered on a very finely pulverized seed bed, covered with 2 or 3 centimeters of earth, and watered once a day, or oftener in dry weather. If the planting takes place in March, general germination normally occurs in September and some seed continue to sprout until December. The young plants must be carefully shaded, both in the seed beds and after transplanting. The trees are pruned each year, but the first harvest is deferred until they are 4 years old.

Australia Cuts Down Estimates of Its Forested Area

The forest area of Australia was estimated in 1900 at 107,000,000 acres, or 5.62 per cent of the total area of the continent, C. E. Lane-Poole, inspector general of forests, stated in a paper published in the December, 1929, Australian Forestry Journal. By 1921 the official estimate had dropped to 72,000,000 acres, and in 1922-23 it sank to 24,500,000 acres, or 1.29 per cent of the total area of the continent. In 1928 the Empire Forestry Conference was told that the area of the Dominion's forest lands was 19,500,000 acres. Mr. Lane-Poole comments as follows:

The rapid diminution of our forest area is not due to the exploitation of the forests by sawmillers or their alienation to settlers, but is due entirely to the improved knowledge of our forest resources. * * * For a very long time the people lived in a fool's paradise and considered that their timber resources were inexhaustible, and the returns sent to the statistician were all tinged with the optimistic idea that in this vast con-

tinent of ours there must be immense areas of forests. There are actually immense areas of scattered open park-like woodlands, but these are not commercial forests. They have certainly helped the pioneer settlers to make fences and in smaller measures they have provided sleepers for railways, but they are not forests in the proper sense of the term. Of real forests capable of yielding timber in quantities of at least 50 cubic feet per acre per year the area is very small, and what most people fail to realize is that it was very small when Captain Cook first landed on our shores. In Western Australia, New South Wales, South Australia, and Tasmania the area is known, but in Victoria and Queensland classification of forest lands is not finished yet. * * * That is why we may anticipate a further reduction of around 7,000,000 acres, from 19,500,000 to 12,500,000, or down to around three-fourths of 1 per cent of the total area of the Commonwealth when we know the worst.

This is a very small area indeed and compares most unfavorably with other lands. * * * European nations claim that at least one-fourth of the total area of a country should be devoted to the production of timber. But European countries have for the most part a forestry climate throughout their areas and all but the heath and bog lands are capable of maintaining a more or less dense population. It is not so with us. The area capable of carrying a dense population is comparatively speaking small. There is a vast area inland that can not carry a population and can not carry forests. Actually the area in Australia that is capable of carrying dense forests and a dense population is within the narrow coastal fringe from Perth to the Queensland Tropics which receives a rainfall of 25 and over inches. The rest must remain a land of sparse population and of small forest interest. * * * Apart from a little area of hoop and kauri pines in Queensland and an insignificant supply of softwood derived from Cypress pine in the western area of Queensland and New South Wales and the almost vanished forests of Huon celery top and King William pine in Tasmania, we possess no areas of woods that can be called soft. Real pines, spruces, and firs do not exist in our climate. While our hardwoods are immeasurably better for all purposes than the softwoods of commerce, we can not afford to pay for hardwood and put it to entirely derogatory uses. Thus it is that over £5,000,000 in cash has to be sent out of Australia to pay for the softwood of the common kitchen type that we require. That is not all, for some £6,000,000 worth has to be imported in the shape of paper or pulp.

* * * Apart from alienated real forest land which will come back to the forest estate, there are lands which, while not carrying native forests of commercial value, will carry forests of exotics. We want a softwood that will grow on our second-class woodlands. * * * In the highlands of New South Wales and Victoria we possess country which has a climate which very closely approximates to the more southern coniferous belt of America and the higher lands of the Mediterranean region. Here then is an opportunity of increasing our forest estate by the introduction and planting of exotic pines. Again in the assured rainfall of the southeast coast of South Australia and of Victoria we have coastal sandy lands which have given but a poor return for agriculture, but which will yield good crops of pine timber. Again, on similar land on the east coast pines of the South-eastern States of America will thrive.

Economic History of a German City Forest

By BERNARD FRANK, United States Forest Service

The city of Villingen, in South Baden, Germany, has a 9,200-acre forest from which it derives a net annual income of \$10.73 per acre. This income is only 75 or 80 per cent of the annual net proceeds of the forest, the difference representing the value of free wood distributed to citizens and cash paid to citizens in lieu of wood. The operating ratio is about 54 per cent. Taxes compose 8 per cent of the total expense, as against 2 per cent before the war. An analysis by Forest Supervisor Gayer of the management of the forest, based on accounts covering a period of 90 years, appears in the January-February-March, 1930, number of *Allgemeine Forst- und Jagd Zeitung*.

Conditions on this municipal forest are typical of the Black Forest highland. Climatic conditions and other site factors favor the development of raw humus, and drainage is poor. Spruce, pine, and fir compose practically the entire stand. A small quantity of beech is present, which is to be increased, and larch is to be introduced as a means of increasing soil productivity. The management plan was first made in 1837 and has been revised every 10 years since except in 1917. Clear cutting was superseded by the selection system in 1880. As a result of early clear cutting the forest consists mainly of even-aged stands. The oldest age class occupies 24 per cent of the area, in contrast to a normal 7 per cent. This is balanced by a deficiency in the 61-80 year age class; the 1-60 year classes are normal. Cutting will, for a time, be concentrated on the surplus growing stock over 100 years of age and the normally stocked 81-100 year old stands.

A recent stem tally covered 88 per cent of the growing stock. This inventory, including computation, cost 67 cents per acre of measured area, or 0.7 cent per 100 cubic feet of timber.

From 1907 to 1927 utilization is reported to have averaged 922,000 cubic feet a year. This corresponds roughly with the average increment for the period. The average stand per acre increased steadily from 3,725 cubic feet in 1837 to 5,100 cubic feet in 1927. The total growing stock is now 47,450,000 cubic feet. About 24 per cent of the growing stock, or slightly more than the growth, is to be removed in the decade 1927-1936. The excess consists in improvement cuttings.

The annual cut has risen from 666,000 cubic feet in the decade beginning with 1837 to 1,065,000 cubic feet in 1927. The records show a great increase in the ratio of saw logs to fuel wood. Fuel wood distributed free to citizens made up 50 per cent of the 1870 cut but only 10 per cent of that of 1927. The steady rise in income per cubic meter previous to the war, which was par-

alleled by a rise in lumber prices, contrasts sharply with postwar fluctuations. The 1927 price was only 1.56 times the 1907-1913 average price, which indicates that the increase in the price of wood has not kept pace with the general rise in prices.

Logging costs increased by 79 per cent between the period 1907-1913 and the year 1927. They now compose from 15 to 18 per cent of the gross income. In 1927 the logging cost per 100 cubic feet was \$2.24 for the main crop and \$5.95 for the intermediate cut. The difference is due largely to the fact that the main crop was cut on a contract basis and the intermediate crop on a day-labor basis. Extension of the logging-road system has prevented logging costs from rising more than wages since the war.

Net returns per 100 cubic feet rose from \$5.25 in 1877-1886 to \$12.10 in 1926 and \$15.15 in 1927. In 1926 by-products yielded 13 cents per acre, most of which was brought in by the sale of hunting licenses.

Cultural costs have been high because large areas have had to be planted. Additional expense was incurred for drainage as far back as 1837. The cost for planting, at the rate of 1,550 trees per acre, including soil preparation and plant production, is \$27 per acre. The production of 4 and 5 year spruce transplants costs \$3 or \$4 per 1,000.

The revised management plan effective April 1, 1927, provides for improved methods of bookkeeping which will show the relation between utilization, rent, and capital, the changes in the value of the growing stock, the division of outgo into expense and investment, and the return on the investment, and will furnish the data necessary to develop the growing stock to its full earning capacity.

Ontario's New Forest Fire Act

Under Ontario's new forest fire law, enacted this year, the municipal corporation of any organized township is responsible for extinguishing forest fires in the township and for meeting the expense of extinguishing them. If a fire occurs that can not be controlled by means at the corporation's disposal, assistance may be requested from the provincial department of lands and forests. If the department furnishes assistance, half the expense so incurred by the department is payable by the township.

Provision is made for restricting travel on forest areas during periods of special fire danger. Permits are required for logging and other woods operations and for operating lumber mills within one-fourth mile of forest or brush land. Logging or other industrial permittees may be required to maintain fire-fighting equipment at specified locations and are required to bear the full cost of extinguishing any fires caused by their summer operations.

Violation of the law is made punishable by a fine of from \$25 to \$300 or, in default of payment of the fine, by imprisonment for not more than 90 days.

Fires on Prussian State Forests in 1928

Official fire statistics for the State forests of Prussia for the year 1928 give the total number of fires as 880. The fires burned over an average of 9.25 acres each, or 8,144 acres in all. The proportion of State forest area burned over during the year was 0.134 per cent. Stands entirely or mostly killed by fire included 66 acres of oak and beech, 3,910 acres of pine, and 443 acres of spruce. On 952 acres the timber was injured but not so badly that it had to be cut, and on 2,773 acres the ground cover only was burned. March was the worst fire month, with 40 per cent of all fires. The remaining fires were distributed chiefly as follows: April, 15 per cent; May, 14 per cent; July, 11 per cent; September, 7 per cent; and June, 6 per cent. The only months without fires were January and December. Causes of fires were reported as follows: Carelessness (campers, smokers, brush-burning, lumbering, etc.), 52.9 per cent; railroads and motors, 8.1 per cent; incendiaries, 4.3 per cent; lightning, 0.4 per cent; and unknown, 34.3 per cent.

Growth of Douglas Fir in Switzerland

In certain conditions of soil and exposure Douglas fir is capable of an average growth of more than 20 cubic meters per hectare per year in Switzerland, Prof. H. Badoux has found through studying the growth of the species on a number of plots established by the Swiss Federal forest experiment station. At 45 years it is capable of growing 40 cubic meters per hectare in a year. Lowland white fir (*Abies grandis*) has produced nearly the same volume in Switzerland, but is found undesirable for culture there because its wood is inferior in quality to that of the native fir and because the seed imported from the United States has not germinated well.

An Adaptable Spruce

An incident illustrating the vitality of the spruce was related within the past few years by Seniore Mario Michelangeli, in charge of the State forests of Taravasio, Italy. The trunk of a spruce tree was covered to a height of more than a meter with alluvial soil, whereupon the tree, to escape death due to the smothering of its roots, threw out adventitious roots near the surface of the alluvial deposit. Flood waters subsequently carried away the alluvial soil, denuding the adventitious roots. Thereupon the original set of roots, having not yet ceased to function to some degree, resumed their full duty, with the result that the tree continued to flourish. In quoting this story the Bulletin de la Société Centrale Forestière de Belgique points out that the case was an exceptional one, and that to deposit soil removed in clearing roadways, etc., at the base of trees is an undesirable practice often resulting in the slow death of the trees.

Forests and Forest Products of Estonia

Forests cover about 21 per cent of the 18,354 square miles of land south of the Gulf of Finland that now constitutes the Republic of Estonia, United States Consul Harry E. Carlson reported in 1929. Of the total forested area of 945,883 hectares the Government owns 79.8 per cent and farmers own 15.6 per cent. The remaining 4.6 per cent is the property of industrial concerns and cities. The Government forests are managed by the bureau of forests in the department of agriculture. Some of the timber designated for cutting is felled, and a portion of this is sawed into lumber, by the State forest industry, a Government institution formed in 1926. Other Government timber to be cut is sold on the stump at public auction. During the 5-year period 1922-1927 the annual timber output of the Estonian State forests averaged 3,586,000 cubic meters.

In the year 1927-28 the total outlay of the State forestry bureau was \$570,060 and total receipts from the Government forests were \$1,925,350. In that year the bureau expended \$64,480 on reforestation and other forest cultivation work, areas planted and otherwise reforested totaling 6,313 hectares.

In the 5-year period 1923-1927 the value of Estonia's exports of forest products ranged from \$3,110,470 to \$4,533,100 a year. More than 90 per cent of the Republic's lumber exports are sent to England and Holland. Lumber exports to England in 1927 were valued at \$2,071,830.

Raising *Pinus Merkusii* on the East Coast of Sumatra

On the east coast of Sumatra the *Pinus merkusii*, although it is a strong plant when the root has taken good hold of the soil, requires careful protection until the seedlings are several weeks old. The seed are menaced by doves and mice, the young plants by moles, insects, and damping off. According to the planting practice approved by W. S. Gonggryp, chief forester of the east coast of Sumatra, the seed of this species, valued in the East Indies for naval-stores production, are sown not in nursery beds but in germination trays. The trays used are about 15 centimeters deep and of such size that they can be lifted by two men. It is recommended that the trays be filled with pure sand or with a sand and loose earth mixture of which sand composes 50 to 75 per cent. To disinfect the earth as a method of preventing damping off the tray filled with earth is placed on a zinc plate on stone supports over a fire which applies heat to the whole under surface of the plate. In order that the earth in the tray may not become too hot it is kept wet during the heating process by pouring boiling water over it. Heating at the boiling point for 15 minutes is sufficient to disinfect the earth.

The nursery trays are deposited on frames the legs of which have been placed in bamboos filled with water to keep ants away. The seed are laid out in the trays in furrows about one-half centimeter deep which are then filled with fine sand.

Because shading furthers damping off the trays are not covered except during heavy showers, when movable "atap" roofs are used. When moles or locusts are feared the nursery trays are covered with mosquito netting during the night. Covers of fine gauze may be used as a protection against ants or doves.

The pine seedlings come above the surface of the soil in about two weeks. As soon as the skin of the seed has been dropped, that is, in about six weeks or two months, they are transplanted into nursery beds in which the soil has been loosened to a depth of 30 centimeters and thoroughly drained. Beds in which damping off occurs shortly after transplanting are disinfected by pouring over the affected spots a solution of 1 part of trade formalin to from 150 to 200 parts of water and covering the spots for one day with mats or gunny sacks. The disinfected earth is exposed to the air for at least a week before it is replanted.

The young pines are transplanted to the cultivation areas when they are from 6 months to 1 year old.

Forest Protective Associations of Quebec Report Few Fires in 1929

Forest-protective associations of lumbermen operating on public lands in Quebec reported only 191 forest fires on the 77,680 square miles of land which they patrolled in 1929. Areas stocked with mature timber that were burned over by these fires totaled 184 acres. The associations give a good share of the credit for this record to rainy weather. They are unanimous in praising the regulation which requires that persons wishing to travel through Quebec forests obtain permits. Another safeguard mentioned is the prohibition of smoking by men employed in lumber operations.

Careless campers head the list of forest fire causes, being held responsible for 23 per cent of all the fires. Lightning is second, with 20 per cent. Land-clearing fires, formerly a leading cause of forest fires in Quebec, accounted for only 2 per cent of the 1929 total.

Nearly all the forest area under license in Quebec is patrolled by the following protective associations: St. Maurice, Lower Ottawa, Laurentian, Ottawa River, Southern St. Lawrence, and Price Bros. All the associations cooperate with the provincial fire protection service. The associations employ, in all, 2,216 persons. They maintain 390 lookout towers and 8,768 miles of telephone line, and have cut or cleared 2,273 miles of portage or trail and rebuilt 593 miles of road. The Price Bros. now employ aircraft in patrolling 1,000,000 acres of land.

Mexican Dust Storms Charged to Deforestation

El Universal and other Mexican newspapers annually renew a campaign for reforestation when February and March bring the season of dust storms to the Mexican Capital, says a dispatch from Mexico City. Great forests that once thrived about the city have been cut for fuel and lumber, and to this fact the press attributes the dust storms that sometimes descend on the city with the density of fog. At the time of the Spanish conquest Mexico City occupied an island in a vast shallow lake called Texcoco. Modern drainage has reduced Texcoco to one-tenth of its former size, much of the old lake bed is now dry, and when the unbroken winds swirl in the bowl-like valley the dust rises in clouds that obscure vision for miles.



The University of New Brunswick has received a gift of \$10,000 from the International Paper Co. to be used in equipping its new forestry building. This follows a gift of \$5,000 made to the university by Price Brothers & Co. for the use of the forest school.



Western Australia's Giant Gum Tree

The karri tree (*Eucalyptus diversicolor*) of Western Australia has been known to attain a height of about 278 feet. It averages about 200 feet in height and is characterized by a long, cylindrical, clear bole. One case is recorded in which 20,000 cubic feet of merchantable timber was removed from an acre of karri forest; in one operation covering 2,650 acres of karri forest the average volume of merchantable timber removed per acre was 3,600 cubic feet. Karri shows rapid growth, and regenerates freely from seed; but because its habitat is within the agricultural area of the State, and because of the nondurable nature of its wood, much of the land formerly occupied by forests of this species has been diverted to purposes other than the growing of karri timber. The total stand of karri in Western Australia was officially estimated in 1928 at 301,650,000 cubic feet.

A Royal Norwegian decree of March 21, 1930, prohibits importation into Norway of any species of elm.

Personals

Hugh Potter Baker has been elected dean of the New York State College of Forestry, succeeding the late Franklin F. Moon. Doctor Baker was the first dean of the college, serving from 1912 until 1920, when he became executive secretary of the American Paper and Pulp Association. Since 1928 he has been connected with the United States Chamber of Commerce. Doctor Baker is a graduate of the Yale School of Forestry and holds the degree of doctor of economics from the University of Munich. His earlier experience included 10 years with the United States Forest Service and several years of forestry teaching in the State Colleges of Iowa and Pennsylvania.

H. Basil Wales, assistant in forest management in the Albuquerque, N. Mex., regional office of the United States Forest Service, has been transferred to Milwaukee, Wis., as assistant regional forester in the Lake States region, succeeding W. F. Ramsdell. Mr. Wales's 20 years' experience as a member of the Forest Service has all been in the Southwest. He is not a stranger to the Lake States, however, having had his home in Michigan and received his forestry training at the Michigan Agricultural College.

James O. Hazard has accepted appointment as State forester of Tennessee. R. S. Maddox, Mr. Hazard's predecessor in that position, succeeds him as assistant State forester of Virginia.

Emanuel Fritz, associate professor of forestry at the University of California, has been made editor of the Journal of Forestry, succeeding Samuel T. Dana. Professor Fritz has been a member of the editorial board of the journal since March, 1922, and has written many articles in his chosen field of forest products and wood utilization. He holds the degree of mechanical engineer from Cornell University and that of master of forestry from Yale University, and has been a member of the forestry faculty of the University of California since 1919.

Peter Keplinger has been transferred from the Denver office of the United States Forest Service to the Washington office and given charge of personnel-training activities throughout the service. For more than 10 years Mr. Keplinger has been studying the training needs of the Forest Service and working out methods for meeting these needs. The work contemplated covers training in all kinds of national-forest work.

Will C. Barnes, formerly chief of the branch of range management, United States Forest Service, has retired as secretary of the United States Geographic Board. After 23 years in the Government service, Mr. Barnes turns from official duties to travel and literary work. His immediate plans include extended research in State records of Arizona in preparation for writing a history of that State.

Holland Coleman, of the Denver regional office of the United States Forest Service, has been made regional engineer of the service in the Lake States region. He will have general supervision of engineering work on the national forests in the Lake States, including the development and maintenance of roads, trails, and portages. Mr. Coleman entered the Forest Service in 1914, and since 1922 has been engaged in national forest road construction work in the Rocky Mountain region.

L. W. R. Jackson has been appointed assistant pathologist in the Office of Forest Pathology, Bureau of Plant Industry, and assigned to the Allegheny Forest Experiment Station, Philadelphia, Pa. He will work principally on butt rot of sprout hardwoods and on diseases of forest nursery stock with particular emphasis on the relation between soil acidity and root fungi. Mr. Jackson is a forestry graduate of the University of Minnesota and has had three years of graduate work in botany at the Universities of Minnesota and Pennsylvania. He was formerly connected with the Office of Forest Pathology for two years.

L. M. Gromov, president of the union of lumber, paper, and wood products industries of the Union of Socialist Soviet Republics, recently came to the United States to make a study of American woodworking and sawmilling machinery, accompanied by I. A. Murashov, E. P. Trutnev, and K. I. Pushkin, chief engineers of a furniture factory group, a group of plywood and veneer plants, and a sawmill group, respectively.

Karl M. Müller, forest assessor and assistant at the forest experiment station at Munich, Germany, is in America making a special study of the Abies. The American species, particularly *A. nobilis* and to a lesser degree *A. grandis*, apparently are less subject to insect injury and disease in south Germany than the native species *A. pectinata*. Doctor Müller is the author of several books on forest trees, and a few years ago explored the Balkan Peninsula in connection with a study of *Pinus peuce*, the white pine that apparently is not susceptible to the blister rust. He will be in America about six months, spending his time principally in the Pacific Northwest and British Columbia.

Robert Marshall, of the Northern Rocky Mountain Forest Experiment Station, has received the Ph. D. degree from Johns Hopkins University. Mr. Marshall has obtained leave of absence for 1930 and 1931 and is going to Wiseman, Alaska, where he will make a sociological study and will continue his studies of tree growth at the northerly limits of its existence.

The present membership of the National Research Council's forestry committee is Raphael Zon (chairman), Earle H. Clapp, H. C. Cowles, S. T. Dana, R. T. Fisher, W. R. Hine, B. P. Kirkland, Aldo Leopold, David T. Mason, and E. N. Munns.

R. Grady Rankin, Gastonia, N. C., has been appointed a member of the North Carolina Board of Conservation and Development to succeed Ben B. Gossett.

J. Alfred Hall has accepted appointment to the staff of the Forest Products Laboratory, to engage in naval stores studies. He will take charge of the chemical phases of the studies in which Eloise Gerry is conducting the work on physiology and microscopic structure. Mr. Hall, who is a graduate of the University of Wisconsin, has had eight years' experience in research on plant products and volatile oils. Since 1928 he has been chief chemist of the chemical laboratory established at Duke University under the Liggett & Myers research fellowships.

R. R. Fenska, of the faculty of the New York State College of Forestry, visited Europe this summer, his itinerary including forests and forest schools in France, Germany, Switzerland, Austria, and Czechoslovakia.

R. P. Holdsworth has resigned as professor of forestry in the University of Arkansas and during the coming school year will teach forestry in the Massachusetts Agricultural College.

Floyd E. Carlson has accepted a position in the extension department of the New York State College of Forestry, succeeding J. D. Kennedy. Mr. Carlson received the B. S. and M. F. degrees from the University of Washington in 1928 and 1930, respectively. He has had reconnaissance experience in Alaska and has represented the State of Washington in a forestry educational campaign.

Arthur Koehler, in charge of silvicultural relations, Forest Products Laboratory, has accepted the position on the editorial staff of the Journal of Forestry that was formerly occupied by Emanuel Fritz, now editor in chief of the Journal. The subjects assigned to Mr. Koehler are forest utilization and wood technology.

Annie E. Hoyle has retired as artist, United States Forest Service, after five extensions of time beyond the usual age for retirement. In 23 years' connection with the service Mrs. Hoyle has made a valuable and lasting contribution to American dendrology and botany with her many expert line drawings illustrating characteristics of tree and plant species. The drawings appearing in the dendrological bulletins of the late George B. Sudworth are her work, as are those in several publications dealing with American forage plants. In recent years certain of her drawings have become widely familiar as illustrations for a popular series of State forest tree manuals. Mrs. Hoyle's preparation for her work included seven years' art study in Washington, New York, Paris, and London, and also studies in morphological and systematic botany.

A. C. Seward, of Cambridge University, was made president of the Fifth International Botanical Congress, which assembled at Cambridge on August 16. The chairmanships of three of the eight sections in which the active work of the sessions was carried on were given to Americans. These were H. C. Cowles, of the University of Chicago, who presided over the section on plant geography and ecology; R. E. Buchanan, of the Iowa State College, who had charge of the section on bacteriology; and L. R. Jones, of the University of Wisconsin, who headed the section on plant diseases and the fungi that cause them. American honorary vice presidents of the congress were L. H. Bailey, of Cornell University, R. A. Harper, of Columbia University, and E. D. Merrill, of the New York Botanical Garden.

E. G. Wieseuegel is leaving the faculty of the Idaho School of Forestry to take charge of the work in forestry at Ohio State University, succeeding Norman W. Scherer.

R. E. McArdle, of the Pacific Northwest Forest Experiment Station, has received the Ph. D. degree from the University of Michigan, after three years' graduate study at that institution. He has been preparing especially for forest fire studies.

R. M. Nelson, forest pathologist of the Bureau of Plant Industry stationed at the Appalachian Forest Experiment Station, received the Ph. D. degree this year from the University of Minnesota.

Ferdinand W. Haasis, formerly assistant silviculturist at the Appalachian Forest Experiment Station, has resigned as associate professor of forestry at the University of Idaho and is now associated with D. T. MacDougal, of the Carnegie Institution of Washington, with headquarters at the Carnegie Coastal Laboratory, Carmel, Calif.

R. E. Balch, a graduate of the Ontario Agricultural College, who was for two years a graduate student in the New York State College of Forestry and was temporarily employed by the United States Bureau of Entomology at several periods, is now forest entomologist for New Brunswick, with headquarters at Fredericton.

P. S. King has been made assistant State forester of Oregon in charge of forest protection. Mr. King has been a field inspector in the Oregon Forestry Department since 1921.

Margaret C. Stoughton, a forestry graduate of the Iowa State College, has been appointed junior forester at the Appalachian Forest Experiment Station. Miss Stoughton is the first woman to be appointed to the United States Forest Service in that grade.

W. G. Wahlenberg is being reinstated at the Southern Forest Experiment Station, from which he resigned early in 1929 to accept a position as forester at the Eddy Tree Breeding Station, Placerville, Calif. He returns as associate silviculturist, and will engage in studies of the management of second-growth pine.

James Lindsay Alexander, assistant professor of forestry, University of Washington, shares with four other Americans and one Canadian the good fortune of being named by the Charles Lathrop Pack Forest Education Board in the board's first annual award of fellowships. He will make an investigation of forest survey methods, working at the University of Toronto and the University of Washington and in the forests of the eastern and western United States. Ralph Caird, graduate student, University of Chicago, is awarded a fellowship for general forestry study at the University of Michigan and advanced work in tree physiology and pathology. Bernard Frank, assistant forest economist in the Washington (D. C.) office of the United States Forest Service, will work on land classification methods and land utilization technique especially as applied to forest lands, studying at the University of Wisconsin and making field investigations in the Lake States. George Ritchie Lane, forester in charge of reforestation, Canada Power & Paper Corporation, Grand' Mere, Quebec, will investigate the planting of pulpwood species and the growth and yield of such species in the Maritime Provinces of Canada. Raymond Frank Taylor, technical assistant on the Tongass National Forest, Alaska, will study the silvicultural management of coniferous forests at the Yale School of Forestry, supplementing this work with field study in Washington and Alaska. John Burton Woods, forester of the Long-Bell Lumber Co. at Longview, Wash., will study the practice of forestry on private timberlands and write a book on the subject.

F. T. Murphey, extension forester for Pennsylvania, has been granted leave of absence for graduate study during the nine months beginning with October, 1930. William Ira Bull, a forestry graduate of the Pennsylvania State College, will substitute for him during that period.

Orrin L. Latham has resigned as forest ranger on the Idaho National Forest to become an instructor in the New York State Ranger School. Mr. Latham is a forestry graduate of the Iowa State College.

Ralph G. Unger, a graduate of the New York State College of Forestry, has been made an associate forester of St. Lawrence University, with headquarters at Malone, N. Y. Mr. Unger's principal duty will be to cooperate with officials of Franklin and Clinton Counties, N. Y., in county forestry work. He will assist any individual or organization in the two counties in reforestation work.

Bibliography

Büsgen's Forest Botany Available in English

By E. N. MUNNS, United States Forest Service

Another outstanding European work in the field of forestry has been made available to those reading no language other than English, through publication² of a translation of *The Structure and Life of Forest Trees*, by Moritz Büsgen, late professor in the Royal Prussian Forest Academy in Hannover-Münden. The translation is of the third edition, in which Büsgen's text was revised and enlarged by E. Münch, professor in the Forest Academy at Tharandt. The book is a gem of the first water, taking its place beside such recent European works as Dengler's *Waldbau*, Troup's *Silviculture*, and Maximov's *Growth*. Thomas Thompson, lecturer in forestry, University College of North Wales, is the translator.

As a specimen of idiomatic English, it may be remarked, the translation suffers by comparison with the English version of an earlier edition of Büsgen's work prepared by Raphael Zon.

There is little doubt that the translation will be, as Thompson hoped, "a useful addition to our forest-botanical literature." Forest, or, as it may almost better be called, tree botany is now served up to the American student forester by botanists who, however capable as botanists, and however interested in trees, usually know little of forestry principles or practices. Most botanists consider the tree as a plant differing significantly from other plants only in size. The forester considers the tree not only as a plant but also as a member of a society in which the individual functions in relation to other individuals and to the whole forest population. Büsgen's approach to the subject makes his book one that can be heartily commended to botanists who teach forest botany and to practicing foresters. Indeed, the book could well be made a part of the general reading of any forester, particularly of any forester to whom information on recent advances in plant physiology is not readily available.

The book closes with a chapter on the subject, largely neglected by foresters, of local races of trees and the climatic and soil factors that have brought about their occurrence. A consideration of what Büsgen has to say on this subject should give pause to those who are basing reforestation programs on cheap seed rather than on seed suitable for the planting site.

² By John Wiley & Sons (Inc.), New York, 1929.

The translation is well indexed and is well illustrated. The volume would have been improved by the addition of a glossary for the benefit of the general reader. Another drawback is the lack of references to American literature, which includes a growing and important list of real contributions on the subject.

Yale Bulletin Tells How a Watershed Forest is Managed for Timber Production

By F. H. EYRE, United States Forest Service

In a publication entitled "The Eli Whitney Forest"³ Ralph C. Hawley and William Maughan have described in easily understandable style the demonstration of forestry practice on the lands of the New Haven Water Co. The publication is exceptionally well illustrated. In fact the illustrations alone would make a worth-while publication. We sometimes hear of busy people who will not read bulletins even if the bulletins are given to them, but almost every one will look at the illustrations of any bulletin that falls into his hands. Anyone who will take time to scan the 56 large plates in this publication and read their legends can learn much about applied forestry. Even so, the illustrations would have been much more effective had there been more plates to show conditions before forestry treatment.

Under the direction of Eli Whitney, for many years its president, the New Haven Water Co. early adopted the plan of developing a productive forest on the lands which it was holding for watershed protection. In 1907 the company's entire holdings of more than 8,000 acres were placed under management with Prof. R. C. Hawley, of the Yale School of Forestry, as forester. In the past 20 years a regulated average annual cut of 320,000 feet board measure and 1,300 cords has been made. The cut has been most conservative, and the growing stock has been increased materially by judicious improvement cuttings. At present the growing stock⁴ is estimated at nearly 26,000,000 board feet. The policy of undercutting the annual growth, now estimated at 3,720,000 feet board measure, will be continued until such time as the growing stock approximates 80,000,000 board feet, the ultimate aim. Since 1907 the company has gradually extended its holdings,

³ Yale School of Forestry Bulletin 27. 42 pp. New Haven, Conn., 1930.

⁴ Excluding hardwoods with breast-height diameters of less than 8 inches and conifers with breast-height diameters of less than 5 inches.

so that it now owns more than 20,000 acres. Detailed descriptions are given of each of the various forest types and of the silvicultural treatment that has been adopted for each type on the basis of experience. The commercial development and operation of the tract is shown to be entirely consistent with its functioning as a protection forest.

It is to be regretted that some standard terminology was not used throughout in giving the common names of trees. *Liriodendron tulipifera*, for example, is frequently termed "whitewood."

This publication is intended to present an object lesson in applied forestry. The price, \$1.50 a copy, would seem likely to limit its distribution. It may well be that a cheaper bulletin would have served more effectively the purpose the authors had in mind. Nevertheless, a publication presenting such an admirable example of forest management should serve to interest many owners of forest property. It would seem that many city or county owned tracts could be handled in a manner similar to that described. In New York State alone, according to another author, 26 cities own or control 220,000 acres of watershed. Many watershed areas owned by municipalities, unquestionably, are in as good condition as were those of the New Haven Water Co. in 1907. What better treatment could be given them than to put them under management comparable to that of the Eli Whitney Forest?

Knotty Lumber Found Serviceable for Boxes

Boxes made of knotty lumber, if properly designed, will give as good service in shipping as boxes made of selected clear lumber; in some cases, in fact, a better and more serviceable box results from using the knotty material. This was brought out in tests conducted by G. E. Heck and I. B. Lanphier, engineers at the Forest Products Laboratory, Madison, Wis.

In thin box lumber the diameter of no knot should exceed one-fourth the width of the board; in thicker material a knot occupying one-half the width of the board is permissible. The position of the knot makes little difference so long as it does not occur at the nailing edge.

In one group of boxes with short, relatively thick sides included in the tests the boxes in which knotty lumber was used withstood half again as much knocking about as those built of all-clear material.

"The effective use of wood for shipping containers has a broad and realistic bearing upon public interests," said Carlile P. Winslow, director of the Forest Products Laboratory, in announcing the results of the tests. "Shipping containers constitute one of the principal outlets for the large proportion of low-grade lumber that necessarily develops incident to the manufacture of higher grades. The utilization of this low-grade

lumber is one of the key problems in the practice of forestry. Unless the lower grades can be made to stand some share of the costs of timber production, the growing of timber can hardly be made to pay its way. As this type of material can be segregated and used according to its special properties, larger amounts will be absorbed in industry and its economic value will become stabilized and strengthened. While it is true that the indiscriminate use of knotty stock may produce inferior boxes, these tests clearly show that the elimination of all knots is unnecessary."

The results of the laboratory's tests and suggestions for applying them are given in United States Department of Agriculture Circular No. 105, Knotty Lumber for Boxes. Copies of the circular may be obtained free of charge from the United States Department of Agriculture, Washington, D. C., as long as the present supply lasts.

American Museum Curator Describes Araucaria Forests of Chile

"Camping in a Prehistoric Forest" is the title of an article in the July-August number of *Natural History* by H. E. Anthony, curator, mammals of the world, American Museum of Natural History, telling of experiences in the Araucaria forests of Chile. A general description of the "prehistoric" genus is given as follows:

The Araucaria is a coniferous tree, called a pine by South Americans but only distantly related to the true pines. The tree, which took its name from the district of Arauco, Chile, is one of the few relicts of a type of forest formerly distributed throughout the world. Only about a dozen species exist to-day, which are confined to very restricted areas in Chile, Brazil, Australia, and a few of the Pacific islands to New Guinea. The fossil records show that forests of the Araucaria type probably existed in Paleozoic times and were widely distributed and comparatively abundant during the Mesozoic era. During the Jurassic, these trees flourished in what is now Great Britain, France, India, and southern Africa, among other localities. In the Cretaceous, they were growing in the Western Hemisphere from New Jersey and the Dakotas to Patagonia. * * * The tall, straight trunk of the Araucaria makes splendid lumber and this tree is the most valuable timber in Chile. Because of the scarcity of large limbs, the Araucaria gives a very high yield per tree of merchantable timber.

Describing the tree as seen in his recent travels as a member of the Otteley-Anthony South American Expedition, Mr. Anthony writes:

The Chilean Araucaria (*Araucaria imbricata*) looks like something out of the past, at least to northern eyes. At a distance the fully grown trees appear to be large palms, with all the limbs confined to a crown carried on a straight columnar trunk. This is the species known to the nurseryman and florist as the monkey-puzzle. Before visiting Chile I had supposed that the feature which puzzled the monkey was the close arrangement of the limbs, a not particularly disturbing tangle for an active animal like the monkey. Inquiry

in the region where the trees grow provided another explanation. The monkey is puzzled because of the stiff, spiny character of the foliage, which tips upward. The monkey might climb the tree without pricking itself, but would be in a quandary when descending against such an array of points. This foliage is stiff enough to pierce clothing and draw blood if one carelessly brushes against it.

The Araucaria forest in Chile is restricted to a small area in the Nahuelbuta range (a coast range), about 37° south latitude, and a rather larger stand in the main cordillera of the Andes between 37° 30' and 40° south, where it occurs in a narrow strip little more than 100 kilometers wide and between the altitudes of 600 and 2,000 meters above sea level. The expedition camped and collected mammals in both forests.

* * * Our tent was pitched in a small grove of Araucaria atop a low hill. There was considerable similarity to a pine forest in the vista of clean, rough-barked trunks, in the litter of needles underfoot, and in the noise of the wind through the tree tops. But there was a vicious note to the souging of the wind, a cutting quality to the rush of the air through the keen foliage overhead, that seemed more in keeping with the rugged character of the trees themselves. The Araucarias did not give pliantly to the breeze, like pines; their stiff foliage cut the wind and let it whistle past, and one might imagine that to these survivors of more strenuous epochs a little wind was nothing—in the struggle for existence the species has seen millions of years of winds.

The forest of the Nahuelbutas is not a pure stand of Araucaria. There is a large admixture of deciduous trees, mostly varieties of the southern beech, *Nothofagus*. These beeches are fine, large trees, with thick foliage, and are often draped with long streamers of gray Spanish moss. * * * The Nahuelbutas are squirrelless, although the seeds of the Araucaria would be a favorable food supply. These seeds are large, much larger than those of any of our pines, and are edible for humans. The Araucarian Indians in the past gathered them regularly when the cones ripened. The trunks of the Araucaria are rather too large to climb easily; one I measured near camp had a circumference of 12 feet 2 inches, at a height of 5 feet above the ground.

A series of excellent photographs by the Ottley-Anthony South American expedition illustrates the article.

New Bulletin Gives Results of Studies of Air Seasoning

The sawmill owner with a stock of millions of feet of lumber in his yard and the farmer with a few hundred green fence posts will each find useful wood-drying facts in a new Government bulletin, *The Air Seasoning of Wood*. J. S. Mathewson, of the Forest Products Laboratory, is the author.

The new bulletin is based on the results of research conducted by the Forest Service at the Forest Products Laboratory, Madison, Wis., and elsewhere. It outlines basic principles of wood drying and shows how they apply to the air seasoning of boards and planks, dimension stock, lath, crossties, poles, posts, timbers, cordwood, cooperage, and veneer. It discusses the

variations observed to occur in rate of drying and in final moisture content according to climate, time of year, kind of wood, thickness of stock, locality of growth, yard location and arrangement, and piling method.

While the supply lasts Technical Bulletin No. 174, *The Air Seasoning of Wood*, can be obtained free from the Department of Agriculture, Washington, D. C.

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