

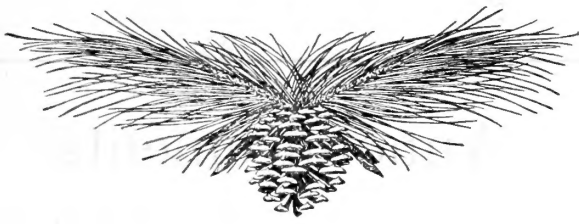
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FOREST WORKER



March, 1933

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UNITED STATES DEPARTMENT OF AGRICULTURE

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Announcements

Fifth Pacific Science Congress

Resumption of plans for the Fifth Pacific Science Congress, postponed from 1932, has been announced by the National Research Council of Canada. The meeting will be held in Victoria and Vancouver, British Columbia, between June 1 and June 14, 1933. During the week following adjournment of the sessions of the congress, excursions will be arranged through the western part of Canada.

An invitation to participate in the congress has been extended by the Canadian Government through the National Research Council of the United States to the scientific societies and institutions of the United States.



The National Academy of Sciences will hold its annual meeting in Washington, D. C., April 24-26, 1933. The sessions will be held in the academy building, 2101 Constitution Avenue.

Western Forestry and Conservation Association Meeting

Lumbermen, foresters, and public land officials of all the Western States and British Columbia have been invited to meet under the auspices of the Western Forestry and Conservation Association in Seattle, Wash., March 22-24, 1933, to discuss problems of forest land management in the West. The program includes discussions of cooperative protection problems, use of public unemployment relief funds, and readjustment of forest land ownership necessitated by the growing area of tax-delinquent land.



Two sections of the Society of American Foresters, the California and the North Pacific, are scheduled to meet with the Pacific Division of the American Association for the Advancement of Science at its seventeenth annual meeting, to be held June 12-15, 1933, in Salt Lake City, Utah.

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State Forestry

Organized Suppression Crews Prove Advantageous in Oregon

By E. H. MACDANIELS, United States Forest Service

Increased efficiency and reduced costs are two of the advantages gained through the use of the organized fire suppression crews with which five county fire patrol associations in Oregon have replaced the old system of hiring fire fighters hit-or-miss in an emergency. Better personnel may be obtained when only able men of known responsibility need be hired. The motive for setting fires to get work or for prolonging fires is eliminated, and the number of incendiary fires is consequently decreased. Protection costs may be reduced by use of the crew on improvement work and reduction in the number of wardens.

The first of the private patrols in Oregon to use organized fire suppression crews in addition to the wardens usually employed was the Klamath County Fire Patrol Association. Following the practice of the Federal Forest Service in its use of road and improvement crews, a system of protection motor ways was laid out and a crew of 8 to 12 men was employed and equipped with a Cletrac, a V-drag, and a truck big enough to carry both men and equipment. Improvement work began at the opening of the active fire season, which in Klamath County is ordinarily early in July. The tractor and drag were used in road construction; upon notice of a fire about 10 minutes were required to load them onto the truck and get started. The practice of taking the machinery to every fire was followed. Runs of more than 70 miles were occasionally made. The effectiveness of this crew and its equipment is estimated to be equal to that of 50 to 100 men who must be assembled and supplied with hand tools, camp outfit, and the other necessities after the fire is reported. With some modifications, this plan has been followed since 1927.

In 1928 or 1929, a similar plan was taken up in Josephine and Jackson Counties, which are State patrol units, and in both of which incendiary fires are the chief cause of trouble. Large areas of old burns, covered with highly inflammable grass and brush, make up a good part of the lower foothill lands in these two counties. Fires start easily, spread fast, and extra

quick action is called for to keep them to small size. Less importance is attached to improvement work in these units. The hazard justifies keeping the crews at headquarters and ready to go during most of the season. A couple of light cars of the pick-up body type are used in each unit. Boxes filled with hand tools provide seats for four men. By the time the report of the fire is complete, the car is on the way, without too much attention to the speed laws.

In these two units many fires are believed to have been set and kept going in order to get work. Since the crews take care of all fires, this motive for setting new ones is removed, and no member of any permanent suppression crew has yet been suspected of throwing fire over the line in order to make the job last longer. There is every incentive to put it out quick and resume the pinochle game where the alarm interrupted it. No estimate can be made of the saving from removing a part of the motive for setting fires, but it must be substantial.

The Douglas County Patrol Association has nearly a million acres to protect. Much of it is grass and brush foothill land, similar to that farther south, in the above-mentioned units. Higher in the hills large areas of Douglas fir forest have been burned. In this type, values are high and suppression is expensive. Since about 1928, the association has employed a suppression crew of 8 to 20 men beginning early in August. In an ordinary season there are enough of what might be called routine fires to keep the crew busy all the time, and except on a few days during the height of the season they handle everything that comes up. Fire fighting, therefore, is mostly paid for by the month instead of by the hour, which is an additional item of saving. On foggy days and cool mornings the crew builds roads and trails on routes close to a telephone line, with a portable phone to keep them in close touch with headquarters.

In this unit, the plan of a central suppression crew started from the observation by the warden that three or four men hitting a fire together can usually get better results than one man who gets to it a little earlier, and the obvious fact that time and transportation are saved by starting the crew from one place instead of individual wardens coming from scattered stations. The only members of the Douglas

County crew not immediately available in one place are the lookouts, a few men who for convenience in issuing permits or for the effect on the residents are stationed in selected areas, and two men who are stationed at the entrance to an area where pack animals must be used. The old-time practice of stationing wardens all over the unit so that if a fire started in any district the local warden could put it out is definitely abandoned. The association would not consider going back to the old plan.

The Coos County Fire Patrol Association protects a little less than 1,000,000 acres. Extensive logged or burned areas, a population scattered through a large part of the timbered region, the conflicting uses of grazing and hunting, and much unemployment, made a burden that could be handled only with difficulty. During the 1932 season, beginning August 3, three suppression crews of 10 men each were employed at an average rate of \$35 per month and board. From that time on they were engaged every day and most nights by the 250 fires, more or less, which occurred before the October rains.

Mississippi Relief Project Increases Protected Forest Area

By the use of relief funds to pay unemployed men to act as forest fire wardens, Mississippi has put into operation a plan which should greatly aid prevention and control of woods fires in the State. This work has been undertaken in eight counties—Attala, Benton, Choctaw, Clarke, Copiah, Holmes, Lauderdale, and Newton, mostly in central Mississippi. The State's protected area has been increased by 2,500,000 acres during the past few months, making a total area of 3,500,000 acres of potential forest land in Mississippi now protected from fire. Protection activities have heretofore been limited to the southern portion of the State.

The men are appointed at 5-mile intervals throughout a county, each one being responsible for the protection of about 10,000 acres of forest land. They are carefully selected by county supervisors and relief workers with the understanding that they may be replaced if found unsatisfactory by the State Forest Service, whose officers supervise the work. The duties of the new wardens are: To make contacts with the people in their districts with the object of obtaining the signature of every one to a volunteer forest protection agreement; to patrol the district; to fight fires; and to keep alive interest in protection. Each warden is paid for 8 to 12 days' work per month. Instructions and materials, including report blanks, are furnished by the State forest service. Work has been provided for about 300 men.

The wardens are meeting with success in obtaining signatures to the protection agreement, not more than 2 per cent of the people approached having refused to

sign. Each person who subscribes to the agreement receives a card stating that he is a registered forest protector in Mississippi for the year 1933. Practically all the residents, white and colored, of the counties participating in the project will have the need of care with fire brought to their personal attention, and it is expected that as a result the fire records of these counties will be greatly improved this year.

Need of Forests Stressed at Land Use Conference in New Jersey

That maintenance or restoration of forest cover is the fundamental necessity in formulating a land-use program was the outstanding conclusion of a conference held at Rutgers University, New Jersey, December 21, 1932. This meeting was the first of a nation-wide series of land-use conferences to be held by the land-grant colleges of the several States as recommended by the Association of Land Grant Colleges in recognition of the vital need for a definite program of land use throughout the United States.

More than 250 representatives of agriculture, forestry, wild life, and civic and business interests met at the conference and discussed such topics as farming and forestry, water supply and wild life, soil erosion, recreation, tax delinquency, and financing. The function of forests in reclaiming idle land, balancing land use, protecting soil, wild life, and water, and solving the problem of waste areas was stressed by all interests represented. It was agreed that the great areas of wild land, abandoned farms, and marginal or sub-marginal land should be taken over and administered by the public.

The program for the State of New Jersey, sponsored by the New Jersey Department of Conservation and Development, calls for the acquisition by the State for State forests of at least 200,000 acres of wild land—one-tenth of the total woodland area of the State. Acquisition of this land is going forward as rapidly as funds permit.



The total forest area burned in Alabama during 1932 was 1,433,345 acres, or 6.4 per cent of the total of 22,427,000 acres of forest land in the State. On the 9,165,000 acres on which the State provided a certain degree of protection against fire the percentage burned was only 2.75 per cent, while of the remaining 13,262,000 acres, 8.9 per cent was burned, reports the State forester.



At an average cost of \$10.65 per acre, 1,036 acres in the Pennsylvania State forests were planted with 1,308,275 trees in 1932. In addition, 1,600 pounds of seed and 844 bushels of walnuts and acorns were sown in the four State forest nurseries.

Florida Trying Out New Protection System

A variation of the usual patrol method of forest-fire control, called the "retained warden bonus system," is being tried out this year by the Florida forest service. The new system has been installed in two protective areas and is expected to aid in overcoming the difficulties encountered in protecting forest land where the local inhabitants manifest little interest and often outright antagonism toward any effort to control fires.

The plan, which was originated by District Forester R. R. Whittington, of Panama City, Fla., provides for a protective area, in charge of a ranger, divided into warden districts ranging in size from 200 to 2,000 acres. The most desirable resident of each district is selected for appointment as retained warden for one year. His duties are to patrol his district, to prevent and suppress fires, and to assist neighboring wardens in fighting fires. Compensation is divided into monthly payments on the basis of one-half cent per acre per year for the land under his protection, as a retainer fee, with a bonus of one-half cent per acre additional for each month during which less than 3 per cent of his district burns. If at the end of the year less than 3 per cent of the district has been burned during the entire period, another bonus of an additional one-half cent is given; and if no fires whatever have burned on his land during the year, he receives another one-half cent per acre. The total compensation possible is, therefore, 2 cents per acre for the year. Although for his year's work the warden may receive only \$8 or \$10, this sum is not insignificant when compared with the returns from a small field of cotton, corn, or tobacco.

Under this plan the ranger, who is equipped with a fire truck, assists the wardens in suppression work as much as possible and encourages cooperation between them.

Sample Plots in Connecticut Contest

A contest which brought to light 10 interesting small forest plots was held in Connecticut last fall. The plot selected as best by the judges—W. O. Filley, forester of the Connecticut Agricultural Experiment Station; R. M. Ross, secretary of the Connecticut Forest and Park Association; and A. F. Hawes, State Forester—belongs to Charles Gold, who was awarded a prize of \$10. Arthur Brooks, patrolman, who reported the plot, also received \$10. The prizes were contributed by individuals interested in forestry.

Of the 10 sample plots examined, two were 1 acre each in size and the rest were one-half acre. The winning plot is a 1-acre stand of 251 white-pine and hemlock trees about 120 years old, with an average height of 100 feet and diameters ranging from 11 to 32 inches. The volume is estimated at 60,500 board feet, which is

equivalent to an annual growth of 500 board feet during the entire life of the forest. The trees on three of the other plots had a higher mean annual growth. One of them had produced 51,000 board feet in 80 years, an average growth of 655 board feet annually. All but two of the plots were in Cornwall, Conn.

Texas Forest Service Plants Slash Pines

Sixty thousand slash pine seedlings were planted this winter by the Texas Forest Service on the Kirby Gift Forest, 4 miles south of Warren, in Tyler County, Tex. This 600-acre tract was donated to the Texas Agricultural and Mechanical College by John H. Kirby, of Houston, to be used as a demonstration and research forest.

The 10-month-old slash pines were planted to reforest areas where the natural reproduction of the young long-leaf pine that covers most of the tract was not sufficient to make up a full stand. The seedlings were 6 to 8 inches in height, having been grown in the State forest nurseries near Conroe and Kirbyville, Tex., from seed obtained in Alabama and Florida. They were spaced 6 by 6 feet. The actual planting was done by a crew of 16 men of the locality who were otherwise unemployed.

Although not a native of Texas, slash pine has been successfully planted by the State forest service on various soil types in east Texas to test its adaptability to that region. A 7-year-old plantation of slash pine in a State forest in Newton County showed a growth of one-half inch in diameter during the first six months of 1932.



During the patrol season, June 1 to December 10, 1932, the Los Angeles County Forestry Department handled 471 fires, according to Spence D. Turner, county forester. Fifty per cent of the fires in county territory were controlled within 15 minutes of the arrival of the suppression force and nearly 70 per cent within 30 minutes. The record for elapsed time from discovery to arrival indicates that the crews were on 45 per cent of the fires within 15 minutes and on nearly 75 per cent within 30 minutes.



Of the 2,276 miles of firebreaks built by the State department of conservation in the northern part of Michigan, 1,589 are in the 12 State forests, 454 are in scattered areas, 213 in game refuges, and 20 miles of fire line protect the wooded areas of the State parks. The fire lines are 20 feet wide with a plowed and disked strip 12 to 16 feet wide in the center. This center strip is replowed once or twice a year. The lines serve the dual purpose of stopping fires and providing lanes for fire-fighting equipment to enter the woods.

1932 Additions to New Jersey's State Forests Include Tax-Sale Area

With the acquisition in 1932 of 15,777 acres of forest land, including a 7,000-acre tax-delinquent tract, New Jersey increased its State forest area to a total of 54,143 acres. All the recently acquired areas lie in the coastal plain region of the State and were added to existing forests. No new purchase units were established during the year.

The 7,000 acres of tax-sale land, or so-called tax land, cost the State \$4,767, or 68 cents per acre. Thousands of acres more of such forest land are for sale at low prices by townships in the badly abused and run-down coastal plain region of southern New Jersey. No forest development of the newly acquired tract is contemplated for two years, since at any time within that period the land may be redeemed by the owner upon payment of tax arrears.

State ownership of New Jersey forest lands confers definite benefits upon the townships in which they lie. State-owned land is tax exempt and excluded from the area for which returns must be made by the town to county and State. In addition to this relief, the State pays the township 10 cents per acre annually in lieu of taxes, and this money, unlike tax receipts, is retained wholly by the town for its own use.



At its December meeting, the Michigan Conservation Commission increased the area of the Michigan Forest Fire Experiment Station, administered in cooperation with the Lake States Forest Experiment Station of the United States Forest Service, by the addition of 3,000 acres of adjoining tax-delinquent land. The station now comprises 12 sections, or a total area of 7,680 acres, of which 4,350 acres, or 56.6 per cent, is State owned. As most of the privately owned land is one or more years tax delinquent, it is probable that the bulk of the area will eventually be deeded to the State.

New York Installs Radio Station in Patrol Plane

After a series of tests during the late fall of 1932, New York State has installed in the airplane which is used in State fire control work a 5-meter wave length receiving and transmitting radio station. By the use of this equipment 2-way continuous communication has been successfully maintained for a distance of 50 miles between the plane and a semiportable radio set erected in the Dix Hill fire tower in Suffolk County, N. Y. In the same locality, 1-way communication with the plane has been maintained for a distance exceeding 80 miles.

According to Kinne Williams, superintendent of forest fire control of New York State, a semiportable receiving and transmitting set is to be located in a fire tower, and a third portable set has been obtained by the State for emergency use.



Under a cooperative arrangement between the Maryland State Department of Forestry and Baltimore County officials, a number of unemployed men in that county are working on the Patapsco State Forest, thinning out timber as an improvement measure. Six crews of 15 men work two days every two weeks. The work is under the supervision of David Prince, resident warden, and State equipment is used. In return for their work the men are given credit slips, redeemable in food in a quantity sufficient to last a family one week. The cordwood obtained is distributed to poor families by the county.



In 1922, the New York Conservation Department's tree seed requirements were 400 pounds; in 1932, 8,000 pounds were needed to carry out the State's planting program.

Education and Extension

Planning a Forest for the University of Idaho

By E. A. SHERMAN, United States Forest Service

When Dean F. G. Miller, of the school of forestry of the University of Idaho, turns from his desk and looks out of his office window, his eyes rest on the timbered south slopes of a range of hills known as the Moscow Mountains. These constitute a short secondary

range, running east and west almost at a right angle to and fairly well detached from the main mountain mass occupying the central and northern parts of the State. The most striking feature of the range, Moscow Mountain proper, is only 12 miles in an air line from the dean's office. The area is unusually productive, with a fertility carried to it in wind-borne soils from the famous Palouse region. The total area comprises 65,753.62 acres and is divided naturally into two rather distinct units, the Moscow Mountain unit, containing

35,410.79 acres, and the Potato Hill unit of 30,342.83 acres. All the principal commercial forest types are well represented, with acreages as follows: White pine, 14,080; ponderosa pine, 20,000; larch-fir, 28,710; Douglas fir, 1,390; cedar-white fir, 700. It would be hard, the dean believes, to find a more nearly ideal set-up for a university forest.

To obtain this area for the Idaho School of Forestry as a field laboratory to be studied, protected, developed, and managed by his students has long been the dream of Dean Miller. Two steps toward the accomplishment of that ambition have recently been taken. In 1932 the Forest Development Co. donated to the university about 3,650 acres of forest land on Moscow Mountain. This area is already in use by the forest school and forms a nucleus for the projected forest. The second step was taken on January 13, 1933, when Representative Burton E. French, of Idaho, introduced in Congress a bill which, if enacted into law, will enable the State to acquire for its university the entire forest area in question.

The plan which passage of the bill will further is based upon the fact that the State of Idaho owns large acreages of land within the boundaries of the national forests in the State. The bill authorizes the Federal Government to acquire privately owned lands within certain described sections in the Moscow Mountains region and extending northeastward of that region to the Palouse division of the St. Joe National Forest and southward to Potato Hill (a landmark of some local prominence). Boundary lines are to be so drawn as to exclude farm lands and settlements and all land having substantial agricultural potentialities. The Federal Government would acquire these lands with the ultimate object of exchanging them for an equal value of the lands owned by the State within the boundaries of national forests.

It may take many years to round out the entire project, as a great many small ownerships are involved. Meanwhile, the State and the Federal Government already own a part of the land. In addition to the tract donated to the university, the State owns 8,029 acres within the boundary limits of the two units, and the Federal Government before long will come into ownership of about 9,000 acres, 200 from the public domain and the balance from pending donations, making combined State and Federal holdings of approximately 20,000 acres.

The exact terms of the final exchange transaction between the State and the Forest Service will be worked out after the Federal Government has completed the work of consolidation and the State authorities have been empowered to make such an exchange.



Chamaecyparis is represented in the Wooster Arboretum of the Ohio Forestry Department by 26 species. Seventeen yews and six hemlocks are growing there.

Cornell Forestry Department Reorganized

Undergraduate instruction in professional forestry is to be discontinued at Cornell University as the result of action taken by the board of trustees at a meeting held in Ithaca in February. With the beginning of the next academic year, 1933-34, undergraduate students will no longer be received as candidates for a degree in forestry, and after June, 1936, all undergraduate courses in professional forestry will be discontinued. The students now registered in the classes of 1933-1936 will be carried through to graduation with the B. S. degree.

The faculty members of the Cornell department of forestry will after 1936 devote almost their full time to research and to the teaching of graduate students, candidates for advanced degrees. Only such undergraduate courses in farm forestry as may be required to round out the agricultural curriculum will thereafter be offered by the department. Extension work in forestry will also be continued.

High School Group Forms Forestry Club

A forestry club was organized last fall at the Flushing High School, Flushing, N. Y., and an active program of forest work undertaken. Among the club's projects is the planting with forest trees of an area of grassland in the Alley Pond Bird Sanctuary under the direction of a professional forester. A thousand black walnuts obtained from the American Nut Tree Planting Association have been planted by the club, and 30 seedlings from the Syracuse Forest Extension Service form a demonstration planting. Members have also pruned and improved a stand of trees on the school grounds.

An exhibit on "Forest Enemies," prepared by the club after many field trips and extensive preparation, was entered in the Children's Science Fair at the Museum of Natural History in New York City and was awarded the first prize of \$25. The prize money will be used for purchasing nature-study equipment for the club.

New York State College Has Full Registration

Out of a total of 388 applicants for admission to the New York State College of Forestry, Syracuse University, last fall, 150 were tentatively accepted and 144 actually registered. A new system of selecting applicants was put into effect for the present academic year by which all applications were held until July 15, when selections were made for the entire freshman class. All those accepted had good scholastic records in their preparatory schools.

The 404 students registered at the college this year are classified as follows: 25 graduates, 57 seniors, 79 juniors, 96 sophomores, and 144 freshmen.

Welfare Activities of Michigan State College

A thinning operation carried out by the forestry department of Michigan State College on a portion of the Dunbar Forest Experiment Station near Sault Ste. Marie, Mich., just before Christmas, yielded 1,500 Christmas trees. The thinning was made primarily for the purpose of reducing overstocking in balsam and spruce stands. About 5,000 trees, averaging 6 feet in height, were cut. The 1,500 which were suitable for Christmas trees were trucked to the Lower Peninsula and given away to welfare organizations in the larger cities of the State. No attempt was made to sell them, not only because of their value as gifts to those who could not afford to buy Christmas trees but also to avoid competition with people in need of the money from the sale of trees.

Trucking these trees 400 miles cost approximately 4 cents apiece, half of the cost being borne by the taxpayers and the other half coming from private contributions. A sign displayed on the truck read: "These Christmas trees cut as a thinning in the practice of forestry to improve the forest," and each tree bore a tag explaining that "This tree was cut from the Dunbar Forest Experiment Station of Michigan State College for the purpose of improving the forest and increasing the growth and quality of the trees left standing. This tree has been inspected by the State Department of Agriculture, and declared apparently free of dangerous insect and disease pests."

Welfare labor from Sault Ste. Marie and the vicinity has been employed to cut approximately 1,000 cords of overmature hardwood in the experiment station forest. A number of large decaying maples were removed that had been crudely tapped for syrup many years ago by Indians. Several young men, otherwise unemployed, are carrying on experimental work under the station's two technically trained foresters in return for their board.

Wyoming Tree Distribution in 1932 Sets State Record

During 1932, 407,774 trees and shrubs were planted in Wyoming, writes W. O. Edmondson, extension forester. This total, the largest recorded in the State in any one year, includes 240,000 planted in nurseries in about 40 towns and cities of the State as George Washington Bicentennial plantings. These are to be set out in one to four years in memorial parks, along highways, and in school and State institution grounds.

Trees distributed in the State by the University of Wyoming under the Clarke-McNary law, from the Northern Great Plains Field Station at Mandan, N. Dak., and by the Central Great Plains Horticultural Investigations Station at Cheyenne, Wyo., totaled 167,774 during the year. These were used primarily

in the establishment of farm shelter belts, windbreaks, and wood lots.

A high percentage of survival has been shown by all trees planted in Wyoming in the 1932 season. The survival of the trees and shrubs planted in nurseries is about 92 per cent for the first year. Records of the Clarke-McNary plantings give an average survival of 89 per cent for all species. The minimum percentage recorded was 67 for ponderosa pine. American elm, boxelder, Caragana, Chinese elm, green ash, northwest poplar, Russian olive, and willow each showed a survival of more than 90 per cent, and blue spruce and cottonwood of 87 per cent.

Oregon 4-H Forestry Club Work Expanding Rapidly

By LYNN F. CRONEMILLER, State Forester, Oregon

Since the organization of the first 4-H forestry club in Oregon, in 1931, the total number of such clubs had grown by the end of 1932 to 48 with an enrollment of 428 boys and 71 girls. A 4-year project that will give club members a general understanding of forestry and some of its problems has been outlined for the clubs by the State club leader in cooperation with the Federal Forest Service and the State forester.

When a club is organized a local leader is appointed and officers are elected by the members. All work is carried on through the county club leader or county agent, and the nearest State fire warden or national forest ranger cooperates by seeing that the club has all the help necessary to complete its project. A tract of land must be available for the club's use, either its own or one assigned to it on a near-by national forest.

A typical club is that in Tillamook County. A tract of 80 acres of tax-reverted land suitable primarily for growing trees has been given it by the county court. Since the club can not hold title to this land, it is to be transferred to the American Legion Post at Tillamook, which will hold it for the club members as long as they carry on the 4-H forestry project. Should the work be discontinued at any time in the future, the land will revert to the county.

The tract is situated about 5 miles from the town of Tillamook where most of the club members live, and 10 miles from the Pacific Ocean. It contains 40 acres of Sitka spruce and western hemlock 12 to 20 inches in diameter, 15 acres of mature red alder, a considerable number of cascara trees, and an area of open fern land which has been periodically burned in the past.

Taxes and fire-patrol assessments must be paid by the club. To meet these expenses, some of the red alder, which is selling for \$6 a thousand board feet at a near-by mill, and some of the cascara can be sold. Later on, the spruce and hemlock can be cut. The land is classified under the Oregon law as reforestation land, and is taxed at 5 cents per acre per year and 12½

per cent of the unit market value of all forest products harvested. The fire patrol fee should not be more than 5 cents per acre additional. The club members are carrying the same responsibility as a private owner, and are thus learning something about forest taxation.

The club has reconstructed a mile of old road and built half a mile of new trail. Plans for a cabin are under way and some logs for it have already been cut. Last year 2,500 trees were planted, including black locust, green ash, Scotch pine, ponderosa pine, European larch, and Port Orford cedar. The last two species have shown more than 90 per cent survival. All the trees planted by 4-H forestry clubs are furnished from the State nursery at Corvallis.

Each member of a club in Oregon is required to prepare a forestry exhibit to be shown in competition at the county fair. The winning exhibits are sent to the State fair at Salem. At the 1932 fair the American Forestry Association awarded a placque to the outstanding club and medals to the outstanding boy and girl. The Oregon State Board of Forestry gave \$100 in prizes and sent the winning member in each division to the 4-H school at the Oregon State College for two weeks with all expenses paid.

Arboretum Acquired by the University of Pennsylvania

Two estates at Chestnut Hill, Philadelphia, Pa., on which a collection of trees and shrubs was established by the late John T. Morris with the cooperation of C. S. Sargent and the Arnold Arboretum of Boston, have been left to the University of Pennsylvania to be maintained as an arboretum. The will of Lydia Thompson Morris, who left the land to the university, also established the Morris Foundation with a liberal endowment for the support of the arboretum.

On the 170 acres included in the bequest are specimens of trees from many parts of the world. The collection of conifers is exceptionally fine, including Asian, African, Australian, and European species, as well as some rare evergreens of western North America.

In carrying out the wishes of Miss Morris for the administration of the arboretum, a number of graduate fellowships have been provided by the Morris Foundation for students working for higher degrees in botany. A stipend of \$1,250 is granted with each appointment. Awards for 1933 were to be made in February.

Syracuse Offers Annual Course in Kiln Drying

The fourteenth annual short course in dry kiln practice will be given by the New York State College of Forestry at Syracuse, N. Y., March 20-29, 1933, inclusive, with Prof. J. O. Blew in charge.

It is the purpose of these short courses to present to the wood-using industries available information on proper kiln construction and operation and the latest scientific methods in kiln drying. In addition to lectures and discussions, students have the opportunity to season lumber in the up-to-date kiln operated on the college grounds. The course is attended by mill owners and superintendents, kiln operators, architects, and others concerned with the problems of lumber seasoning and wood use.



Thirty-five students are enrolled in the Yale School of Forestry for the present academic year, 29 of them candidates for the M. F. degree next June. Twenty-one institutions are represented, Maine heading the list with 5 graduates and Yale having four. Students of forestry in the graduate school number 15, all but one of whom are working for the Ph. D. degree.

Forest Service Notes

Planting Problems in the Virgin Islands

By E. V. ROBERTS, United States Forest Service

Planting activities were undertaken in the Virgin Islands by the United States Forest Service early in 1931 in order to determine the possibility of replacing worthless bush land, which constitutes approximately 25 per cent of the land area of the islands, with forest trees of commercial value and to encourage through demonstration and experimentation the planting of trees for windbreaks and pasture shade.

As the entire project was essentially a planting job, the first necessity was to secure seedlings. It was impracticable to attempt to establish a nursery on the

islands because of water conditions—the only fresh water there is cistern water, there are no running streams, and well water has such a high salt content that it is injurious to vegetation. Therefore, an arrangement was made with the Puerto Rican Forest Service whereby seedlings were mailed from the Puerto Rican nurseries at cost plus transportation charges. The trip takes less than a day by steamer, and the seedlings arrived in excellent condition.

It is essential that seedlings establish sturdy roots as quickly as possible to resist the periods of drought to which the islands are subject. Potted seedlings were therefore used for planting stock. On the two larger islands, St. Thomas and St. Croix, sheds were erected

where seedlings could be potted upon their arrival from Puerto Rico and where they could be cared for until ready for planting. Each shed was 72 by 48 feet, with concrete floor, and lath sides and top giving about 50 per cent shade. The seedlings were received in lots of 3,000 to 5,000 and were promptly heeled in at the sheds, to be taken up in small quantities as the potting work progressed. The pots used were of heavy treated paper, folded, and when opened were 1½ inches square by 6 inches high and bottomless. One man could pot about 350 seedlings in an 8-hour day. The seedlings rooted quickly and were ready for planting within a month.

The first Forest Service plantation was on a tract of 25 acres of bush land adjacent to the town of St. Thomas. So thick was the low, thorny foliage in this area that it was necessary to clear parallel trails with machetes for planting and for transporting the seedlings. Men with mattocks followed the trail swamper and dug holes, but no seedlings were planted until moisture conditions became favorable; then the entire crew would work until the prepared area was planted. Three days of clearing were required to provide sufficient area for one day of planting. Heavy rains during the planting season were extremely beneficial to the seedlings but also encouraged the growing of the bush species to such an extent that it was necessary to make a release cleaning within a month after completion of the planting work. Two more thinnings were made in the next three months.

Approximately 8,000 trees of mixed species were planted on this area, an average of 320 trees per acre. Costs were unusually high, as it was the first planting to be done on this type and the system had to be worked out and developed as the work progressed. The total cost per thousand trees planted was \$78.47, and the cost per acre \$24.74. In future plantings a saving of at least one-third could be made in the planting costs, but even so the cost would be beyond that warranted by the expectation value of the plantation when the uncertainties of the future are taken into consideration. Prolonged droughts and severe tropical hurricanes are of rather frequent occurrence in the islands and cause heavy losses in the forested areas, particularly of the desirable species. With such threats against the survival of plantations and the initial high cost of establishment it was not deemed practicable to continue the attempt to establish forests in the bush type. Planting activities by the Forest Service in the Virgin Islands were discontinued July 1, 1932.

The windbreak and pasture-shade experimental plantings were much more successful and gave promise of supplying a real need on the islands. The constant northeast trade winds, together with high temperatures and a comparatively low humidity, result in an excessive evaporation throughout the islands, producing semiarid conditions in the more exposed areas. In an effort to reduce the evaporation rate somewhat a system of windbreaks consisting of several rows of hardy, fast-growing trees has been developed. Similarly tree

planting is recommended on the extensive areas of pasture lands, to reduce the wind velocity and to provide partial shade for both grass and cattle. The Forest Service plantations in these types of planting were important in determining the best species to be used and the technic of planting, and also served as practical demonstrations of the value of such plantations.

Potted seedlings for all types of planting were furnished free of charge to the people, approximately 10,000 plants being distributed in the first year of operation.

A large number of species was used in planting work at first in order to ascertain those best suited for the various types and sites. In the early bush plantings 14 species were used, with Australian pine (*Casuarina equisetifolia*), rosewood (*Dalbergia sissoo*), West Indian mahogany (*Swietenia mahoganii*), and various species of eucalyptus forming the bulk of the stock. It was soon found that many of the exotics which were very successful in Puerto Rico were not adapted to the peculiar soil and climatic conditions of the Virgin Islands, so that more and more attention was given to the use of native species. West Indian mahogany, although not native, has been long grown on the islands and is outstanding as the best general utility tree for all types of planting. It germinates readily, withstands transplanting well, is very tolerant, and grows fairly rapidly. When mature it is resistant to disease, windstorm, and drought and produces a wood of unexcelled quality. Desirable native trees include the West Indian locust (*Hymenaea courbaril*), thibet (*Albizia lebbek*), raintree (*Samanea saman*), fiddlewood (*Citharexylum fruticosum*), moca (*Andira inermis*), Gregory wood (*Bucida buceras*), manjack (*Cordia*), bay-oil tree (*Amomis caryophyllata*), and several species of mangrove.

The forestry program in the Virgin Islands will be continued by the Insular Agricultural Station, with emphasis on the development of mahogany groves, windbreak planting, and pasture trees. The equipment and property of the Forest Service, including the two plant sheds with a capacity for handling over 100,000 seedlings each per year, have been turned over to the station, and funds have been requested from the Insular Government to carry on the program under the station's supervision.



"Uncle Sam's Forest Rangers," radio drama depicting the work of the Forest Service, having completed a successful year on the air, is to be continued in 1933 under the same arrangements with the National Broadcasting Co. It will be presented in the National Farm and Home Hour program each Thursday at 12 noon central standard time over stations of the National Broadcasting Co. east of the Rocky Mountains and on Mondays in the Western Farm and Home Hour at 12.35 p. m., Pacific time, over stations in the company's western network.

Aviation Activities Important in Region 1

Five projects carried on by the use of airplanes were undertaken in the Northern Rocky Mountain Region of the Forest Service in 1932: Fire patrol; photographic mapping; transportation of freight; count of an elk herd; and a study of insect control.

Air patrol was less used during the 1932 season than in any year except 1927 since its introduction in Region 1. No really critical fire situation developed during the season, and only six actual forest patrol trips, involving 31 hours 25 minutes flying, were made. In one instance, the exact location of a very threatening small fire, which was in doubt, owing to an incorrect map, was promptly discovered by the plane. The ground report of the lookouts was more than a mile in error.

A 4-year program of aerial photographic mapping was set up for this region in 1932, estimates of the cost of which were based on costs of similar work done on the Kootenai Forest in 1930-31. This program is subject to the vicissitudes of the use of planes for fire control work. The plan outlined the photographing in 1932 of 1,075 square miles at an expected cost of \$7,843. The actual accomplishment for the season was more than 3,000 square miles photographed for \$7,446. This was practically three years' work, as called for by the program, at the cost of one. It was made possible by the decrease in costs of flying, film, and photographic prints. The cost of the plane and pilot dropped from \$30 an hour in 1931 to \$16.44 in 1932; film dropped from \$35 to \$30 a roll; and prints from 12½ cents to 8 cents each. In addition to these savings, the substitution of 8¼-inch focal length lens for the 12-inch one formerly used reduced flying time, the number of pictures needed, and the amount of developing, printing, and compilation. A new camera assembly was purchased, the cost of which was not included in the season's aerial photographic expenses. The average cost of the photographs was less than 8 cents per print as compared to 20 to 30 cents formerly.

Howard R. Flint, regional forest inspector, was in charge of the mapping. The past season's experience, he believes, indicates that the future of aerial photomap work in forestry is assured and that its more general adoption is a matter of time and further dissemination of knowledge in regard to it. By no other means can such reliable drainage, culture, and general cover maps be secured at comparable costs or with anything like the accuracy and rapidity of this method. The prints form a reliable and permanent record of the appearance of a definite area of terrain at the time the picture was taken, and the maps compiled from them are superior to those made by any other method.

Aerial transport of forest freight is beyond the experimental stage in Region 1. Its development depends chiefly upon the further reduction of cost and the

provision of greater numbers of negotiable landing fields in the more remote parts of the region. In 1931, 116,000 pounds of freight went to Holbrook Field near Big Prairie Ranger Station in the Flathead National Forest; in 1932, 93,352 pounds. The air service was prompt and satisfactory and made possible early delivery of material for spring work regardless of late snow or high water. The cost in 1932 of 3.8 cents per pound is contrasted with a probable 7 cents for ground transportation.

A unique use was made of aerial transport on the Coeur d'Alene Forest in February, 1932. Three thousand pounds of hay was delivered to snowbound parts of the forest for the relief of starving deer. Small bales of hay dropped from the plane were pulled out of the snow by men on the ground and distributed to the deer.

Count of the Sun River elk herd in the Lewis and Clark National Forest was undertaken in March, 1932. The project was experimental and from the point of view of actual achievement of the purpose was a failure. From the attempt, however, several things were learned, and the project will be undertaken again in 1933. A time will be chosen when practically all the elk are out in the open; a certain type of clear day will be selected for the flight; and a more suitable plane will be used.

Two flights were made in 1932 for the Bureau of Entomology's forest insect field station at Coeur d'Alene, Idaho. Special insect traps were attached between the wings of a biplane, with the object of learning more about the flight habits and migration of *Dendroctonus monticolae*. Results were not conclusive because of the short flying time for which funds were available.

Effect of Forest Cover on Snow Melt

By CHARLES A. CONNAUGHTON, United States Forest Service

An acute watershed problem is presented by the distinctive combination of climatic and topographic features of southwestern Idaho. In this region the productivity of tillable land in the valleys is largely dependent on irrigation water which has its source in the near-by mountains. The ability of a watershed to deliver ample supplies of usable water largely measures its value from an irrigation standpoint, and a large part of this water is derived from snowfall.

In response to recommendations made in 1929 by irrigationists dependent on the watersheds of the Payette and Boise Rivers who believed that drastic restriction of timber cutting and of other forest land uses was necessary to abundant water supplies, a study was begun by the Intermountain Forest and Range Experiment Station on the effect of cover conditions upon the rate at which the accumulated winter snow melted. Five plots were established at McCall, Idaho, in 1931. They were of similar soil, slope, elevation, and exposure and were within a circle having a half-mile radius.

Each plot represented a distinctive condition, including bare ground; sagebrush; a stand of reproduction of ponderosa and lodgepole pine 20-30 feet tall; a typical overmature, clean-floored ponderosa pine stand; and an overmature stand of ponderosa pine with a heavy understory of young growth. To insure exact and uniform measurement of the snow conditions, 15 to 35 snow-measurement stations were established on each plot by a gridiron system, the number of stations varying with plot conditions. Measurements were also made along compass-line survey courses over a large area, along which lines conditions similar to those of the plots were found. Observations at 2-day intervals were begun in the late winter when there was a maximum accumulation of snow. These continued throughout the melting period. Weather data were taken in the open and in the dense timber.

In 1931, a year of light snowfall, the maximum water content of the accumulated snow under the heaviest crown canopy was 73.5 per cent of that contained in the snow on bare ground in the open. This is in contrast with conditions in 1932, a year of average snowfall, when on the reproduction plot the water content of the accumulated snowfall was 95.7 per cent that in the open.

This study brought out sharply the fact that the crowns of the trees had much to do with the accumulation of winter snows. It was found that under the crowns of mature trees the accumulated water content of the winter snow was only approximately 67.4 per cent of that in the open, while under crowns of immature trees (less than 80 years old) the water content of the snow was 78.6 per cent of that in the open. This indicates that the influence of tree crowns is proportional to their size and density. The snow in openings within the forest contained approximately the same amount of water as that in the open field.

Analysis of the records taken at the two weather stations showed that the rate of melting was materially influenced by both temperature and wind and that the effect of a given temperature and wind velocity was the same in the open as in the timber. Correlating these weather factors with periodic water content of the snow it was found that for the two years recorded 91.18 per cent of the variance in the change in water content from period to period was due to variation in temperature and wind, and the remaining 8.82 per cent to other and as yet unmeasured factors. Soil temperature at a depth of 2 to 3 inches under the snow consistently remained between 32° and 33° and did not cause appreciable snow melting.

The retarding effect of the forest cover on the melting of snow was very marked. At the time that the snow disappeared from the bare ground and sagebrush areas, snow which contained 5 to 20 per cent of its total original water content still persisted in the forest. Melting was retarded 3 to 10 days under the forest canopy, the heaviest forest cover holding the snow the longest.

This preliminary study has indicated several facts: Interception of winter precipitation by tree crowns has an important bearing on the water content of accumulated snow; forest cover materially affects temperature and wind, and thereby greatly decreases the rate of snow melt; the snow cover lies longest in the forest; and a sagebrush cover is not much better than bare ground in retarding snow melt.

Freezing Out the Western Pine Beetle

By E. E. CARTER, United States Forest Service

In December, 1924, severe and prolonged cold weather broke up a bad epidemic of the western pine beetle (*Dendroctonus brevicornis*) in *Pinus ponderosa* within the Deschutes National Forest, Oreg., and caused varying degrees of mortality in the broods throughout northern California and southern Oregon. Research by the Bureau of Entomology showed that prolonged exposure to subzero temperatures would cause losses among insects of this species in all of their forms, with practically complete kill resulting from exposure to cold of -10° F. or lower. Insects from the northern portion of the range of the species were more resistant than those from California. Some other species of the same genus, such as *D. monticolae*, were found to be uninjured after subjection to temperatures which killed *D. brevicornis*.

The next low temperatures of similar intensity and length in northern California and south-central Oregon occurred December 9-12, 1932. The effect on known epidemics of the western pine beetle is being carefully studied by officers of the Bureau of Entomology and of the Forest Service. Bark samples from infested trees have been taken to laboratories, carefully shaved to expose the insects in them, and the condition of each insect determined. The results from infested areas where the subzero temperatures were most severe and prolonged indicate that more than half of the insects were killed. Samples collected in January or early February show a higher percentage of mortality among the insects than did samples collected immediately after the cold snap. Also, the insulating effect of thick bark is very apparent in that the kill may have been almost complete along the upper portion of the stem of a tree, where the bark was less than an inch thick, but only 50 per cent or less in the thick bark of the lower stem, as at breast height.

The degree to which this freeze of 1932 has reduced the widespread and destructive epidemics of the western pine beetle in Oregon and northern California can not be fully determined until next summer. However, several insect control projects on the national forests and on private lands have been stopped or will not be started because they are now considered unnecessary. The degree of killing was irregular in northern California and the freeze did not reach the southern Sierra at all, so that control work on an especially bad infestation on the San Joaquin drainage is still essential.

Virgin Forest in Pennsylvania Yields Research Results

By A. F. HOUGH, United States Forest Service

Pennsylvania's original forest growth has almost vanished as the result of clearing for agriculture, commercial logging, and forest fires. In the northwestern part of the State a few remnants of virgin areas yet exist within the Allegheny National Forest. The largest of these is about 6,000 acres of hemlock-hardwood forest owned by the Central Pennsylvania Lumber Co. in Warren and McKean Counties, Pa. In 1930, a 5 per cent strip cruise of 1,200 acres was made on this tract to determine the characteristics of such a forest before it too fell under the ax. A tally of the species, size, and reproduction, as well as the shrubby and herbaceous vegetation, was made by a 4-man field party of the Allegheny Forest Experiment Station. The nature of the topsoil was sampled at 2-chain intervals along cruise strips and photographs were taken of the tract.

The principal species on the area are hemlock and beech, the latter in general forming the understory. Species of less importance, though found in all size classes, are sugar maple, yellow birch, red maple, black birch, and black cherry. More rarely white ash, yellow poplar, cucumber magnolia, basswood, and ironwood are present. Black cherry, white ash, yellow poplar, and cucumber magnolia require light and growing space for their development. Past windfalls and the group-dying of large hemlocks result in opening up the forest so that these species may exist alongside of the hemlock, beech, and sugar maple, which are capable of reproducing under the unbroken shade of a virgin area.

Judging by ring counts on stumps left in the areas already logged, the mature hemlock trees are 250 to 550 years old. This species attains a diameter of nearly 50 inches $4\frac{1}{2}$ feet above the ground and a height of 125 feet. All of the hardwoods, except black birch, basswood, and ironwood, reach diameters exceeding 30 inches and heights of 120 feet.

The soil is a loamy sand or clay loam, often with many sandstone rock fragments, and the top layers are ash-gray in color from leaching by the acid hemlock duff layer. This leaching commonly extends down from 1 inch to 3 inches, but in a few samples leached layers were 6 to 14 inches deep. In humid northern climates this leaching, or podsolization, is a common soil phenomenon, especially under coniferous forests, and may be a severe handicap to the establishment of young seedlings.

When this area is logged practically the same condition will exist as if a tornado had swept away the forest. By noting various stages in the regrowth of past wind-swept areas, the type of forest which will return can be predicted. The young growth of seedlings and older

trees spared by wind or logging are the nucleus of the future stand. In general, all the hardwoods grow more rapidly in the seedling stage than hemlock, and the next crop is almost sure to be made up of a mixture of beech, red and sugar maple, black and yellow birch, black cherry, white ash, and some minor species. Hemlock seedlings of the same age as or older than the hardwoods will be overtopped and it may take a period of 100 or more years before they gradually usurp the place of the hardwoods.

The study of this virgin area has shown that at least three natural tendencies which influence the species and soil of forests must be recognized and taken into account in planning future management:

(1) All the factors of climate and soil are working toward the reestablishment of a forest in which hemlock and beech are prominent species. Under fire protection hemlock will continue to increase in amount, and this important native conifer should be favored in future forests. Beech, however, is less valuable than sugar maple, economically, and special methods of cutting second-growth forests must be discovered in order to discourage beech and secure the establishment of species with greater market value.

(2) By rotating crops of pure hemlock and the hardwoods or by producing a mixed hemlock-hardwood forest, the tendency of top-soil layers to leach will be checked and there will be less chance of a hardpan forming at lower levels. Better tree growth should result from such mixed stands, and proper management will give rapid decomposition of leaf-litter and a less acid soil.

(3) Cutting methods which approach the natural opening of a stand by windfall or decay will probably give best results. A group selection felling or clear cutting in strips or patches (not too large) will perpetuate valuable space-demanding species, such as black cherry and white ash, in almost as great abundance as they now exist in second growth which has followed clear cutting. Shade-enduring beech, hemlock, and sugar maple would eventually crowd out other species unless such a cutting method were used.

Burned Watershed on the Santa Barbara Forest Seeded from the Air

To prevent erosion on 2,000 acres of recently burned, mountainous watershed in the Santa Barbara National Forest, this area was seeded by airplane with mixed mustard and clover seed in November, 1932. The contract for this work was awarded by the Forest Service to the United Air Service (Ltd.), and Hewitt F. Mitchell of that company was assigned the tasks of designing a special seeding hopper, supervising its manufacture and installation in an airplane, and flying the plane for the actual seeding.

Since so far as could be determined mustard and clover seed had never before been sown in this manner

it was necessary to determine the proper type and size of hopper, and to design a shut-off valve to control the release of the seed and a mechanism that would remove the seed from the hopper and spread it evenly below the plane. Similar operations in crop dusting had shown that eddy currents below the plane tend to force the seed back into the hopper.

The airplane used was a standard Stearman biplane with a Wright Whirlwind engine. The hopper was constructed of galvanized iron to fit the front cockpit with the bottom sloping in to a 6-inch by 1-inch opening, running crosswise of the ship, and fitted into a funnel which carried the seed through the floor. A valve, consisting of a sliding plate between two fixed plates, released or cut off the flow of seed, and was operated by a lever from the rear cockpit. The seed was emitted through a Venturi tube below this valve.

Before the sowing was begun, tests were made to determine the most effective altitude from which the seed should be dropped and the correct manipulation of the seed valve. Warren T. Murphy, assistant supervisor of the Santa Barbara National Forest, conducted the ground observations during the tests. An altitude of 300 feet was decided on as giving the best spread of seed. To sow the desired 9 pounds of seed per acre, it was found necessary to open the valve fully.

In sowing the seed, 40 trips were made from the operation base at Carpinteria, Calif., to the Juncal and Agua Caliente areas of the Santa Barbara Forest. The average time per trip was 30 minutes, including the 12-mile flight from the base, the actual seed dropping taking about 5 minutes. About 450 pounds of seed were carried per load, enough to cover 50 acres if evenly distributed, but on Mr. Murphy's advice a heavier crop was sown on the lower, barer areas than on the higher and rockier sites. Four days were required to complete the sowing of the 18,000 pounds of seed provided for the job.

Beetle-Infested Timber Supplies Fuel and Work to Unemployed

By A. C. AUSTIN, United States Forest Service

Fuel for 300 needy families of Missoula, Mont., has been supplied this winter through the removal of beetle-infested timber from the Fort Missoula district of the Lolo National Forest. The district during the past three years has sustained a heavy loss in second-growth ponderosa pine 2 to 8 inches in diameter and an appreciable loss in mature trees as the result of the pine-bark beetle infestation. About two-thirds of the infested timber had been removed by February, and the loss from beetles and from the resulting increased fire hazard should be greatly reduced.

The Fort Missoula district, comprising about 1,250 acres, was set aside in 1878 as a timber reserve for Fort Missoula. More recently the district was trans-

ferred to the Lolo National Forest for fire protection and administration, subject to the needs of the War Department. For the past six years it has been under special-use permit to the University of Montana Forest School for use as an experimental forest and field laboratory. It is under the supervision of the forest school that the unemployed of the vicinity have been permitted to remove and use for fuel the infested timber.

Additional work will be provided for about 250 men for 10 days each through the use of Reconstruction Finance Corporation funds which have been obtained to provide for experimental thinnings on 90 acres of the same forest. Pay for this work is \$3 per day in orders to local merchants for clothing and groceries or for urgent medical attention. It is estimated that about 900 cords of wood will be obtained from these thinnings. Brush resulting from the cutting will be piled and burned currently and the wood left ready for hauling under free-use permits to needy families. The officials of Fort Missoula are cooperating by awarding a contract for cutting and hauling 90 cords of wood from the area for fuel at the fort. Most of this will be obtained from overmature and mistletoe-infested Douglas fir adjacent to the experimental thinnings.

These projects will increase the value of the area as an experimental forest as well as contributing to the welfare of the community.

Both in artificial reforestation and in leaving seed trees for natural reproduction it is desirable to know whether seed from a young tree will produce better seedlings than that from an old tree. To answer this question, among others, seed was collected by the Forest Service in 1921 from both young and old trees in various parts of the Douglas fir region, and experimental plantations were established on four national forests. Height measurements have been made periodically on several thousand of the seedlings, and the results now in process of compilation indicate that the age of the tree from which seed is collected has no effect on the growth and development of the planted seedlings.

Nearly three-fourths of the area burned on the national forests during the 1932 fire season was in California, where one fire alone swept over 220,000 acres in the Santa Barbara National Forest, accounting for more than half the total burned acreage. In all other regions great reductions from the totals of last year were recorded in area burned, suppression costs, and damages. Comparison of the figures for the two years shows: Area burned in 1932, 397,722 acres—1931, 605,073 acres; fire-fighting and protection expenses, 1932, \$986,886—1931, \$4,219,174; property damage, 1932, \$384,355—1931, \$4,409,309.

General Forest News

Unexplained Abnormalities in Forest Trees May Be Due to Virus Diseases

By CARL HARTLEY, United States Bureau of Plant Industry

Although such knowledge as we have of the virus diseases of woody plants has been gained mainly from the more intensively studied fruit trees and shrubs (particularly the stone fruits and brambles), diseases of the virus type are known to exist in two timber species—the sandalwood of India and the locust of the United States. It seems reasonable to suspect that some of the abnormalities of other forest trees may be attributable to this cause.

Numerous infectious diseases of man and animals, and a still larger number in herbaceous plants, have been attributed in recent years to filterable viruses. These are somewhat hypothetical entities which have never been seen and which can be made to pass through porcelain filters without loss of virulence. Their ability to increase and their sensitivity to heat would indicate that they are living organisms. However, they are more resistant to both heat and poisons than are most living things, they can not be grown on artificial media, and there is some support for the view that they are inanimate chemical products of the host tissues.¹ Yellow fever, smallpox, foot-and-mouth disease, hog cholera, the wilt disease of the gypsy moth, mosaic diseases of various plants, and the degeneration diseases that give rise to the belief that potato varieties "run out," are among the well-known disorders for which viruses are accepted as causal agents. Even the bacteria are subject to virus diseases, if the belief of a number of investigators of bacteriophages is correct. The recognition of virus diseases in crop plants has made it possible to explain many cases of subnormal yield that had previously been laid to physical, chemical, or genetic factors. It may be that some of the variability, abnormality, and mortality in trees which now vex foresters are caused by viruses.

In none of the woody plants studied has it been possible to transmit virus diseases by transfers of expressed sap; successful experimental transmission has depended on actually grafting or budding tissue from a diseased plant on a healthy one. The filtrability of the supposed viruses of woody plants has, therefore, yet to be demonstrated. For both herbaceous and small woody plants, sucking insects appear to be the principal agents of natural spread; the discovery of transmission by leaf-hopper of the peach "yellows" which ruined many peach orchards during the closing years of the last century has just been announced by

Kunkel. This is the only case in which the natural transmission of a virus disease of trees has been found.

The best-known disease of this type in forest trees is the spike disease of sandalwood, described in the September, 1932, issue of the *Indian Forester* as one of India's major forest problems. It has been made the subject of special annual conferences in that country, the seventh of which was held in 1932. The presence of the spike disease reduces the sandalwood output by about half. Its transmissibility by grafting was demonstrated in 1917, and the technic of experimental transmission has now reached the point where only a few milligrams of diseased tissue need be used if a true union with the stock takes place. Much effort has been expended on the search for insect carriers, but the method of natural transmission remains to be determined. The situation is complicated by the fact that sandalwood is itself a parasite on the roots of other plants. Sreenivasaya² states that the disease is particularly destructive where species of legumes are serving as hosts for the sandalwood; when attached to certain nonleguminous hosts the sandalwood is nearly immune.

In view of the foregoing, it is interesting, though probably a mere coincidence, that the only other timber species on which a disease of the virus type has been described is leguminous. A systemic disease of *Robinia pseudacacia* already recognized by a number of foresters appears to have been the first disorder of this type reported on a timber-producing species, attention having been called to it in a brief and generally ignored note in 1898. The disease is characterized by the development of conspicuous witches' brooms—clusters of twigs bearing large numbers of very small leaves. These usually develop from exposed roots or at the tips of 1 to 2 year old sprouts. Brooms sometimes break out in the crowns of older trees, developing mainly in the late summer after normal growth has ceased for the season. Trees live only a few years after the first appearance of brooming in the crown. Evidence of the graft transmissibility of the disease and citations to some other literature on virus diseases of woody plants are given by Jackson and Hartley in the January, 1933, issue of *Phytopathology*.

It is believed that the recently recognized "phony" disease of the peach, described by L. H. Hutchins in the United States Department of Agriculture Yearbook for 1927 (pp. 499-503), and proved infectious by him, is particularly significant for forest pathology. It represents for woody plants the obscure type of virus disease that must be kept in mind in any thorough examination of puzzling cases of abnormal or subnormal plant

¹Schultz, E. W.: The Ultrascopic Viruses from the Biological Standpoint. *Scientific Monthly* 31: 422-433. 1930.

²Sreenivasaya, M.: Present Position of the Problem of Spike Disease. *Current Science* 1: 126-127. 1932.

growth. The infective principle in this disease is entirely limited to the root, though the effects appear in the top. The symptoms are not so conspicuous and easily recognized as are those of the locust disease. Diseased trees differ from normal by having leaves of a darker green, fewer and smaller fruits, shorter and more numerous twigs, narrower annual growth rings, earlier blooming, and later leaf fall. As with the locust disease, the difference between normal and diseased trees is most conspicuous under conditions that favor vigorous growth. Doctor Hutchins states that incipient cases can be diagnosed with certainty only by applying a chemical reagent to the wood of the root. Diseased trees live as long or nearly as long as those not infected. Although they lose their profit-producing capacity, the departures from normal growth habit are so slight that for 40 years the poorer yield was attributed to other causes. With a species less intensively cultivated than the peach, the trouble might easily have gone for a century undetected.

It is evident that symptoms as inconspicuous as those of the phony disease can be recognized only by men who are thoroughly acquainted with the normal aspect of the tree. The forester, in the nature of things, is particularly familiar with the timber species of his region and is in a good position to detect suspicious conditions. It is probable that some of our forest tree groups, like the citrus and pome fruits, have no virus diseases that can be readily detected, but among the many species of commercial trees careful search should discover numerous abnormalities of the virus type. Mottled or otherwise unusually colored leaves, curling or crinkling of leaves, marked changes in habit or rate of growth, growth at abnormal times of year, and particularly the shortening and multiplication of twigs, are to be viewed with suspicion when they can not be correlated with soil or weather conditions, and especially if two or more such symptoms appear in association. Symptoms due to virus infection commonly appear almost simultaneously in different parts of the plant, so that troubles limited to certain branches are usually due to other causes. A generally poor condition of a tree is reason for suspecting virus disease only if there is considerable difference between adjacent uncrowded trees of the same age and under the same conditions; uniformly subnormal growth of an entire stand of seedling origin or suppression of individuals in a crowded stand would not justify suspicion of virus activity; sudden death of otherwise normal-appearing trees should not be suspected of resulting from virus infection; and in no case can a condition be finally accepted as a virus-type disease until infectiousness has been demonstrated.

If foresters will call to the attention of pathologists cases of abnormalities that are not readily explainable on other bases, they will help to develop our knowledge in a practically untouched field,

New Nursery Method Described at Syracuse Nurserymen's Conference

Among the 13 interesting papers presented at the conference of forest nurserymen of the Northeastern States held at the New York State College of Forestry at Syracuse, N. Y., last November, was one describing a new method of producing root-pruned, 3-0 planting stock. This method, which on the surface does not sound so revolutionary as it actually is, has been used at the Pack Demonstration Forest at Warrensburg, N. Y., and was described by C. H. Foster of that forest. It is, briefly, as follows:

The nursery soil at the Pack Forest is light and sandy. The seed beds are carefully leveled and prepared a year in advance, and the weeds that spring up during the summer are burned several times with a Hauck torch. Weeding costs after the beds are occupied by seedlings are greatly reduced by this preliminary burning. The seed are sown in drills for a production of from 30 to 60 seedlings per square foot. Species used are white and Norway pine and Norway and white spruce. In June of the third year the seedlings are root-pruned at a depth of 1½ inches below the surface of the bed. This extremely shallow root-pruning is made possible by the development of a specially designed pruner. According to Mr. Foster, it is possible with this tool to prune as close to the surface as three-fourths of an inch, but experience so far has indicated that 1½ inches is the desirable depth for the species used. This treatment produces stocky seedlings with strong, spreading, shallow lateral root systems.

Planting tests on a variety of sites on the Pack Forest indicate the following advantages for this class of stock as compared with ordinary transplant stock of the same age: (1) Lower cost of production; (2) ability of the stock when planted to start growth immediately, both in roots and tops; (3) ability to withstand drought by getting moisture from a larger area and by the capacity of the roots to grow both laterally and in depth immediately after planting, because of the wide-spreading lateral root system; (4) better ability to compete with ground cover and brush because of greater height growth the first season after planting; and (5) reduced danger of frost heaving on account of the widespreading, shallow root system.

New Lespedeza Promising for Northern States

A new, hardy, drought-resistant strain of Korean lespedeza (*Lespedeza stipulacea*) now being tried out by the United States Department of Agriculture promises to extend the northern limit of the range of this valuable pasture plant in this country 200 or more miles farther north. The new strain was discovered growing wild in Harbin, Manchuria, by P. H. Dorsett, of the Bureau

of Plant Industry. For three years it has been grown at the department's farm at Arlington, Va., at Middlebury, Vt., and at Augusta, Mich. Successful experimental plots have also been established in Connecticut, Massachusetts, New Hampshire, Minnesota, New York, and Wisconsin.

The new lespedeza should fill a big gap in New England and other northern pastures, particularly since it grows well in the type of acid soil commonly found in that region.

National Forest Reservation Commission Summarizes Accomplishments

By JOHN E. BURCH, United States Forest Service

In its report for the fiscal year 1932, the National Forest Reservation Commission reviews in detail its work during that year and also briefly surveys the results accomplished during the 21 years which have elapsed since the purchase of land for national forest purposes was initiated by the passage of the act of March 1, 1911, commonly known as the Weeks law.

The commission during these 21 years has approved for purchase 4,727,680 acres of land at an average price of \$4.49 per acre, or a total of \$21,203,021.93, and title has been acquired to 4,369,656 acres at an average price of \$4.55 per acre, or a total cost of \$19,899,792.15. This leaves an area of 358,024 acres approved for purchase but not yet acquired. The remaining unacquired area involves an obligation of \$1,303,229.78 and is being acquired at an average price of \$3.34 per acre. Approximately 62 per cent of the area in question is or will be involved in friendly condemnation suits instituted in order to clear title. The United States title attorneys are now engaged in preparing abstracts of title for the remaining 38 per cent of these unacquired lands.

Twenty-one purchase units have been established primarily for the protection of the watersheds of navigable streams, and 20 purchase units primarily to stimulate timber production through the determination and demonstration of the forest practices and principles of silvicultural management best adapted to the regions of which they are parts. However, the watershed units also have high timber productive values, while the timber production units contribute to stream-flow stabilization. As the lands have been acquired they have been protected, improved, developed, and subjected to constructive principles of management and use.

The commission's program is only half accomplished. Within the 41 existing purchase units 9,292,303 acres remain in private ownership, and it is roughly estimated that of this unacquired land approximately 7,539,900 acres should be acquired by the United States in order that the purposes underlying the establishment of the purchase areas can most effectively be fulfilled. Purchase units have been established in the States of Alabama, Arkansas, Florida, Georgia, Louisiana, Maine, Michigan, Minnesota, Mississippi, New Hampshire, North Carolina, Oklahoma, Pennsylvania, South

Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

During the fiscal year 1932 the commission held two regular meetings. The total acreage approved for purchase at these two meetings amounted to 83,086 acres at an average price of \$2.48 per acre, or a total of \$206,458.45. Title was acquired by the Government to 362,274 acres at an average price of \$3.34 per acre, a total cost of \$1,210,232.12. These prices, compared with the average price of \$4.51 per acre for all prior approvals and \$4.66 per acre for all lands acquired during the preceding fiscal years, clearly illustrate the downward trend of land values throughout the eastern portion of the United States.

Establishment of three new purchase units in Wisconsin—the Chequamegon, embracing 361,497 acres in Ashland and Sawyer Counties; the Mondeaux, embracing 171,832 acres in Taylor County; the Oconto, embracing 203,418 acres in Oconto and Langlade Counties—and of an addition to the existing Oneida unit in Wisconsin embracing 68,055 acres in Forest and Vilas Counties, was approved by the commission. These units were established with the understanding that the commission would not approve the purchase of any lands within their boundaries until such action is warranted by available appropriations and the desirability of these lands in comparison with those in other units. The primary reason for thus defining the ultimate purchase program of the Federal Government in Wisconsin in advance of the appropriation of funds for the purchase of the lands designated was to aid the State, counties, and private agencies in the formulation of a State forestry program.

The commission also approved the reduction of the Osceola purchase unit in Florida to a gross area of 161,813 acres as representing the maximum area desirable for Federal acquisition in that particular region, and the transfer of a portion of the Kiamichi unit embracing 201,480 acres to the Ouachita unit in Oklahoma for administrative reasons.

Model to Demonstrate Growth of Twig

A twig $7\frac{1}{4}$ feet in diameter that puts on a year's growth in a minute and a quarter will be exhibited at the Century of Progress Exposition in Chicago this summer. This huge model represents a $\frac{1}{4}$ -inch, 3-year-old basswood twig, every microscopic detail of which is shown in cross section. The "growth" is accomplished by a mechanical process which increases the diameter 18 inches, adding "wood" on the inside and "bark" on the outside of the growing zone.

Each cell of the three annual rings of the wood, with its central pith and the radiating pith-rays, is outlined. At the circumference, between wood and bark, is the cambium layer. The fourth year's growth is shown by a series of sliding plates and moving pieces of canvas which take 75 seconds to come completely into view. The process can be reversed and the model restored to its original size, ready to "grow" again.

Knowledge of Properties and Uses of Groundsels Increasing

By W. A. DAYTON, United States Forest Service

A recent report by A. B. Clawson, physiologist of the Bureau of Animal Industry, in the Official Record of the United States Department of Agriculture, brings to attention the steadily growing volume of ascertained facts regarding the rôle of certain members of the genus *Senecio* in domestic livestock poisoning. Mr. Clawson describes feeding experiments with *Senecio longilobus*, a groundsel of the Southwest, results of which demonstrated this species to be one of the more poisonous of the groundsels and dangerous for grazing livestock, particularly cattle.

The properties and uses of this vast genus are varied and invite further research. It is one of the three largest genera of flowering plants and is fairly well developed in this country, where more than 200 of the 2,600 known species occur. The Rocky Mountain region in general and Colorado in particular appear to be the center of distribution for the United States. In some parts of the world species of *Senecio* attain tree size. A number of species are garden ornamentals,

while others are classified as noxious weeds. Several species are reputed to possess medicinal properties, and a number are apparently innocuous food plants of man and beast. One species, indeed, tall butterweed (*S. serra*), has recently been used for range reseeding on the Uinta National Forest, Utah, according to Ranger Edson J. Adair.

The roster of groundsels known to be poisonous is steadily increasing, with reports of losses of cattle, sheep, and horses in many parts of the world. Men are known to have been fatally poisoned by two species of *Senecio* in South Africa.



The forced-draft electrical burner for destroying stumps described in the November, 1932, *FOREST WORKER* as being in use in the Frasier Valley, British Columbia, was developed by R. N. Miller, extension economist in land clearing of the State College of Washington and the United States Department of Agriculture. The device is widely used in the western part of Washington. Two bulletins describing its use have been issued by the State College extension service, and Mr. Miller gave a demonstration of the burner in the Frasier Valley in the summer of 1932.

Foreign Notes

Forestry Activities in Mexico

In the bulletin of the Pan American Union for January, 1933, appears the following account of forestry progress in Mexico:

The conservation of forests and the problem of reforestation have for many years received much attention in Mexico. The Mexican Forestry Association was established in 1922, and its work during the past 10 years is indeed worthy of the highest praise. It promoted the celebration of national Arbor Day, an initiative which found hearty support throughout the nation. During the last three years the celebration has been extended to include the week of February 14-20, any day in which may be observed locally as Arbor Day. Official recognition was given this celebration by a presidential proclamation issued in 1932. The General Bureau of Agriculture is conducting through its regional agents in the various sections of the country an active campaign for the promotion of reforestation. * * * A technical course in reforestation has been added to the curriculum of the vocational school at Tlalpam. This course is to be supplemented by practical experiments to be conducted on land furnished by the General Bureau of Agriculture.



The Hebrew University, Jerusalem, has received a gift of land from Solomon Lamport of New York to be used for the establishment of a botanical garden. Native vegetation and a collection of the flora of other sections of the Near East will be cultivated.

Importation of Wood Products into Norway Restricted

Import restrictions placed on certain wood products by Norway for the protection of the Norwegian lumber industry have been extended, by a royal proclamation of October 28, 1932, to plywood and veneered panels. Importation of all sawn and planed lumber into the country without the permission of the forest branch of the department of agriculture was forbidden by an order of July, 1931.

The law authorizing the placing of these restrictions was passed in 1918 and provides that the king or his delegate can forbid the importation of any product until further notice. Up to the present time lumber and wood products only have been affected. The immediate cause of the action of July, 1931, according to the Norwegian Forest Director, was a plan of the Russian Soviet Government to ship large quantities of sawn and planed lumber to Norway and to establish consignment depots at various places along the coast. Since the Norwegian legislative body, the Storting, was not in session at the time and it was therefore not possible to obtain any increase in the import tariff, recourse was taken to the 1918 law, which had not been used for many years. The action taken by the department of agriculture was approved by the Storting during the 1931-32 session, and the present restrictions will probably be maintained until conditions in the

lumber market become more favorable. Under the present system, as compared with the imposition of higher tariffs, the lumber industry can be protected without increasing the price of those types of wood and lumber which it is necessary or desirable to import.

In considering applications for import permits, the deciding factor is whether or not the same lumber, or a satisfactory substitute, can be obtained locally. In general, no permits are issued for the importation of products which compete directly with local lumber. Extension of the restrictions to include plywood and veneered panels for furniture making was made primarily to protect the Norwegian plywood industry from competition from Finland and the Baltic countries, which were beginning to ship in considerable quantities of birch plywood.

These measures have so far had little effect on lumber imports from the United States, which consist chiefly of hardwoods and hardwood products. The amount of plywood exported from this country to Norway is extremely small and consists largely of special types which can not be obtained there. It is not expected that any action will be taken to limit the imports of hardwood flooring, which would more seriously affect American interests.

Private Forestry Societies in Sweden

A member of the Royal Swedish Forestry Department, F. Aminoff, writing in the Quarterly Journal of Forestry of the Royal English Forestry Society for January, 1933, discusses the private forestry societies in Sweden, whose work he considers a very important factor in the care and management of Sweden's forests. The principal societies are the Swedish Forestry Society, the Norrlandian Forestry Union, and the Forestry Society. Mr. Aminoff, after a brief survey of the extent and value of the forests of his country, describes these organizations as follows:

The Swedish Forestry Society was founded in the year 1902. It was started at a time which for Swedish forest economy has been of far-reaching importance. The need of efficient protection and safeguarding of the country's forest resources and the establishment and creation of forest management, based upon native research, became more and more accentuated and resulted in a general forest act, applying to the private forests, and in the organization of the State Forest Research Institute. The interest in questions relating to forestry found expression in an endeavor to form by combination and cooperation a body which might be able actively to look after and further the development of forestry in the country.

The Swedish Forestry Society has made it its task, alongside the State's own organs, to work for the advance and improvement of forest economy. By organizing meetings and excursions the society gives opportunity for discussions on and information about new achievements in forestry.

Every person interested in the association's aim and purpose is entitled to membership. Its business is in the charge of a committee, and its registered office is

in Stockholm. The committee consists of 10 members, elected for a term of three years.

Meetings are organized annually in Stockholm, generally in the course of the month of March. At these meetings lectures are delivered on subjects of major importance for Swedish forestry. * * *

Apart from minor, popularly written, pamphlets, which have been printed in large editions, the society regularly publishes periodicals: Svenska Skogsvårdsföreningens Tidskrift (The Swedish Forestry Society's Journal) and Skogen (The Forest). * * *

The society's work is carried on first of all by membership fees as well as subscriptions and revenue from advertisements. Furthermore, it might be mentioned that the society is in receipt of a state grant—of late years 13,000 kronors annually—and contributions from companies and corporations such as the Swedish Timber Exporters' Association, the Swedish Cellulose Association, the Swedish Wood-Pulp Association, the Swedish Paper Mills' Association, and others. * * *

The society's membership has on the whole been constantly increasing, and numbers at present 5,589. Of these 202 are foreigners.

The Norrlandian Forestry Union was founded in the year 1883. Its original aim and object was to stimulate interest in forestry, particularly in the northern Provinces of Sweden, called Norrland, by organizing meetings and employing planters and instructors in silviculture for the purpose of assisting private forest owners. The union had from the first another aim, namely, to provide the necessary forest seeds of a suitable nature for forest culture in Norrland, and to draw up statistics on forest cultivation and forest fires in that part of the country. In the year 1913 the union was reorganized on a wider basis.

The [governing] committee consists of not less than 7 and not more than 11 members, elected for a term of three years at a time. The union now carries on its activity mainly along the same lines as the Swedish Forestry Society. It organizes annual excursions to various state and private forests in Norrland. These excursions are largely made to the vast estates, owned by the lumber companies in these parts of Sweden. The initiative and policy of the union have exercised a great deal of influence on Norrlandian forest legislation.

The union's periodicals are: Norrlands Skogsvårdsförbunds Tidskrift (The Norrlandian Forestry Union's Journal) and Skogsvännen (The Forest Friend). The former is published quarterly, and contains more or less technical papers on forestry. In the latter, which is also published four times annually, there appear popularly written instructions and advice relating to sundry kinds of measures suitable for forestry. * * *

Among the leading members and patrons of the union are men drawn from the Norrlandian lumber companies who contribute liberally toward the union's work. By way of state grant the union has of late years been in receipt of 5,500 Swedish crowns annually. The union has at its disposal a fund "for awarding prizes to small forest owners."

At present the union has a membership of something like 2,500.

In the course of its life of nearly 50 years, the Norrlandian Forestry Union has had a very great influence on Norrlandian forestry. When the union was founded forestry in the north was characterized by the exploitation of the almost untouched natural forests. Nowadays, forestry in these northern parts of the country is on the whole run on parallel lines with those of southern Sweden. The forestry of northern Sweden, however, presents very special problems, and in spite of the establishment of the Swedish Forestry Society, covering the whole of Sweden, there is good reason for the perpetuation of the Norrlandian Forestry Union.

The Skogssällskapet (Forestry Society) is carrying on its work along lines that materially differ from those along which the two aforesaid societies or unions are working. The Forestry Society was founded in the year 1912, its chief task being the afforestation of such areas as have for a long time been deforested (heaths) or have of late years been the subject of mismanagement.

This society has located its sphere of labors in the southern Provinces of the country, where there are large areas of land on which, thanks to good soil and favorable climatic conditions, afforestation is profitable. The two species most generally used are pine and spruce.

For the purpose of performing its task the society is trying to interest local authorities in establishing communal forests by the purchase of minor areas of forest soil from private persons, and to amalgamate these into forests on behalf of the community—village or borough, as the case may be. The society, which has in its employ persons trained in silviculture, on payment of expenses assists such communities in the care and management and economic exploitation of the communal forests thus established.

The society's supreme management is in the charge of a central council, and its registered offices are at

Gothenburg. The central council includes, as *ipso facto* members, the chairmen of the committees of each of the communal forests. The remaining members are elected for terms of six years at a time. The central council appoints a managing director trained in forestry. * * *

The society has in the course of its work established about 80 communal forests with a total area of 40,000 hectares.

The society's expenses are defrayed to a large extent from the income from bequests and donations, and also from membership fees and the fees paid for the care and management of forests which are looked after by the society.



New Zealand's native white pine is reported to be rapidly approaching the point of depletion which will make necessary the importation of the species into that country. The present large exports of New Zealand white pine are expected to continue, however, for another year or two.

Personals

Ralph C. Hawley, professor of forestry in the Yale School of Forestry, has been appointed Morris K. Jessup professor of silviculture to fill the vacancy left by the death of Prof. J. W. Toumey.

Harold J. Lutz has been appointed assistant professor of forestry in the Yale School of Forestry, effective July 1, 1933. After obtaining the B. S. degree in forestry from Michigan State College in 1924, Professor Lutz spent two years in Alaska with the United States Forest Service. After obtaining the M. F. degree from Yale in 1927, he spent a year in investigative work with the Connecticut Agricultural Experiment Station, and was then appointed associate silviculturist at the Allegheny Forest Experiment Station. In 1929 he became assistant professor of silviculture in the department of forestry of the Pennsylvania State College, which position he holds at present. Since the fall of 1931 he has been on leave of absence to complete his work for the Ph. D. degree at Yale under a fellowship grant from the Charles Lathrop Pack Foundation.

Emanuel Fritz, associate professor of forestry at the University of California, has resigned as editor of the *Journal of Forestry*. Professor Fritz, who was associate editor of the *Journal* for eight years and editor-in-chief for three years, stated that the increasing amount of time required by the work had made it necessary for him to relinquish it. No appointment of a successor has so far been made.

L. O. Howard, former chief of the Bureau of Entomology, has returned to Washington after spending a year as official collaborator of the bureau in Paris.

E. N. Munns, in charge of the division of silvics of the United States Forest Service, has been elected vice president of the permanent committee, governing body of the International Union of Forest Research Organizations. This committee, elected at the meeting of the union in Nancy, France, last September, is composed of the following members in addition to Mr. Munns: G. Roth, of Hungary, president; L. Fabricius, of Germany; Sir Roy Robinson, of Great Britain; Y. Ilvessalo, of Finland; H. Badoux, of Switzerland; P. Guinier, of France; and A. Pavari, of Italy. The next annual meeting of the permanent committee will take place in the autumn of 1933, in Munich.

M. A. Mattoon, supervisor of the Pisgah National Forest, N. C., was chosen this year as the lecturer to speak to students of the forest schools of the East and Middle West on national forest administration. His schedule includes the forest schools at the University of North Carolina, the University of Minnesota, Iowa State College, Purdue University, Michigan State College, University of Michigan, Syracuse University, University of New Hampshire, Yale University, Cornell University, Pennsylvania State College, and Georgia State College. The lecture tour covers the period January 24–March 20. In connection with his talks Mr. Mattoon will hold group discussions on working conditions in the Forest Service.

Myron E. Krueger, associate professor of forestry at the University of California, is spending a year of sabbatic leave at Harvard University, where he is studying economics.

Officers elected by the Southern California Association of Foresters and Fire Wardens for 1933 are W. C. Coupe, deputy State forester of California, president; Spence D. Turner, Los Angeles County Forester, first vice president; S. A. Nash-Boulden, supervisor of the Santa Barbara National Forest, second vice president; J. A. Graves, State ranger, secretary; and J. E. Elliott, supervisor of the San Bernardino National Forest, treasurer.

A. E. Wieslander, of the California Forest Experiment Station, has received recognition of his discovery of a new species of manzanita, as well as of his work in establishing more definitely the range of that plant in California, through the naming of the species *Arctostaphylos wieslanderi*. The type specimen was collected in the Santa Lucia Mountains where *Arctostaphylos wieslanderi* covers extensive areas.

Elections of officers by the American Association for the Advancement of Science at its December meeting include that of A. F. Woods, director of scientific work of the United States Department of Agriculture, as a member of the executive committee of the association for a 4-year term. Henry Norris Russell, astronomer, of Princeton University, was elected president for the present year; Burton E. Livingston, biologist, of Johns Hopkins University, was reelected general secretary; Henry B. Ward, zoologist, University of Illinois, was elected permanent secretary; and John L. Wirt, of the Carnegie Institution, Washington, D. C., was reelected treasurer.

John C. Kuhns, for the past eight years supervisor of the Whitman National Forest, Oreg., has been transferred to the Snoqualmie National Forest, Wash., as supervisor. He will succeed W. G. Weigle, who is retiring, and will be succeeded on the Whitman Forest by Walt L. Dutton, who has been inspector of grazing in the regional office of the Forest Service at Portland, Oreg. Mr. Kuhns is a forestry graduate of Penn State College.

W. V. MacNaughton, who for the past three years has been connected with the newsprint division of the International Paper Co., has been appointed assistant research chemist at the pulp and paper laboratory at Savannah, Ga., of which Charles H. Herty is in charge. Mr. MacNaughton is a graduate of McGill University and has had a number of years' experience in paper manufacturing. He succeeds George C. McNaughton, resigned.

Harold S. Foley, of Foley, Fla., and Mrs. Lynwood Jeffreys, of Jacksonville, have been appointed members of the Florida Board of Forestry by the governor of the State.

John M. Heilman has been permanently appointed forester for the city of Newark, N. J. He is stationed on the Newark watershed of 35,000 acres, with headquarters at Charlotteburg, N. J. Mr. Heilman was formerly with the New Jersey Department of Conservation and Development.

Bibliography

"Cary" in an Enlarged Form

By E. E. CARTER, United States Forest Service

In every profession, certain books are so well known that they are commonly identified merely by the name of the author. Sometimes the title is discarded the more readily because it was intended to emphasize some idea or modest limitation which time has shown to be untrue. So it is with "Cary"³ among foresters. The original title, "A Manual for Northern Woodsmen," implied both geographical and occupational limitations. The former has now been removed, so far as the United States is concerned. The "woodsman" remains to emphasize the thought expressed repeatedly in the text, sometimes subtly, sometimes bluntly, that the book is not written for students of forestry, but for a special class of practical forest workers. Doctor Cary seems to believe that there is some gulf between these

groups. It is perhaps significant that those who use his book have tacitly discarded his classification as represented by the title. Although the proponent of the distinction between foresters and woodsmen, Doctor Cary is one of the best exponents of its inherent falsity.

Few men in forest work need to be reminded of the contents of the previous editions of the manual. There are too many cover-stained, pencil-marked, dog-eared copies on the desks, in the packs, or in the pockets (rarely in the bookcases) of the doers in forestry to make necessary any extended discussion of the chapters on land surveying, forest maps, log and wood measurement, and timber estimating. They have been and are a very present help in time of trouble. The chapter on log and wood measurement is still the briefest and is not so fully satisfying, but the worker in this particular field now has available other and more comprehensive guides and instructions. These four chapters have been retained with few changes. They reflect the experiences of a man who has done under forest conditions the kind of work described, who knows "the

³Cary, Austin: Woodsman's Manual. 4th edition, 366 pp., illus. Cambridge, Mass., Harvard University Press, 1932.

tricks of the trade," and who can tell of them plainly and simply.

A new chapter, *On Growth of Timber*, has been added. The surprising thing about it, and about the discussion of it in the preface, is the apologetic tone with which it is presented—apologetic not for its substance but for its inclusion. Doctor Cary says in effect that the time has come when woodsmen in America have to deal with growth as part of their business, so he has tried to help them in their thinking and in their work in this field. He succeeds in offering something of value to many to whom the subject is not new as well as to the previously ignorant.

This value to the student, in forest school or out, lies in the coldly practical and cautious way in which Doctor Cary selects tested facts and omits unessentials and refinements. He uses the case method, telling briefly but effectively what has been done and tested by time in specific instances; he shows suspicion of everything that has not proven its worth by actual results. For example, he states: "The normal yield table * * * is an ideal or standard, and at that less reliable than might be thought because with the idea of full stocking understood in a general way, different men vary more or less in interpretation." He is didactic on occasion, with the experience of an observant lifetime rather than definite data to support him. "A stand that has the right [yield table] number of trees for admirable stocking at 20 years of age is liable at 50, if unmanaged, to be much too dense to yield best or according to the table. Conversely a stand that in early years appears entirely too open may in the course of time contain just as much timber as normal stands." Such reflections of Doctor Cary's years of practical experience add greatly to the worthwhileness of the book. But sometimes a few added words of explanation would not be amiss, as when he includes that unusual table for second-growth hardwoods in New England, with the indicated number of trees per acre increasing each decade. In this case, little space would have been needed to bring out more sharply the facts that only trees 7 inches in diameter breast high and larger are considered and that the table carries the stand only to age 80.

There is a challenge to American foresters in Doctor Cary's caution and skepticism. Here is a man of unquestionable qualifications as a forestry leader and of wide reading in American forestry literature, undertaking to write about growth for the guidance of the hard-headed forest manager who lacks forest-school training. Partly directly, partly by inference, and especially by omission, he warns his readers that there is little on the subject as yet available for confident application by the forest owner or manager, and that they should be wary of the complexities with which professional foresters are likely to enmesh and baffle the practical man. Is Doctor Cary right, granting that the practical man must have good intelligence in

order to be really practical? If so, what needs to be done about it?

The new chapter is delightful reading. In it, Doctor Cary is philosophical and even epigrammatic. "The relative cost of operating large and small sizes [of trees] is a matter that it was easy to drop out of mind, while the fact that timber does actually grow and improve was apparently beyond the comprehension of many." (Doctor Cary obviously does not consider data showing high costs for small timber to represent any startling new discovery.) "Forests have been selectively cut through all stages of lumbering history." "The best of managers need reminder, guide and check"—and therefore plans are necessary. "Radical reversal of policy without adequate grounds for it is of course a bad and dangerous thing." And in his summary of the subject, "Too elaborate figuring may lead to confusion." If the new chapter serves no other purpose than to remind foresters (who can read it profitably, whether they are woodsmen or not) that "simple methods are best," it will take its place with those written in former years to make the whole book a cherished possession.

Determination of the Errors of Estimate of a Forest Survey

By S. R. GEVORKIANTZ, United States Forest Service

The ultimate goal of the technic of forest surveys is to strike a balance between the expediency and the reliability of the work. The knowledge of the reliability of the survey statistics is, therefore, of paramount importance. The authors of this paper⁴ explain how to evaluate the various errors of sampling and how to coordinate the different items of land-area classification and of tree volume. The paper lays a foundation upon which much constructive thought will gradually develop, and in most respects is clear and instructive.

A forest survey is a method of sampling. The proportion of forest types or other land areas is usually determined by one of two methods: (a) Number of plots in each type in relation to the total number of plots; or (b) linear distance traversed through each type in relation to the total length of line run. The law of sampling states that, if an event which can happen in two different ways is repeated a number of times under the same essential conditions, the ratio (R) of the number of times that it happens in one way to the total number of trials approaches constancy as the number of trials is increased indefinitely. The greater the number of observations or trials, the more reliable the sample is ordinarily considered. In a homogeneous

⁴Schumacher, Francis X., and Bull, Henry: Determination of the Errors of Estimate of a Forest Survey, with Special Reference to the Bottomland Hardwood Forest Region. *Journal of Agricultural Research*, December 15, 1932, pp. 741-756.

universe the value of R approaches constancy sooner than it does in a heterogeneous universe; therefore in a homogeneous universe fewer trials are necessary.

In forest surveys one deals with a heterogeneous universe. The authors' analyses essentially prove this point. The heterogeneity of the universe along the survey lines is overcome by a closer spacing between plots, while the heterogeneity in the opposite direction is overcome by a closer spacing between survey lines.

With a given spacing between plots, sampling is essentially accomplished by means of survey lines, and plots or linear measurements are used only to determine proportions of the items under consideration. The larger the number of survey lines, the more reliable is the proportion of the observed items. The universe is thus broken up into rational subgroups, the variability of which, whether it conforms to the theoretical error of random sampling or not, is an evidence of the quality of the whole. The proper analysis of the reliability of surveys, therefore, requires a study of the variability of survey statistics with both the distance between the lines and the spacing between the plots. A certain desired accuracy should then be decided upon in relation to the area of the universe, and the spacing between lines and plots adjusted accordingly. These essential variabilities, however, have not been conclusively analyzed by the authors and, instead, a recommendation has been given to use a spacing between lines of 10 miles. This recommendation would seem to require further analysis.

The method of correlating errors in volume and area is a contribution to the literature of forest surveys, and the paper as a whole may be read profitably by all foresters interested in that subject.

A Study of Decay in Douglas Fir

By ERNEST E. HUBERT, University of Idaho

In reviewing *A Study of Decay and Other Losses in Douglas Fir in Western Oregon and Washington*, the recent contribution to our knowledge on the pathology of our important timber trees by J. S. Boyce,⁵ there is much to be said in commendation of the thoroughness of the work and the excellent manner in which it is presented. The bulletin emphasizes the importance of fact-finding studies to determine more accurately the part defects play in the economics of forest management. "Knowledge of prospective yield is of value only if correlated with knowledge of prospective loss" might well be used as a basis for readjusting our age-old concept of the use of yield tables.

The main object of the study was to determine the amount, rate, and types of losses affecting the almost pure stands of Douglas fir in Washington and Oregon. The data obtained are intended to establish the proper

age of cutting second-growth as well as overmature stands in order to avoid serious losses due to decay and other factors. Following a brief review of the various agencies which cause loss, the methods used in the study are given in detail. In all, measurements were made on 2,633 Douglas firs representing a total volume of 10,146,530 board feet.

The principal loss factor was found to be decay (16.99 per cent). Of the 7 or 8 wood-rotting fungi common on Douglas fir, *Trametes pini* was found to produce the greatest amount of loss, or 13.7 per cent of the total board-foot volume and more than 80 per cent of the total loss due to decay by all species. Brown trunk rot caused by *Fomes laricis* and the red-brown butt rot caused by *Polyporus schweinitzii* came next in importance but represented only 1.46 per cent and 1.06 per cent, respectively.

Nearly 28 per cent of the total volume was found to be lost through all of the factors studied. Of the factors other than decay, Boyce finds that 9.25 per cent of the loss of total volume was due to breakage, a little less than 1 per cent due to shake, and about 0.6 per cent due to miscellaneous defects. No relation was found between the age of the stand and the loss due to miscellaneous causes. As the age of the stand increased the loss through shake increased, but age again seemed to have no effect upon the loss through breakage. This loss, however, was markedly increased on rougher ground, in denser stands, and among the larger trees.

The more important heart rots showed exterior signs of their presence on the trunks of living trees, swollen knots and conks indicating the presence of red ring rot, and fire scars, churn butts, and conks pointing to the presence of red-brown butt rot. It was found that scars play a minor rôle as entrance points of decay from red ring rot, which enters mostly through dead branches.

With some fungi a small amount of decay was found in the heartwood of very young trees, but in general the rapid increase in decay appeared in mature and overmature stands. The data furnish means of determining the rate of decay in mature and overmature stands and so make it possible to evaluate the amount of sound material which may be obtained. In the future the decay problem will present fewer difficulties, since the cutting age for Douglas fir will fall somewhere below 110 years. On Sites I, II, and III very little loss due to decay was found below this age. The use of unmerchantable trees as seed trees, on account of the amount of decay they contain, is indicated as an economic method made possible by this study; trees not worth felling can also be left with greater assurance that no valuable material has been overlooked. The study also renders much easier the task of bucking the trees into logs and selecting the portions to be culled through a better knowledge of the exterior signs denoting decay.

Boyce's work is a valuable contribution to our knowledge of Douglas fir stands and includes many practical

⁵ U. S. Department of Agriculture Technical Bulletin 286, 60 pp., illus. 1932.

applications of the carefully analyzed data. This type of study should be applied to all of our important commercial tree species. There was never a greater need for accurate inventories of our forest capital, and the evaluation of losses due to decay, insects, fire, breakage, and other factors has become a necessary part of our forestry practice.

A Self-Liquidating Reforestation Plan

A program for "Reforesting Pennsylvania's Idle Land as a Self-Liquidating Public Work" has been issued by the Department of Forests and Waters of that State as Bulletin 51. It was compiled by the Pennsylvania Forest Research Institute, which is under the direction of E. A. Ziegler.

The immediate need for the utilization of the 4,000,000 acres of idle land in the State is stressed. Proper use of these acres should be made so that they may provide their share of taxes, a crop revenue, and work for the unemployed. Since agriculture is already overdeveloped in Pennsylvania, these lands, which constitute almost one-seventh of the State's area, can best be used for growing trees. The need for forests is indicated by the fact that less than 16 per cent of the lumber used in the State is grown there.

The bulletin suggests that a 10-year planting plan should be initiated, with the State assuming leadership. It advocates the purchase of 25,000 acres of land and the planting of 15,000 acres with forest trees in the next two years, that program to be doubled in each succeeding biennium. At least half of the estimated expenditures of \$294,000 by the State and \$100,000 by counties and municipalities during the next two years would go directly into emergency labor.

From such a program, requiring an initial investment estimated at \$12 per acre and an annual expense of 20 cents per acre, the State may expect to be built up a capital value of \$100 to \$300 per acre, according to the bulletin.

Cutting Practice for Small Forests

By W. R. MATTOON, United States Forest Service

A bulletin with a timely and important message, which will be widely valuable because of its extensive application and semipopular, readable style, has recently been published by the Yale School of Forestry.⁶ Extension foresters and others engaged in

⁶ Hawley, Ralph C., and Goodspeed, Allen W.: Selection Cuttings for the Small Forest Owner. Yale University, School of Forestry Bulletin No. 35, 34 pp., illus. 1932. 35 cents.

interesting forest owners in good cutting practices and a certain class of woodland owners will find the information given here very useful. The price of the bulletin will probably much restrict its distribution among farmers.

A brief discussion of clear cutting furnishes the prime argument for avoiding the method, and this leads up to a description of selection cutting, which is shown to be the rational and profitable method for farmers and other owners of small acreages of woodland. A detailed account of the number of trees and the volume before and after cutting selectively furnishes valuable data. Timber production is treated in terms of saw timber rather than cordwood.

More emphasis might have been placed on the possibility of the sale of some of the timber cut in the thinning process in addition to its use on the farm for fuel and repair wood. Such sales of timber provide an important increase to the farm cash income in many regions.

This publication is an important addition to our sources of basic information on the subject.

Recent Publications of the Forest Service

(These publications can be obtained from the Superintendent of Documents, Washington, D. C., at the prices indicated)

- Technical Bulletin 323-T, Second Growth Yield, Stand, and Volume Tables for the Western White Pine Type, by Irvine T. Haig. 10 cents.
- Technical Bulletin 332-T, The Bearing Strength of Wood Under Bolts, by George W. Trayer. 5 cents.
- Technical Bulletin 337-T, The Portable Band Sawmill and Selective Logging in the Loblolly Pine Forests of North Carolina, by R. D. Garver and J. B. Cuno. 5 cents.
- Circular 236-C, Design Factors Affecting the Strength and Rigidity of Wooden Crates, by George E. Heck. 5 cents.
- Circular 239-C, Moisture Content of Wood in Dwellings, by Edward C. Peck. 5 cents.
- Farmers' Bulletin 1071-F, Making Woodlands Profitable in the Southern States, by W. R. Mattoon. (Revised.) 5 cents.
- Farmers' Bulletin 1693-F, Growing Christmas Holly on the Farm, by Perkins Coville. 5 cents.
- Leaflet 30-L, Cutting the Farm Woods "Profitwise," by R. D. Garver. (Reprint.) 5 cents.
- Leaflet 35-L, Producing Pine Nursery Stock in the South, by Philip C. Wakeley. (Revised.) 5 cents.
- Job-Load Analysis and Planning for Executive Work in National Forest Administration, by E. W. Loveridge. 25 cents.