

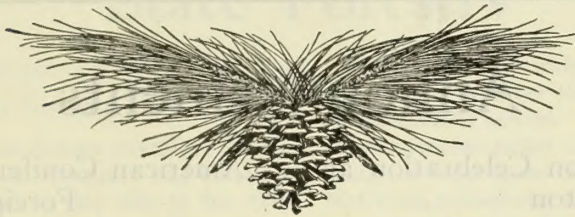
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FOREST WORKER



September, 1928

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CONTENTS

	Page
Announcements.....	ii
State forestry.....	1
Education and extension.....	5
Forest Service notes.....	9
General forest news.....	15
Foreign notes.....	20
Personals.....	25
Bibliography.....	26

Announcements

Farm Demonstration Celebration at Houston

The twenty-fifth anniversary of the beginning of farm demonstration work in Texas will be celebrated in Houston during the week beginning February 4, 1929. At that time will be held the annual Conference of Extension Agents of the South, and a meeting of the Southern Agricultural Workers Association.

Ohio Valley State Parks Conference

The Ohio Valley Regional Conference on State Parks this year will be held at Waddington Farm, Wheeling, W. Va., October 10-12.

National Grange to Meet in Capital

The sixty-second annual meeting of the National Grange will convene in Washington, D. C., November 14-23. Headquarters will be at the Willard Hotel.

American Conifer Seed Wanted for Foreign Use

Requests for seed of American conifers to be planted in foreign countries are coming to the United States Forest Service in increasing volume. Already official requests have been received from foresters in some 15 countries. Most of these foresters have expressed an appreciation of the need for getting seed from the best trees and from regions having climatic conditions similar to those under which they desire to grow the species. Others have requested only that particulars be given as to the kind of trees from which the seed are procured and as to the climate in which the trees have grown.

Since the demand is large, anyone having collected a small quantity of seed can send it to the office of forest experiment stations, United States Forest Service, Washington, D. C., with the assurance that the effort will not be wasted. With each packet of seed should be sent information as to species and as to whether the parent trees were of good vigor and open grown, also as to the elevation and geographic location at which the parent trees grew. Seed from promising, rapid-growing trees are of course especially desired.

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

Material offered for publication in the FOREST WORKER should be addressed to L. C. Everard, Editor, United States Forest Service, Washington, D. C.

FOREST WORKER

Washington, D. C.

SEPTEMBER, 1928

Vol. 4, No. 5

State Forestry

Fire Protection Improvements for the Dismal Swamp

Since June two new fire towers overlook the Virginia portion of the Dismal Swamp. One stands at the head of Jericho Ditch, by the side of the State road, about $1\frac{1}{2}$ miles east of Suffolk. The other is south of Wallaceton at Angle Siding, in the heart of the swamp, close to the Dismal Swamp Canal and the State road. Each is 100 feet high to the base of the cabin, with inside stairway.

In providing these towers the Virginia Forest Service had many cooperators. Landowners of the district that have contributed $2\frac{1}{2}$ cents per acre for fire protection during the year 1928 include the Camp Manufacturing Co., the Richmond Cedar Works, the John L. Roper Lumber Co., the Stave and Timber Corporation, and the Ackerly Lumber Co. Among the public service companies that made contributions of from \$100 to \$300 toward the erection of the towers are the Norfolk & Western Railway Co., the Seaboard Air Line Railway Co., the Atlantic Coast Line Railroad, the Virginian Railway Co., and the Virginia Electric & Power Co.

Additional protection is afforded to the Dismal Swamp by a tower recently erected by the Camp Manufacturing Co. in Hertford County, N. C., overlooking the southwestern part of the swamp.

War Veterans Organize to Fight Fire

A volunteer organization of 500 World War veterans was recruited by the Sacramento, Calif., post of the American Legion this year for emergency duty in fighting forest fires. E. T. Cook, director of forest fire prevention for the Sacramento legionnaires, organized the men in units of 50 and formally placed them at the command of State Forester M. B. Pratt. The post arranged for trucks to take the men to the fire line and for the necessary supplies and tools.

The men were so organized that they could be called out in first, second, and third line units rated according

to the rapidity with which they could be assembled and according to whether they were available for short or long periods of service. H. M. Witbeck, a detective of the Sacramento police force, was given charge of mobilizing the units when they were "called out." L. M. McGinnis, an inspector of the State motor vehicle department, was placed in charge of mobilizing transportation facilities, supplies, tools, and provisions. Mr. Cook assumed the responsibility of directing the legion fire fighters in the field, working in conjunction with State forest rangers.

An Indiana Farm Woodland Success

From R. F. Wilcox, acting State forester of Indiana, comes a story of what an Indiana farm woodland has done for its owner in the past 28 years. For \$570 John Fensel, of Montpelier, Ind., bought 20 acres of hardwood forest in 1900, just after all the timber down to 3 inches diameter had been cut for spokes. Since that time the woodland has supplied the timber for the following buildings: A double corn crib 20 by 24 feet, a sheep barn 20 by 30 feet, a horse barn 20 by 36 feet, a garage 10 by 14 feet, and a cellar house 12 by 14 feet. Not less than 150 posts and 40 cords of wood have been taken from the forest, either to be used on the farm or to be sold. In addition, the ash was sold for handles in 1918 for \$400 and the elm was sold for barrels in 1924 for \$300. For the standing timber Mr. Fensel has been offered \$3,000.

Mr. Fensel has "farmed" his woods, choosing the mature and undesirable trees for cutting, and has protected it from fire. He permitted grazing for one year only. The prolific crop of young growth in his woodland forms a striking contrast to the complete absence of tree seedlings on an adjoining woodland area owned by his brother, which has been heavily pastured.

This woodland was the first forest to be approved for classification under the Indiana forest land taxation act of 1921.

Vermont Adds to Its State Forest Acreage

In the fiscal year ending June 30, 1928, the State of Vermont received a gift of a new State forest, bought additions to three of those formerly created, and established one new State forest on purchased land. These acquisitions, 2,430 acres in all, brought the total area of Vermont State forests to 33,725 acres. The new Granville Reservation, which was received as a gift from ex-governor Redfield Proctor, comprises 900 acres in Granville Gulf extending along the highway for a distance of about 6 miles. The additions made during the year increased the Calvin Coolidge Forest by 150 acres, the Proctor-Piper Forest by 460 acres, and the Groton Forest by 300 acres. Usually the Vermont appropriation for purchase of land for State forest purposes is devoted to making additions to existing forests. In departing from this policy to buy the 620-acre Willoughby State Forest, in the Town of Sutton, the State forest service provided the north-eastern part of the State with its first State-owned forestry demonstration area.

The complete list of Vermont State forests, with their locations and areas, is as follows:

Forest	Town	Acres
L. R. Jones.....	Plainfield.....	600
Mansfield.....	Stowe.....	5,000
Camels Hump.....	Duxbury.....	4,500
Groton.....	Groton, Peacham, and Marshfield.....	15,300
Lyndon.....	Lyndon.....	75
Charles Downer.....	Sharon.....	800
Proctor-Piper.....	Cavendish.....	884
Calvin Coolidge.....	Plymouth.....	879
Townshend.....	Townshend.....	700
Arlington.....	Arlington.....	225
Hapgood.....	Peru.....	100
George Aiken.....	Mendon.....	800
West Rutland.....	West Rutland.....	350
Putnam.....	Worcester.....	1,400
Mount Philo.....	Charlotte.....	160
Ainsworth.....	Williamstown (Gulf).....	432
Granville.....	Granville (Gulf).....	900
Willoughby.....	Sutton.....	620
		33,725



A committee of North Carolinians headed by Dr. Joseph Hyde Pratt is trying to find a way to purchase and preserve in State ownership the Poole woods, a 75-acre tract of virgin shortleaf pine and hardwoods about 5 miles southeast of Raleigh. This woods is perhaps the only piece of virgin timber in eastern North Carolina.



The Pennsylvania Game Commission has charge of 102,541 acres of forest lands. These lands were purchased from a fund provided from fees paid for resident hunting licenses. This fund amounts to about \$378,000 a year, and entirely supports the State's game management activities.

New York Buys More Forest Land

Purchase of 11,667 acres of forest land was approved on May 31 by the board of commissioners of the New York Land Office. In the Adirondack area there was approved, among other lands, the so-called Eagle Point property on the westerly side of Schroon Lake. This tract, which has an excellent sandy beach and fronts on the main New York-Montreal highway for approximately a mile, is to be developed as a public camp site. A loop of old road that was abandoned last year when the highway was straightened at this point runs through the middle of the property and helps to make it desirable for development as a camp for automobilists. A contiguous tract of about 10,000 acres in the westerly end of the town of Ticonderoga, bounded on the west by State-owned lands and including many ponds, lakes, and streams, is among the lands approved for purchase.

In the Catskill area there was approved a parcel of approximately 45 acres that includes about five-eighths of a mile of fishing rights on the Beaverkill trout stream and also about one-fourth of a mile on Berry Brook, a tributary. With two adjoining parcels recently acquired by the New York Conservation Department, State purchase of this tract will open to the public nearly 2 miles of the Beaverkill stream.

Virginia Runs a Bobwhite Farm

Quail for stocking the woods and fields of Virginia are being obtained by large-scale propagation from brood stock that is kept in captivity year after year. The work is carried on at the State game farm at Boulevard, Va., by W. B. Coleman, who is credited by the Maryland Conservationist with being the first to succeed in rearing large numbers of bobwhites from stock held in confinement through a succession of years. In 1927, 158 hen birds on the farm produced 10,626 eggs, from these eggs 7,023 chicks were hatched, and more than 4,000 of the chicks were reared to maturity. Some 1,000 quail were kept at the farm over the past winter. The Virginia Commission of Inland Fisheries and Game has signified its willingness that members of game organizations of other States should come to the game farm and learn Mr. Coleman's methods.



The 400-acre deer preserve of former State senator J. E. Bursleson near Spruce Pine, Mitchell County, N. C., has been taken over by the North Carolina Department of Conservation and Development. The preserve now contains about 350 deer. It is planned to keep this herd intact and to use the young of these animals to stock State game refuges and other parts of the State.

Improvement Cutting at a Profit in Indiana

An improvement cutting was made this year on about 75 acres of the Clark County State Forest, Henryville, Ind. This forest was burned over about four years before the State acquired it in 1903. In 1908 it was clear-cut of every tree that would yield a crossie. In the cutting made this year only over-mature trees and trees with defects due to the old fire scars were removed. The substantial profits from this improvement cutting are shown by the following figures:

Contract prices:

- Felling trees and cutting into log lengths, 10 cents per log.
- Skidding to the mill, 10 cents and 11 cents per log.
- Sawing ties, 20 cents each.
- Sawing lumber, \$7.50 per 1,000 board feet. (State gets the slabs for wood.)
- Hauling ties to railroad (2 miles), 14 cents each.
- Loading ties, 3 cents each.
- (Cost of ties f. o. b. cars, 58 cents each.)

Returns (loaded on railroad cars):

2,834 crossies, at \$1.16.....	\$3,287.44
17,000 feet lumber, at \$15.....	255.00
20,000 feet lumber, at \$30.....	600.00
50 cords fuel wood, at \$3.....	150.00
400 cords fireplace wood, at \$4.50 (delivered at Indianapolis).....	1,800.00
Total.....	6,092.44

(Returns per acre, \$81.23.)

Operating costs (loaded on railroad cars):

2,834 crossies, at 58 cents.....	1,643.72
37,000 feet lumber, at \$15.....	555.00
50 cords fuel wood, at \$2.50.....	125.00
400 cords fireplace wood, at \$4 (includes freight to Indianapolis).....	1,600.00
Total.....	3,923.72

(Costs per acre, \$52.31.)

Profit and stumpage..... 2,168.72

(Per acre, \$28.92.)

East Texas Chamber of Commerce to Promote Forestry Practice

A forestry and highway department has been created by the East Texas Chamber of Commerce, an organization made up of 10,000 members in about 67 counties having a population of not less than 2,500,000. This department will cooperate with the Texas Forest Service and with private agencies in efforts to promote the practice of forest protection and other forestry measures in eastern Texas.

Clarence Ousley has been chosen to head the new department. Mr. Ousley is a former assistant secretary of agriculture who has served as editor of agricultural journals and as director of the Extension Service of the Texas Agricultural College. In recent years he has directed the activities of the National Boll Weevil Control Association and the Texas Safe Farming Association.

North Carolina Forestry Association Recommends New Legislation

A list of recommendations drawn up by the legislative and executive committees of the North Carolina Forestry Association is to be submitted by the association to the general assembly of 1929. As summarized by Dr. Joseph Hyde Pratt, president of the association, it calls on the legislature to submit to popular vote at the next general election a constitutional amendment giving the general assembly full power and authority "to prescribe for all classes of forest land, farm woodland, and wild waste lands such methods of taxation as will develop and conserve the forest resources of the Commonwealth." Second, it calls for legislation authorizing the planting and protection of roadside trees and shrubs, and providing means for supervising the planting and protection of trees. It requests increased appropriations for the acquisition of lands for State forests, and legislation that will permit the United States to acquire land in the piedmont and coastal plain regions of North Carolina for the establishment of national forests. Legislation heretofore adopted by North Carolina permits the establishment of national forests in the mountains of the western part of the State only.



A 162-acre park on the shore of Lake Tahoe, including Rubicon Point, has been offered to the State of California by William S. Bliss, Walter D. Bliss, and Miss Hope Bliss, of San Francisco, in honor of their father, Duane L. Bliss. The gift is contingent on the State's acquisition of additional land in the Tahoe region.

North Dakota Farmers Plant Shelter Belts

Eighty-two farmers in 37 counties of North Dakota shared 75,000 trees furnished by the State forest nursery this spring, planting them as shelter belts on land prepared for the purpose by summer following in 1927. Seventy-nine farmers in Mountrail, Ward, and Grant Counties planted shelter belts with 100,000 trees that they bought through a local forestry committee under the direction of their county agents and Extension Forester Gillett.

Each one of these farmers had a visit last summer from Mr. Gillett, who told him how to prepare his land for shelter belt planting and made a sketch of his farmstead and planting site. Later a planting plan was drawn from this sketch and mailed to the farmer.

Pine Plantation Sold at a Profit

In a recent sale of farm property near Tarentum, Allegheny County, Pa., reported by the Pennsylvania Department of Forests and Waters, \$800 was paid for a plantation of northern white pine established seven years ago on about 6 acres of land unsuitable for agricultural crops. The seller, Fred Mathia, established the plantation in 1921 with 5,000 2-year-old and 2,000 3-year-old seedlings from the State nurseries. Ninety per cent of the trees have survived, and some of them have reached a height of 9 feet. It cost Mr. Mathia not more than \$75 to make the plantation. Thus his gross profit, seven years after the planting, is \$725.

Growth of a Pennsylvania White Pine Plantation

The 22-year-old Caledonia northern white pine plantation on the Michaux State Forest of Pennsylvania, along the Lincoln Highway between Gettysburg and Chambersburg, was thinned this year for the second time. The second thinning has left 1,300 trees per acre with an average height of 32 feet and a diameter at breast height of 5 inches. The tallest tree is 38 feet in height and the largest diameter is 7 inches. The wood volume is 2,500 cubic feet per acre, or 1.93 cubic feet per tree.

Seed extraction plants have been established by the New York Conservation Department at its Saratoga and Lake Clear forest nurseries. Each has a capacity of 3,000 bushels of cones. When the plants are in full operation they can provide seed enough for planting at the present rate and also allow for the normal increase for several years to come. Their operation will cut in half the State's bill for seeds of coniferous trees. It is expected to place the Lake Clear plant in operation this fall and the plant at the Saratoga nursery next year.

An 80-foot steel lookout tower has been erected by the North Carolina Department of Conservation and Development 1 mile north of Windsor, N. C., on the Stokes Road, one-fourth mile west of State Highway No. 30.

Twenty-five thousand pine transplants were planted at a lake in Cherry County, Nebr., this spring by the State bureau of game and fish.

Many Organizations Cooperate in Colorado Tree Planting

This spring 120,000 trees were sent out by the State forester of Colorado to be planted on 763 farms. Under the provisions of a Clarke-McNary agreement, the trees were sold at cost. A number of these farm plantings were made by organizations. The Camp Fire Girls of Greeley, Colo., set out several thousand western yellow pine and other trees on farms adjacent to highways, the Izaak Walton League made some plantings on farms bordering upon lakes, the De Molay boys planted several thousand trees, and the Kiwanis Club of Fort Collins made a planting on a farm some 3 miles west of the town where they hope some day to have a picnic grove.

Species that were ordered in large numbers were western yellow pine, honey locust, American elm, and blue spruce. For dry-land planting in eastern Colorado State Forester Morrill recommends western yellow pine, and the combination of Russian olive with western yellow pine for windbreaks. Honey locust and hackberry can be substituted for the western yellow pine, but are not so successful in resisting drought. In irrigated regions Mr. Morrill suggests that the rapid-growing lanceleaf cottonwood be used in connection with the Russian olive for windbreaks. Other species offered were laurel leaf willow, European white willow, Carolina poplar, and white ash. A few balm-of-Gilead poplar were provided for planting at elevations of more than 7,000 feet, and some Chinese elm were offered for experimental planting.

In the face of the most serious fire situation that had arisen in California this year, on August 25 the State director of finance granted an additional \$20,000 to strengthen the State forest patrol. This addition made California's 1928 appropriation for forest fire protection \$105,755, the largest in the State's history.

Citizens of Inverness, Point Reyes Peninsula, Calif., this year have arranged through a cooperative agreement with the State to have a State ranger stationed there, paying \$1,000 toward his salary. This action is the result of a fire of last fall that destroyed a large quantity of Bishop pine and threatened to wipe out the town.

The woodlands of New Hampshire, except those of Coos County, were closed to all unauthorized entry by proclamation of the governor on May 14. The ban was lifted on May 19, when the fire situation was relieved by a heavy rain.

Education and Extension

American Forestry Educational Project in the South

An investment of \$150,000 in public forestry education has been agreed upon by the States of Florida, Georgia, and Mississippi in cooperation with the American Forestry Association and with other friends of conservation. For the support of a 3-year campaign each of the three States has pledged \$19,500. The association has taken the responsibility of raising a total of \$91,500, of which \$30,000 has been pledged by the Commonwealth Fund of New York, \$30,000 by John D. Rockefeller, jr., \$4,200 by the Florida State Board of Forestry, \$9,000 by the Georgia State Agricultural College, and \$10,500 by the Georgia State Board of Forestry. Other amounts have been pledged by George D. Pratt, president, and other members of the American Forestry Association.

The primary object of the campaign will be to arouse popular interest in preventing and suppressing forest fires, and particularly to combat the practice of woods burning. To reach the rural population of the three States lecturers will be sent out in autotrucks equipped with electric generators, motion-picture projectors and films, and exhibits, according to the system that has been practiced for more than five years with excellent results by the Canadian Forestry Association.

The State forester of each of the three States plans to assign a member of his staff to the project for an indefinite period. W. C. McCormick, formerly assistant State forester of North Carolina, has been employed as regional director. He is charged with the responsibility of coordinating activities in connection with the project, and in cooperation with the State foresters will plan the work of the field men to be employed. Mr. McCormick's headquarters are at Thomasville, Ga.

Intensive Fire Prevention Effort in Texas

In 1927 the forest patrolmen of Texas visited every school in the patrolled area during both the spring and the fall fire season. The patrolmen also interviewed 27,000 farmers, stockmen, tourists, and other individuals. A teacher of one of the east Texas schools was employed during the summer months to show forestry motion pictures and to give forest fire prevention talks. Programs were given in 95 rural communities and reached 12,800 people. Some 35,000 cardboard fire-prevention posters were put up along roads through the piney woods, and on the main traveled highways 80 metal fire signs, 3 by 6 feet, were

erected. Forestry exhibits were shown at three of the largest east Texas fairs.

An indication of the results of this special effort in public education is seen by the Texas Forest Service in the fact that during the year 3,234 people volunteered their services in helping patrolmen to extinguish fires.

Fire Prevention Propaganda on School Book Covers

A device of the Texas Forest Service for imbedding the fire-prevention idea in the minds of children is the distribution of a school-book cover bearing fire drawings and slogans. The cover is made of heavy kraft paper. On both front and back are pictures of humanized trees and the slogans "We trees are your friends—help protect us," and "Fire is our worst enemy—never start one." Eight fire-prevention rules are given.

It is stated that the Pennsylvania Department of Forests and Waters has bought 400,000 copies of this book cover.

In Louisiana the State division of forestry is preparing a design for a fire-prevention book cover which it expects to distribute through the State. On the front is a picture of a live oak tree, and the back displays a fire picture with the legend "Help stop this." Five fire-prevention cautions appear under the head "Bring back our forests." This cover is to be made of paper produced from Louisiana pine and will bear a statement to that effect.

Ribes Eradication by New York Boy Scouts

On the Sullivan County, N. Y., vacation ground of the Boy Scout Foundation of Greater New York two crews of scouts have been at work this summer eradicating Ribes under the direction of two blister-rust control foremen. The camp ground of 12,000 to 14,000 acres of hilly land along the Delaware River includes 2,000 or 3,000 acres of northern white pine. The blister-rust crews camped in the pine woods with the foremen. The boys worked without pay. The "White Bar Trail" emblem, previously awarded on the satisfactory completion of a 5-day camping and hiking trip of 60 miles, was awarded to each scout who satisfactorily completed a certain period of duty with the crews.

Ranger School Conference at Wanakena

On August 24 the New York State Ranger School at Wanakena, on Cranberry Lake in the Adirondack wilderness, dedicated a new concrete building that is designed to serve as home and school for 70 students and faculty. On the day following its dedication the new building was the scene of a conference on ranger school education. The conference was presided over by Dean Henry S. Graves, of the Yale Forest School. Dean Graves' address is reported in part as follows:

The problem of forest education extends beyond the professional school. The future of forestry is dependent not only on the ability, vision, and sound judgment of the professional foresters but also on the intelligence and skill of the men down the line—the superintendents and foremen of local forest activities and the workers in the woods and at the mill. The key to successful work in forest protection, silviculture, or utilization is oftentimes the interest, enthusiasm, and ability of the local field officers, the ranger, the woods foreman or logging boss. The training of these men for their special work in the forestry undertaking is as important as that of the professional forester.

Heretofore our educational efforts have been directed chiefly to the collegiate school and the training of men for the directive work in forestry. We have largely neglected the problem of training men for the special jobs in the forest and factory and for the secondary executive positions for which a collegiate training is neither necessary nor suitable. We have in the United States 25 collegiate institutions offering a training in forestry and only one regularly established ranger school, namely, the New York State Ranger School, whose progress and success we are celebrating to-day.

It is the task of vocational education to meet the pressing need for better trained field personnel in the forest and mill. The recognition of this situation does not in any way minimize the importance of the collegiate school and of advanced educational work in forestry. Organized vocational education would supplement the work of the regular forest schools. It would fill a wide gap in our present structure of forest education.

In connection with the dedication of the new building of the Wanakena school, announcement is made that 15 acres of land has been added to the school's forest as a gift from the Hon. Louis Marshall, president of the board of trustees. The gift plot borders the school forest for about one-fourth mile along the south boundary and simplifies the boundary line to a considerable degree. The land has been logged but never burned, and on it are growing many old hardwood trees with a fine crop of second-growth hardwoods underneath.

Pasadena Puts Over American Forest Week

American Forest Week, 1928, found a hospitable reception in Pasadena, Calif., according to the report of Ranger M. H. Davis. Mr. Davis, who is stationed in Pasadena as fire dispatcher of the Angeles National Forest, began a forestry education campaign early in April, with semiweekly talks broadcast from radio station KPSN. Ranger Davis and Rangers B. L. Coulter and W. T. Murphy, also of the Angeles Forest, gave talks at nearly all the grammar schools of the city, showing in connection with each talk the one-reel mo-

tion picture, "The Angeles National Forest." One Pasadena newspaper alone gave the campaign 214 column inches of space. Forestry talks were given by members of the American Legion before all the service clubs and by Ranger Davis before the Pasadena Elks and Optimists, the Pasadena and Lamanda Park American Legion Posts, and other organizations. An essay contest sponsored by the Izaak Walton League set children in 20 schools to work on the subject "What forest conservation means to Pasadena." The winning essayist in each school received a pair of round-trip tickets either to Mount Lowe, on the Pacific Electric Railway, or to Mount Wilson, on the Mount Wilson stage line. The second prize in each school was a pair of tickets to one of the Pasadena theaters. First and second prizes for the entire city were \$10 and \$5, respectively, given by the Pasadena Merchants Association, and the school attended by the child who won first prize for the city received a \$20 picture presented by the Pasadena Chamber of Commerce.

Nebraska Extension Forester Reports Important Plantings

The Chicago, Burlington & Quincy Railroad in cooperation with the Agricultural Extension Service and with farmers whose lands adjoin the right of way planted 7,000 trees this year on the Sterling Holdrege division between Holdrege and Grant, Nebr. The purpose of the planting was not only to beautify the right of way but to provide the railroad with a snow fence and the farmers with a shelter belt. During American Forest Week all divisions of this road in Nebraska attached to dining-car menu cards a sheet giving the history of the Nebraska National Forest.

In celebration of Arbor Day and American Forest Week 1,537 Nebraska schools planted trees on their grounds and school children of 56 counties competed in an essay contest on "Trees and tree planting." Prizes for the winning essayists totaling \$100 were provided by the Nebraska Nurserymen's Association.

Community forest plantings in Nebraska reported this year by Extension Forester Clayton W. Watkins include the planting of 2,800 trees at Fremont and of small numbers of trees at Atkinson, Inman, and Ravenna by local chapters of the Izaak Walton League.



During the past winter and spring 30 farm woodland demonstrations, covering 650 acres, were established in Richland County, Ohio, by Extension Forester F. W. Dean in cooperation with County Agent John Gilkey. Trees of undesirable species and grapevines were removed. The areas have all been classified under the forest tax act, which means that they will be used strictly for timber growing purposes and all livestock excluded.

Where, When, and How to Plant White Pine

The Extension Service of the University of New Hampshire has issued directions for planting the northern white pine which bring together in compact form the essentials for successful planting of this species. It is pointed out that "white pine can not be expected to make progress if planted in bog holes or left to grow under dense shade. Pine planted too deep is sure to be retarded or killed. No blanket rule for spacing can be laid down. To offset possible weevil damage, and also to keep the size of the knots at a minimum, trees need to be planted 6 feet by 6 feet or closer on open land. On sprout or cut-over land only 700 or 800 trees to the acre are needed. White-pine plantations must be free from currant and gooseberry bushes to be safe from the blister-rust disease. A plantation usually needs to be freed from competing weed trees, such as gray birch, within a few years after planting."

Further directions are as follows:

Do not plant white pine underneath hardwood on heavy soils. Do not plant white pine underneath gray birch on sandy or light soil unless the birch are to be cut within five years. Do not plant during the summer. Do not plant on a cut-over pine lot until the second year after the pine has been cut, in order to avoid damage from the pales weevil. On soil that is too wet, or that is extremely dry and sandy, white pine will not make good growth.

On field land plant at least 1,000 trees per acre. In young stands density is in direct proportion to quality. On cut-over land where groups of desirable hardwood sprouts from small stumps less than 2 inches in diameter or seedlings of species such as white ash, oak, white birch, rock maple [sugar maple], and basswood are growing, do not plant among such groups, but allow them to come up along with the surrounding planted pine. This will lead to the development of a desirable mixed forest of pine and hardwood. When planting among hardwood stumps, avoid planting close to the stumps. The planted trees will thus have a better opportunity to compete with the hardwood stool sprouts. Keep hardwood sprouts from growing up over the tops of planted pine. Sprouts need not be cut clear back to the ground.

Protect white-pine plantations from disease such as blister rust and from insects such as white-pine weevil.

Red pine [Norway pine] is often suitable for very light soils or for sites where there is apt to be severe damage from the white-pine weevil. Red pine is not susceptible to white-pine blister rust, is usually free from weevil damage, is more resistant to fire than white pine, but does not endure shade so well as white pine. Red pine is susceptible to what is known as sweet fern rust, but this disease seldom causes serious damage. Red pine lumber is not suitable for such general use as white pine lumber.

On sprout land use 4-year-old transplants. On field land 3-year-old transplants usually give satisfactory results. Trees can be purchased from the State forest nursery at Gerrish, N. H., or at commercial forest nurseries.

If trees are not to be planted as soon as they are received, they should be heeled in immediately upon arrival. Save the moss in which the trees are packed, for use at the time of planting.

When planting, carry the trees in a planting basket or bucket in the bottom of which damp moss has been placed. Do not have the roots covered with wet clumping mud that causes them to stick together.

On sprout land slit planting is satisfactory. On sod land mattock planting may be used but is not necessary. For full planting under all conditions slit planting should give the best results. Fall planting properly done gives satisfactory results. When using the slit method, work the planting tool back and forth enough to form a space for the spread of the roots. There are several kinds of tools for slit planting. One practical

tool has a blade about 6 inches wide and 5 inches long with a bar for the foot at the top. This is attached to a peavy handle. The tool is strong and has weight enough to be forced down among roots and rocks, while the blade is short enough not to cause too deep planting. The hole made with the mattock is dug with two or more strokes. The first stroke removes the sod and the second makes the hole. Do not plant too deep, but try to get the tree as deep into the soil as it was when taken from the nursery. Do not bunch the roots, but spread them by a light shake when the tree is placed in the ground. Firm the tree in well with the heel.

To make the investment sound, classify the plantation under the New Hampshire Walker classification law.

The test of good planting is not just whether the trees live, but whether they make good growth during the first few years after planting.

Northern White Pine for Underplanting

"In Connecticut the best tree for underplanting at the present time is northern white pine," Alfred A. Doppel advises Connecticut farmers in an extension bulletin of the State agricultural college. "This species is capable of enduring more shade than red pine [Norway pine] and, though it is not so tolerant in this respect as the spruces, it outstrips them in height growth. When the pines attain a height of 5 or 6 feet the hardwoods may be removed without fear of the sprouts suppressing the pines. The gradual removal of the overstory, if practicable, is better because it permits the sensitive tissues of the shade-grown pines to become hardened to full exposure, otherwise sun scald may result. Another desirable feature of this method of changing the composition of the stand is that the white pines will be almost 100 per cent straight, owing to the fact that the white-pine weevil does not like to lay its eggs on trees growing under shade."

A "Grow Sawlogs" Campaign in Arkansas

In his efforts to dissuade farmers of southern Arkansas from clear cutting their young pine timber for pulpwood Extension Forester W. K. Williams has now been assured of the support of the Dallas County Agricultural Committee. At a meeting in July this committee of 10 farmers and 4 business men unanimously endorsed Mr. Williams's plan for a forestry education campaign for the second half of 1928. Together with lectures and advice to farmers on growing timber to sawlog size rather than selling young timber cheaply for pulpwood, this plan includes lectures and motion-picture showings on forest-fire prevention and the establishment of four well-located timber-growing demonstrations.

Mr. Williams's efforts in Dallas County have been energetically seconded by M. R. Warner, county agent.

Dallas County contains 355,000 acres of woodlands, of which 65,000 acres are owned by farmers.



Of the 39 county agents in New York State who are graduates of the New York State College of Agriculture, 21 have had at least one course in forestry.

Farmers' Tree-Identification Contest in North Carolina

In advance of the annual farmers' short course given at the North Carolina State College, Raleigh, July 24-27, it was announced throughout the State that Extension Forester R. W. Graeber had arranged a tree-identification contest in which the prize would be a wood-sawing outfit of the type to be attached to a tractor for sawing stovewood. As the result about 100 interested contestants appeared, some of them bearing specimens of foliage which they had been collecting for weeks and wished to have identified before they entered the contest. The contest included 50 trees, for each of which were shown specimens of foliage and a full section of the trunk with bark. The five men and the five women who made the highest scores were introduced by Mr. Graeber to an audience of 1,000 that came to see motion pictures. State Forester Holmes presented each contestant with a copy of his forest tree guide, and Mr. Graeber handed or mailed to each a correct list of the trees that had been shown in the contest.

Sterilizing Seed Beds with Steam

The University of Washington reports good results from the first year of its experiments in raising western conifers in seed beds sterilized with steam.

Equal quantities of seed of Douglas fir, Sitka spruce, and western yellow pine were planted in parallel beds. A steaming pan slightly larger than the standard 4 by 4 by 12 seed bed was made of fir and cedar lumber and lined with roofing paper and tar. The steaming was done on June 1. Although the soil was well worked before steaming, its damp condition and the fact that the available steam pressure was under 10 pounds necessitated a long steaming period. Tests were made both with a single hour period of steaming and with an hour period repeated after an interval of 24 hours. A temperature of 100° C. was obtained at least 8 inches beneath the surface within 30 minutes.

At the end of September, there were 30 per cent more Douglas fir seedlings in the steamed beds than in those left unsteamed. Sitka spruce showed an equally great advantage where steam had been used and the western yellow pine showed an even greater advantage. Little difference in results appeared between the once and the twice treated beds.

Weeding required only about one-sixth as much labor in the sterilized as in the unsteamed beds. In the steamed beds there was some appearance of fern prothallia and marchantia thalli, of which the control beds showed no trace.

Late in the summer, both roots and tops of the seedlings in the control beds were found to be markedly undeveloped in comparison with those in the steamed

beds. This was found to be due to "root sickness" attributed to the same fungi that were believed to have caused the first mortality. During the fall and winter months the healthy plants outstripped to a considerable degree those with the affected roots. Sitka spruce in the control beds showed especially poor development during this period and suffered from much frost heaving. Very little difference in development, however, was shown at this period between the western yellow pine in the sterilized beds and that in the untreated beds. Apparently the seedlings of this species had passed the critical stage.

This preliminary investigation is being repeated together with a study of the pathogenic and non-pathogenic soil fungi involved, with special reference to the reaction of the fungi to steam heating.



Temperature under the bark may have an important bearing on the variation in the rates at which different sizes of northern white pine slash decompose, according to a study made by A. W. Gottlieb on the Harvard Forest. Through a series of readings made with a system of thermocouples in the month of August it was found that subcortical temperature reached the highest point in sticks from 4 to 6 inches in diameter. Lower temperatures were shown by sticks of other sizes in the following order: 6 to 8 inches diameter, 2 to 4 inches, 8 to 10 inches, and 0 to 2 inches.

Previous work by S. A. Graham showed that high temperatures beneath the bark of logs limit the activities of subcortical insects.



The De Molay forest on the Columbia National Forest, Wash., was enlarged this spring by the planting of 38,000 trees on 55 acres. This work is a continuation of an 85-acre planting financed last fall by the boys of the Order of De Molay in the State of Washington as their "special patriotic and civic service" of the year. The plantation is situated about 15 miles north of Carson, Wash., on the Evergreen Highway. The planting is done by an experienced crew under the direction of a forest officer.



Forty-five Four-H Club boys of Louisiana have been rewarded for good work in forestry during the past year with prizes donated by the Great Southern Lumber Co. The two highest awards are free trips to the national Four-H Club congress that will be held in Chicago during November. Five prizes consisted in trips to the operations of the Great Southern Lumber Co. and 38 were trips to Four-H camps in various parts of the State.

Forest Service Notes

Some Effects of Fire on Slash and Longleaf Pine Areas

The effects of two severe fires that occurred in southern Georgia in the spring of 1927, each covering several thousand acres of cut-over pine lands, were studied by foresters of the Southern Forest Experiment Station in April, 1928. On a slash pine area where the 1927 fire had been preceded by periodic burning, no living pine reproduction whatever was found. On an area that had been successfully protected from fire for 7 years prior to 1927, most of the slash pine seedlings over 12 feet in height and 6 or 7 years old have been able to survive and a considerable proportion of the younger trees, also, have lived through the fire and the year following it. On this area there remains as a nucleus for another crop of trees an average of 366 young slash pines per acre, averaging about 10 feet in height.

The remarkable fire-resistant powers of healthy, fast-growing longleaf pine stands that have attained diameters of more than 2 inches is attested by the results of this study. In open-grown pole stands of longleaf no evidence was found of the killing of any of the trees ranging from 4 to 8 inches in diameter.

In slash pine on poorly drained sites that had not been burned for seven years prior to 1927, 78 per cent of the turpented and 48 per cent of the round trees 8 inches and more in diameter were killed. In longleaf pine, on better drained sites, that had not been burned for about two years the losses included 56 per cent of the turpented and 32 per cent of the round trees of this size. In longleaf that had previously been burned periodically the trees 8 inches and more in diameter, all of which had been turpented, were all killed.

Crawlers Used Successfully on Fire Lines in Arizona and New Mexico

Tractors of crawler type have proved their value as fire-line builders on the national forests of Arizona and New Mexico. On ground with a slope of not more than 15 per cent, two or more fair-sized logs are hooked to the tractor and pulled along the course of the proposed fire line. If time permits the tractor is whipped from side to side to break up the ground. The logs then open out a fairly wide and clean line that a few men can rapidly work into a good fire line. On slopes of more than 15 per cent the tractor is whipped from side to side to clear the line without the help of the logs. On steep slopes logs will not follow the tractor if the line is run across the slope. The tractors are now equipped with lights for use at night.

Fire Characteristics Related to Forest Cover Type

Characteristics of forest fires differ according to the forest types in which the fires occur, according to analyses by S. B. Show and E. I. Kotok of reports on individual fires on the national forests of California. The fuels in one forest type differ markedly from those in other types, and the various climatic and topographic factors that are responsible for the type also influence in no small measure the rate of spread of fires and the difficulty of their control.

In the chaparral and brush types, Show and Kotok found, incendiary fires are much more common than in other forest types. Here the length of the fire season is five and two-thirds months, as compared with only four months in the fir type, and fires are much harder to control. In the chaparral a going fire covers fifty times as much area in an hour as in pure fir, the type in which suppression is easiest. These facts in themselves indicate the possibility that types may furnish a valuable guide for allotting fire-suppression funds and distributing fire guards and lookouts.

The western yellow pine type, with high values both present and potential, is indicated by these studies as the type most needing additional protection to insure profitable timber production. The measure indicated as perhaps most needed at the present time by the California forests is the protection of the restocking brushfields found in all the timber types.

Wilderness Areas in the Rocky Mountain District

In the Rocky Mountain National Forest District 42 separate tracts of national forest land have recently been set aside as "wilderness" areas. These areas have been selected as lands in which natural forest conditions should be preserved, either for scientific or for recreational purposes. In 13 small areas on the national forests of Colorado, Wyoming, and South Dakota all forms of commercial or recreational use are prohibited, in order to provide opportunity for scientific observation and research. One wild, inaccessible area of 100,000 acres on the Washakie National Forest, Wyo., is closed to commercial use and dedicated to recreation. The remaining 28 areas, comprising 2,451,020 acres in Colorado, Wyoming, South Dakota, and Minnesota, will be kept in a wild state in the sense that they will not be developed by road building or opened to occupancy under permit. They will, however, be subjected to grazing and to timber cutting.

Fertilizer Value of Norway Pine and Jack Pine Litter

A field study of the value of forest leaf litter in pine forests of the Lake States conducted by the Lake States Forest Experiment Station at Cloquet and Cass Lake, Minn., which was reported in the *FOREST WORKER* of March, 1927, has now been completed. In this study burlap strips were laid on the ground in five different localities in Norway-pine and jack-pine stands of different ages and densities, and the accumulated leaf litter was collected from these strips annually.

On the basis of the average accumulation on these plots it appears that a year's fall of litter on 1 acre of pine forest in the Lake States could be stuffed into 200 burlap bags about 2 by 4 feet in size. In pure Norway-pine stands the bulk is somewhat greater than in pure jack pine. The yearly fall per acre was found on the average to weigh 2,257 pounds when air dry, or 2,100 pounds when oven dried (at 100° C.). The total fall of litter for all five plots in 1927 differed by only 1 per cent from that of 1926, on the basis of oven-dry weight. Individual plots, however, showed as much difference from year to year in the weight of litter accumulation as was shown between plots of different species for a given year, the variation being about 15 per cent. Exceptions were the plots in pure jack-pine forest, in which the accumulation varied little from year to year. The lack of uniformity in distribution of needle litter over the forest floor is illustrated in this study by the fact that a consistent variation appeared from year to year in the amount of litter caught on the various plots. In one case the annual catch on plots 200 feet apart differed by 50 per cent in both 1926 and 1927. This difference indicates the necessity of getting adequate samples.

On a plot in a Norway-jack pine stand it was found that the litter accumulated between the middle of June and the middle of October, 1926, weighed as much as that which accumulated during the remainder of the year. In a pure Norway-pine stand the accumulation during these four months was almost five times as great as that of the remainder of the year.

In order to estimate the amount of water that leaf litter will absorb, a portion of Norway-jack pine litter was soaked in water for two days. After the loose water was shaken off it, the litter was found to weigh 156 per cent more than when it was oven dry. Thus a ton of litter oven dried can hold 1½ tons of water by pure absorption. This means that in forests such as those in which this study was made, the average needle fall for a year can absorb within itself a rainfall of about 0.014 inch. Moreover, in addition to the water that soaks into the needles themselves, much water is held by the litter lying on the forest floor that drains away from the litter when it is picked up. Also, in considering the water-holding capacity of forest litter in

place on the forest floor one ordinarily is dealing with the accumulation of a number of years.

According to analysis of the samples collected in this study, the annual accumulation of litter on 1 acre of the forest floor in the pine forests studied contains chemical elements in the following amounts: Nitrogen, 8 to 16.5 pounds; calcium, 9.9 to 21 pounds; phosphorus, 2.1 to 3.5 pounds; potassium, 2.6 to 3.5 pounds; and sulphur, 5.6 to 6.7 pounds.

On the strength of the chemical analysis of the litter Doctor Alway, head of the Division of Soils in the University of Minnesota, has computed that the nitrogen content alone in the leaf litter amounts on the average to 15 pounds per acre. Soils similar to that on which the leaf litter was collected would produce, with liming, somewhat more than 2 tons of alfalfa hay per acre per year. This would carry about 100 pounds of nitrogen. From one-sixth to one-eighth of an acre of alfalfa, therefore, collects from the air just about as much nitrogen as is contained in the leaf litter deposited each year on one acre of the forest floor. In unburned forest there is present an accumulation of litter from three or four years. Therefore fire that destroys the accumulation of leaf litter robs the soil of from 45 to 60 pounds of nitrogen, to replace which would require the application of from \$9 to \$13 worth of sodium nitrate per year.

Do Understocked Stands Ever Catch Up?

N. W. Hosley, forest assistant on the Harvard Forest, has transmitted to the *FOREST WORKER* the comments of Yrjö Ilvessalo on Donald Bruce's article in the January number of the *WORKER*, *Do Understocked Stands Ever Catch Up?* In this article Bruce questioned the theory, commonly held by foresters, that understocked stands approach normality. In so doing he cited tables given in Professor Ilvessalo's book, "The Forests of Finland," that compare actual and normal volume and annual growth of stands in given age classes in southern Finland, and pointed out that these tables offer no evidence in support of the theory. Bruce was careful to explain that some factor unknown to him might make these tables inapplicable to this argument. Professor Ilvessalo states that this is the case; that the Finnish forests whose volume and growth form the basis for these tables have not been allowed to develop naturally but have been subjected to extensive thinnings and fellings.

Bruce remarks:

Professor Ilvessalo's comment on the effect of thinnings is, of course, entirely pertinent, and it was the realization that there were doubtless factors of this sort involved that made me word my comment on his tables so cautiously. I merely said that there seemed to be no evidence there in favor of the approach theory. I was led to call attention to this fact because this theory has been so widely accepted on purely theoretical grounds and because so little evidence in favor of it has been published. If my article stimulates search for it, I shall be more than satisfied.

National Forest Receipts

National forest receipts mounted in the year ending June 30, 1928, adding \$274,829 to the receipts of the preceding year to make a total of \$5,441,434. Timber sales brought in \$3,262,525; livestock grazing fees, \$1,694,273; permits for special uses of land included in the forests, \$285,684; and water power permits, \$101,797.

The share of national forest receipts turned back by the Federal Government to the counties in which the forests are situated, for roads and schools, amounted for the past fiscal year to \$1,387,249.

Improved Market for Alaska Hemlock Logs

By J. M. WYCKOFF, United States Forest Service

Heretofore the sawmills of southeastern Alaska have demanded logging chances with a minimum of hemlock, and the Forest Service has found it difficult to obtain the desired utilization of hemlock of saw-timber size. In 1927, however, two of the largest mills secured contracts from the Alaska Railroad for sawn hemlock ties. The operators of these mills were willing to go into stands with as much as 20 per cent hemlock. In 1928 the tie market improved, and sales were made on areas cruising 35 per cent hemlock. In addition to the sales for ties, an order has recently been placed with the Ketchikan Spruce Mills calling for 800,000 feet board measure of hemlock timber for flume construction in Alaska. This order includes more than 200,000 feet board measure of timber 6 by 16 inches by 16 feet. As a result of this order one sale of 500,000 feet has been made that will cut 75 per cent hemlock. A raft of 250,000 feet of timber from this sale cut 20 per cent 6 by 12 inch, 12 by 12 inch, and 6 by 16 inch lengths of from 16 to 32 feet.

The Tongass National Forest has carried on a persistent campaign to open a market for hemlock lumber, and it appears that these efforts are about to bear fruit. The loggers and sawmill owners are sold on the merits of Alaska-grown hemlock and are cooperating closely with the Forest Service in advancing the market for this product.

Huron National Forest Created

A presidential proclamation of July 30 created the Huron National Forest, in Crawford, Oscoda, Iosco, and Alcona Counties, Mich. The new forest includes some land formerly comprised by the Michigan National Forest. Its gross area is 500,000 acres. Of this total about 200,000 acres are now Government property. The National Forest Reservation Commission has authorized acquisition by the Department of Agriculture of the privately owned lands within the newly defined boundary.

Mogollon Working Circle in Arizona Tapped

The most recent of the saw-timber working circles in northern Arizona to be made accessible, the Mogollon working circle on the Sitgreaves National Forest, has just been tapped with a standard gauge railroad 19 miles long. The railroad connects the Arizona towns of Standard and Snowflake. Snowflake is located on the Apache Railway, a common carrier. At Standard the Standard Lumber Mills (Inc.) has nearly completed the rebuilding of a single band resaw mill at which will be milled the 30,000,000 feet of timber to be cut annually from the Mogollon working circle. The operation will be on a sustained yield basis and it is expected that the present mature stand of 2,250,000,000 feet to be removed will be completely logged out during the first cutting cycle, which has been placed at 75 years.

Lodgepole Pine, Aspen, and California Red Fir Tested for Boxes

The Forest Products Laboratory has been testing some of the little-used timber species as material for packing boxes. Boxes of lodgepole pine, aspen, and California red fir when subjected to various storage conditions and changes in moisture content gave results very similar to those obtained with western yellow pine boxes of the same design. A lower rating was earned by western larch, and still less favorable results were shown by white fir, silver fir, western hemlock, and lowland white fir.

It was found that boxes made from green lumber and allowed to dry are likely to show only one-half to one-fourth as much resistance to rough handling as boxes made of dry lumber and stored under the same conditions. For the most satisfactory results boxes should be nailed up at a moisture content only slightly above that of equilibrium conditions of service.



Air patrol of the national forests of Idaho, western Montana, Washington, Oregon, and California during the 1928 fire season was contracted to commercial flying organizations. At a charge of \$30 to \$50 per hour of flying these organizations undertook to fly patrols on request of forest supervisors either to detect or to scout fires.



The Lee National Forest, on the Camp Lee Military Reservation in Virginia, has been abolished. Other military national forests recently abolished are the Jackson, on the Camp Jackson Military Reservation in South Carolina, and the McClellan, on the Camp McClellan Military Reservation, Ala.

A Study of Acorns and Oak Seedlings

In studying problems connected with the germination of acorns and early survival of oak seedlings C. F. Korstian, of the Appalachian Forest Experiment Station, found evidence that for many oaks the bearing of acorns is without profit so far as reproduction is concerned. Doctor Korstian's studies, which were conducted in Buncombe and Haywood Counties, N. C., and in New Haven County Conn., showed that in many cases from 90 to 100 per cent of the available supply of acorns may be eaten by rodents and other animals. Many acorns, also, fail to germinate because of injury by insects, the principal insect offenders being nut weevils.

Whether the acorn that escapes destruction by animal or insect retains the power to germinate depends partly upon the amount of moisture it is able to retain. Red oak acorns are slightly drier than those of the white oak, the normal moisture content of the embryo being from 50 to 60 per cent of total weight for the former and from 60 to 70 per cent of total weight for the latter species. Viability of acorns is largely decreased if their moisture content falls to between 30 and 20 per cent and is completely lost if it falls to between 15 and 10 per cent. Proper storage conditions, whether natural or artificial, provide sufficient atmospheric or soil moisture to maintain the general high level of water content in the seeds, and at the same time provide enough oxygen for the respiration of the moist acorns.

The most favorable storage temperature, in general, averages 50° F. at night and 65° F. in the daytime. Below 40° F. germination does not occur, and temperatures exceeding 80° F. at night and 95° F. during the day affect germination unfavorably.

Germination is somewhat delayed in the black-oak group, the seeds of which are more fatty than those of the white-oak group. An increase in temperature within the vital range tends to shorten the rest period, but is not alone sufficient to terminate it. The need of acorns of this species for a rest period and for high temperatures to hasten after-ripening is believed to be associated with enzyme activity, particularly with reference to the conversion of fats into carbohydrates.

Forest fires usually destroy the viability of acorns lying under the leaf litter. Red oak acorns resist high temperature more successfully than those of other species. The other groups rank in order of decreasing resistance as follows: chestnut, black, scarlet, and white. In the case of oaks as of many other trees, the larger seeds give a better percentage of germination and more vigorous seedlings than the smaller seeds.

Compactness of the surface soil is an important factor in the ability of oak seedlings to take root. According to the results of measurements with a penetrometer and studies of the ability of the oak radicles to penetrate the substratum, it appears that the seedlings can not take root if the penetrability of the surface

layer lies at a point somewhere between 0.01 and 0.023 millimeter per gram of load applied.

Leaf litter has a part of the greatest importance in producing an environment suitable to the germination of acorns and the survival of oak seedlings, because it stabilizes the moisture and temperature conditions and prevents the surface soil from becoming so compact that the seedlings' roots can not penetrate it.

Results of a Test Planting in Idaho

On the experimental forest of the Northern Rocky Mountain Forest Experiment Station near Priest River, Idaho, test plantations were established from 1911 to 1917 with western yellow pine seed from 19 different localities in the Western States. There are 21 plots, each 50 feet square and originally planted with 100 transplants except for 4 that are half that size and were planted with 50 transplants each. They represent nine climatic units within the natural range of this species: The southern Rocky Mountain region, the Siskiyou-Shasta region, the Blue Mountains of northeastern Oregon, the Salmon River Mountains in southern Idaho, the east slope of the central Rocky Mountains, the Black Hills region, the west slope of the northern Rocky Mountains, the Uintah Range of northern Utah, and central Montana. The site is a rather dry, flat, and uniform glacial outwash of deep, fine sand and interspersed gravel lying at an elevation of 2,400 feet. Sixteen years of weather observations made near by show that the air temperature may range in a year from -30° to 100° F., and that the mean is about 43° F. According to the most closely applicable weather records available, it appears that this mean is well below the average mean annual temperature of the localities from which seed were brought for the experimental plantings. The annual precipitation on the planting site has varied from 24 to 41 inches but is normally about 30 inches.

In the fall of 1927 Gerhard Kempff, then of the Northern Rocky Mountain Forest Experiment Station, examined these plantations and recorded observations as to survival, height growth, vigor, and frost resistance of the trees. The results of this examination set off the localities of origin into two general divisions, separated geographically by a line running approximately east and west through the southern Black Hills and through the central Blue Mountains just south of the Umatilla Forest, Oreg. The northern division, embracing the site of the experimental plantations, embraces also the seed sources of the 10 plots that were rated highest. Mean annual temperatures for all these sources are strikingly similar, Mr. Kempff observes, and their extremes of temperature are broadly comparable. Precipitation, on the other hand, varies considerably among these various sources of the seed with which the best results were obtained at Priest River. Between some of them the annual mean differs by as much as 100 per cent.

Seed Bed Density

For several years experiments were carried on by W. G. Wahlenberg, then of the Northern Rocky Mountain Forest Experiment Station, to determine the density at which seed of various tree species should be sown to produce the most desirable planting stock. Working at the Savenac Forest Nursery in western Montana with seed-bed densities varying approximately from 80 to 260 seedlings per square foot, he found that the diameter of 1-year-old seedlings of western yellow pine decreased one-tenth millimeter for each increase of about 44 trees per square foot. The height growth of 1-2 transplants in the nursery decreased one-tenth inch for each increase of about 24 seedlings per square foot in the seed beds, and the number of main rootlets on 3-0 stock decreased by 1 for each increase of about 22 seedlings per square foot. The percentage of distinctly inferior 2-year-old plants increased by 1 for every increase of about 27 trees per square foot. Slight as these differences may seem, they apparently had an effect upon the field survival of 2-0 stock; two years after planting, survival was 1 per cent lower for each increase of about 27 trees per square foot in the original seed bed. Height growth of field-planted stock, also, decreased with an increase in seed-bed density.

Western white pine 2-0 stock grown in dense stands were much smaller, more slender, and slightly taller, and had fewer lateral rootlets than those that were given more room. Field survival was distinctly higher for trees grown at densities of less than 210 seedlings per square foot in the seed beds.

With 3-0 Engelmann spruce ranging in density from 116 to 323 seedlings per square foot in the seed beds, increases in density were accompanied by decreases in characteristics desirable in planting stock. Stems were shorter and more slender, needles were shorter, and tops and roots weighed less. These features of general development overshadowed the advantage from an increase in the proportion of total plant weight contained in roots of densely grown plants.

In spruce seed beds at Savenac frost nipping decreased with increases in density, but in relation to the more severe damage from frost heaving the advantage worked in the opposite direction. Frost heaving of 2-1 spruce in transplant rows and 3-0 spruce in field plantations increased with the density at which the trees were grown in the seed beds. With decreases in the density of seed beds the field plantations showed a tendency toward increased survival and growth.

For the best development of seedlings at Savenac, Mr. Wahlenberg concluded, there should be less than eighty 2-year-old western yellow pine, less than one hundred and sixty 2-year-old western white pine, or less than one hundred and twenty 3-year-old Engelmann spruce per square foot of seed-bed surface.

Forage Plant Seed Sown on the Manti National Forest

On parts of the Manti National Forest, in the Wasatch Mountains in central Utah, where growing conditions are favorable, an effort is being made to reseed depleted range areas with desirable forage plants. In 1924 an acre of fenced ground at the Bear Creek Ranger Station was sown to smooth brome grass, and each year since then the forest rangers have been sowing depleted range areas on the forest with seed harvested on this plot. In order to speed up the work, the forest supervisor and the stock associations wrote to stock owners and herders on the forest suggesting that in connection with their regular work they collect seed of the valuable forage plants on and near their allotments. Suggestions on reseeding practices were given to the stockmen by the rangers. Some of the stockmen now collect a pocketful of seed from time to time, some strip sackfuls of ripened seed from the plants, and some are collecting seed of palatable plants at considerable distances from their allotments and even on other forests.

Certain herders on the Manti have been collecting and sowing seed for several years. The Cottonwood Creek Cattle and Horse Association in 1924 sowed 200 pounds of yellow clover seed furnished by the county agent of Emery County. The seed was distributed by the riders as they made the second fall ride. On part of the area covered an excellent stand of yellow clover was established by 1927. Through cooperation of the Twelve Mile Cattle and Horse Association, sowing of some 40 or 50 acres of denuded range in Clear Creek Flats was undertaken last year. Wheat grass from the steppes of Russia and a mixture of alfalfa, timothy, alsike, and dutch clovers were sown in May, 1927, and late in the fall adjoining areas were sown with rye and with the smooth and native brome grasses. It was expected that the rye, besides furnishing forage for one season, would perhaps act as a nurse crop for the brome grasses.



Sixteen-year-old seed of western yellow pine showed a viability of 88 per cent in germination tests recently made by W. H. Schrader, in charge of the Monument Nursery on the Pike National Forest, Colo. The seed, collected on the Cochetopa National Forest, Colo., in 1911, were water cleaned in 1916, but were not treated in any way from that time until they were tested in the spring of 1928. The seed were kept in an unheated seed room in unsealed cans.



The name of the Minnesota National Forest, Minn., has been changed by Executive order to Chippewa National Forest.

Planting Stock Unhurt by Storage

Planting stock taken from seed beds of the Wind River Nursery, Columbia National Forest, Wash., in the spring of 1927 reached the field in good condition after being stored in the cellar of the nursery as long as 32 days. It is the practice of the nurserymen to keep bundles of stock in storage in order that shipments may be made on short notice. The low temperature of the storage cellar keeps the stock from drying out and holds the buds dormant.

In the spring of 1927 each bale of trees stored in the cellar was given a number and records were kept of the dates on which each bale was placed in the cellar and shipped and of its weight at those times. Position in the pile was noted, and frequent measurements were made of the temperature within bundles. Lots held in storage more than 20 days were resoaked by upending the bales and squirting water in the ends with a hose from 1 to 16 days before shipping. This was done as a precaution rather than because of any direct evidence that the trees were in need of water.

In lots held in storage from 1 to 15 days the average loss of weight per bale ranged from 5.2 pounds to 11.4 pounds. Loss of weight showed very little variation with length of storage, depending in a greater degree on how wet the packing material was when the bundles were made up. The main loss in weight was the runoff of surplus moisture from the packing material the first day. One lot lost an average of 8 pounds per bale in one day's storage. On the average the bales packed in moss lost 1.73 pounds more than those packed in shingle tow, probably owing to the fact that moss absorbs more water at the start.

At no time were temperatures within the bales found to be more than 2° higher than the cellar temperature. The latter varied very little from 40° F.

Position in the pile appeared to make no difference in loss of weight, the extra pressure on the bottom tiers of bales being compensated for by the additional circulation of air around the top tiers.

In all cases the different shipments of stock reached the field in good condition.

Raw Humus

By R. F. TAYLOR, United States Forest Service

In the cold, humid climate of southeastern Alaska, coniferous forests accumulate an immense amount of litter composed of needles, cones, bark, dead wood, and twigs. Because it does not decay rapidly, this litter soon forms a dense mat of raw humus, in some places more than 6 inches deep. The humus layer is thickest and toughest in the poorly drained semimuskeg areas, but is by no means entirely absent from the younger stands of second growth. Throughout the region the forest soils underlying the layers of humus and litter are, except for certain limestone areas, exceedingly acid, varying from 4.6 pH. to more than 3.8 pH.

If the layer of raw humus formed only after the forest reached maturity, we should have no quarrel with nature, for clear cutting would bring decomposition and more suitable soil conditions for reproduction. It appears, however, to be seriously affecting the growth of immature stands.

To get some idea of the actual effect of the dense mat of tough, undecomposed, acid humus upon the growth of young even-aged hemlock-spruce stands, a half-acre plot was measured off in a stand where the layer of raw humus was more than 6 inches thick, measurements were taken of the trees growing on the plot, and these were compared with average figures for nine plots on better-drained soil but a few chains distant in stands of the same age and origin. The area with raw humus was almost level. Moss was grown through the litter, forming a thick mat of undecayed material. The humus gave way sharply to a mottled gray clay, and the underlying strata were greenstone and schists. On the better-drained land the litter layer was thin and unmatted and merged into a humus layer, which in turn merged into a dark, well aerated loam. The underlying strata were the same. The measurements, on an acre basis, were as follows:

	Basal area (sq. ft.)	Number of trees 1 inch and over in diameter	Average dominant spruce		Average dominant hemlock		pH value	Age (yrs.)
			Diameter at breast height (ins.)	Height (feet)	Diameter at breast height (ins.)	Height (feet)		
Normal humus	303	358	17.8	112	16.1	103	4.2	73
Raw humus...	299	808	12.7	97	13.2	89.5	3.8-	73

This is but a tiny illustration of the important rôle of the soil conditions in young stands. Investigations in this highly interesting field should prove enlightening. The farmer's first consideration in growing agricultural crops is the soil. Why not in growing timber crops?

New Zealand Woods Make Good Newsprint

Good newsprint paper can be made from New Zealand woods, according to the results of tests made at the United States Forest Products Laboratory on two carloads of logs sent to this country a year ago by the New Zealand Forest Service. The final test was the production of several tons of newsprint and rotogravure papers at two Wisconsin mills and the running of the newsprint paper over the presses of a daily newspaper.

The woods included in the tests are rimu, a native softwood; tawa, a native hardwood unsuited to the production of lumber; and four introduced species, Monterey pine (*Pinus radiata*), European larch, Austrian pine, and Corsican pine. For the purposes of

the pulping trials the two native New Zealand woods and the Monterey pine were considered the most important.

A satisfactory newsprint was produced from mixtures of tawa groundwood (produced in a strictly mechanical manner on a pulpstone) and tawa sulphite (chemical) pulp with Monterey pine sulphite. Reversing the usual 3 to 1 ratio of groundwood to sulphite pulp (normally added to newsprint to give strength), the laboratory found that a highly satisfactory newsprint sheet could be produced from a mixture of 50 per cent tawa sulphite, 35 per cent tawa groundwood, and 15 per cent Monterey pine sulphite. Indications were found, also, that in this process bleached rimu and European larch might be added or substituted.

Satisfactory kraft pulps were produced from the New Zealand-grown pines and larch, and bleached pulps suitable for book paper and similar products

were produced from tawa by the soda and sulphite processes and from Monterey pine by the sulphite process.

These results may mean profitable utilization of thinnings from the 100,000 acres of fast-growing planted forests in New Zealand that have now arrived at thinning age. They may also mean the freeing of New Zealand from the necessity for importing newsprint. At present New Zealand buys newsprint from Canada and from England.

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Correction.—Headquarters of the Cherokee National Forest have been moved to the Federal Building, Athens, Tenn. In the July number of the FOREST WORKER the new location was erroneously given as Athens, Ga.

General Forest News

Insects as Indicators of Fire Injury

By R. A. ST. GEORGE, United States Bureau of Entomology

The predilection of certain bark beetles and borers for freshly killed or dying trees often affords a practical guide for estimating the effects of forest fires. Attack by these insects on trees injured by fire makes it possible to predict with a considerable degree of certainty that the trees are not going to survive, many months earlier than this could be done in any other way. For this reason it is highly desirable from the forester's standpoint to know the significance of the presence of certain insects that follow fires, and their characteristic modes of attack.

The ambrosia beetles are probably the insects that attack fire-killed timber, both hardwoods and conifers, earliest and in the greatest numbers. Their attack is easily recognizable. Small pinholes extend into the wood, from which often project short tubular columns of white frass. At other times whitish powder or very fine particles of wood fiber may be noticed on the bark or around the base of the tree just below the holes. These beetles attack only moist dead wood, and when their tunnels are found associated with fire injury it is a sure sign that the portion of the tree in which their galleries are extended has been killed. If their entrance holes extend completely around the base of the tree, the tree will not recover.

Certain wood borers commonly known as pine sawyers likewise attack recently killed pine, spruce, and fir. Their attack is conspicuous and is easily recognizable by the oval pits or egg scars (one-fourth to one-half inch in diameter) that they gnaw into the bark. A slit in the bottom of these pits serves as an

opening through which the eggs are inserted in the inner bark. These beetles work only in dying and dead trees. The presence of these pits, therefore, furnishes absolute evidence that the tree is dead or will not recover, even though the foliage is green.

Species of *Ips*, or the bark engravers, are still another group associated with dying or weakened trees. Their attack is less conspicuous; usually the bark must be removed to make certain of their presence. Occasionally pitch tubes or brownish boring dust on the bark serves as an indication of their attack. Normally these species breed in dying or felled trees. Their presence, especially long after a fire, nearly always means that the tree is dead or dying, even though the foliage may still be green, and that the injury can be attributed to fire rather than to insects. An examination of the inner bark usually reveals patches or streaks of yellow-brown discoloration. It is only occasionally and under unusual conditions that these beetles are present in sufficient numbers to attack and kill green trees.

Other insect species such as the tree-killing *Dendroctonus* and certain borers are associated with fire-killed timber, but the significance of their attack is often more difficult to interpret.

Photographs showing characteristic attack of ambrosia beetles and pine sawyers will be furnished on request by the Bureau of Entomology, United States Department of Agriculture, Washington, D. C.

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The Tucson, Ariz., biological investigations field office of the Bureau of Biological Survey, of which Dr. Walter P. Taylor is in charge, has moved to new quarters at the University of Arizona, in Tucson.

Neighborly Accommodation as a Fire Prevention Measure

How generosity can prevent forest fires has been proved by the Pfister-Vogel Co. on its 65,000 acres of forest land in Union County, Ga., according to a story by F. H. Abbott in the June number of Georgia, the monthly magazine of the Georgia Association. On this land the company has erected six lookout towers and maintains a fire-protection system that costs 2 cents per acre per year. But in explaining how the proportion of the total area that is burned over each year has been reduced during its occupancy from 60 per cent to less than one-tenth of 1 per cent, the company gives credit to the excellent cooperation it has won from the mountain folk whose homes are scattered over its widespread holdings. The company's dealings with these people have for many years been directed by Bonnell H. Stone. In 1917 the company sent every taxpayer in Union and adjacent counties a letter offering free use of the range land on its property. The citizens were invited to use the 55,000 acres of range as if it were their own, on the one condition that they must not burn the woods. To-day, Mr. Abbott writes, "fences built at the expense of local citizens and the company thread the mountain sides and valleys from end to end, separating forest and agricultural land, providing great free community pastures." The use of the 100-mile telephone line that connects the company's fire towers is given free of charge to the mountain people, not only in emergencies but as a general practice. The mountaineers respond to this neighborly treatment with care in the use of fire and with help in detecting and fighting forest fires. In addition to the low annual fire score, Mr. Abbott tells us, evidence of the success of the policy is the fact that in all the years since it was announced not a strand of the company's wire has been cut and none of its equipment or property has been lost by theft.

Michigan Kiwanis Underwrites Big Plantation

"Michigan Kiwanis Forest Plantation" is the new name of a 5,000-acre tract on the Huron National Forest located near East Tawas, Mich. To pay for the labor that planted trees on this tract Kiwanis clubs of the State subscribed \$9,700. The Forest Service supplied the trees and the tools, and forest officers directed the planting. Dedicatory exercises, and a picnic on the forest, were planned for September 21. Each Kiwanian attending the dedication was expected to plant a tree along the Thompson Memorial Highway.

Next year the organization hopes to add 5,000 acres to the plantation.

A Device to Prevent Edger Kick-Backs

A device for preventing kick-backs on the edger, a source of many serious injuries to employees, has been perfected by R. F. Buckley, saw filer in the Sumrall, Miss., planing mill of the J. J. Newman Lumber Co. Fingers of high-grade steel suspended from a shaft which is fastened to the top of the edger frame by an I-beam hang down behind the back feed rolls. These fingers are half an inch apart to prevent binding and a spring on the shaft permits adjustment so they will not peck smaller boards that follow cants through the edger. The fingers are slightly curved inward and downward. Any piece passing through the edger pushes the fingers up so that they ride it as it goes through and act as a positive "dog" to prevent either edgings or timber from being shot through the front of the machine by the pressure of the saws. The location at the back of the edger prevents the device from obstructing the edgerman's view, as is the case with many other safety devices, or in any way interfering with the operation of the edger.

Great Quantities of Walnut Burl from New Mexico Ranches

On ranches on the Ruidoso and Bonito Creeks, within the borders of the Lincoln National Forest, N. Mex., Mr. Noel Insall has cut 201,000 pounds of walnut burl. This burl has been bought from the ranch owners for \$3 or more per tree. With the exception of 10,000 pounds sold to the Pullman Co., of Chicago, to be used for interior furnishings of Pullman cars, it has all been shipped to England and France. A single tree in the Ruidoso district of the forest contained 12,970 pounds of merchantable burl. In this tree the burl extended almost to the top and 8 feet into the ground. To cut it up and load the wood on trucks was nine days' work for five men.

The Boots of Tourists Injure Mariposa Big Trees

Heavy and long-continued tramping of human feet has destroyed the root endings and finer roots of many of the sequoias in the Big Tree grove of Mariposa County, Calif., Dr. E. P. Meinecke, pathologist of the Bureau of Plant Industry, concluded after investigating the present condition of the trees at the request of the National Park Service. Thus damaged, the trees are unable to absorb water and mineral nutrients from the soil. Grizzly Giant, one of the finest Big Trees in existence, was found to be similarly affected about 25 years ago. This tree was restored to health by loosening the soil surrounding it and placing additional soil around the tree and over the roots to a height of 3 or 4 feet.

Successful Fire Protection on a Georgia Turpentine Operation

A fire protection experiment is being carried out in southern Georgia by H. M. Wilson, vice president of the Baldwin-Lewis-Pace Co., Jacksonville, Fla., in connection with a naval stores operation in Clinch and Lanier Counties, near Stockton, Ga. This operation, of from 15 to 17 crops, covers about 7,500 acres of land. The protection system covers 15,000 acres. Fire lines have been formed by plowing furrows 30 to 40 feet apart, with tractor and disk plow, and burning the intervening strip. Mr. Wilson finds that lines can be constructed in this way at a cost of from \$6 to \$8 a mile. Eight or ten 5-gallon water tanks, with hand pump and short hose, have been provided. These are carried on the back and are used to spray grass fires so that men with pine tops and brushes can go close enough to a fire to beat it out. They are convenient also for extinguishing fire on stumps and snags. To refill these tanks four or five 50-gallon drums full of water are kept ready. A truck is available to transport men and equipment to fires.

In the first 18 months of the operation of this system, which included two winter seasons, its cost to Mr. Wilson, exclusive of amounts refunded to him by the Federal and State Governments under a cooperative agreement, was \$2,585. In the same time he saved \$2,400 by omitting to rake his turpentine trees. As a result of the net outlay of \$185, Mr. Wilson reports, hundreds of thousands of young pines are growing where two years ago there were none.

Pennsylvania School Children Detect Spread of Blister Rust

By enlisting the help of Pennsylvania school children in a search for white pine blister rust, the Bureau of Plant Industry has discovered the disease in 37 counties of the State. Prior to 1927 the scattered findings of the blister rust in Pennsylvania had been confined to the northeastern counties. In that year it was requested that children in the public schools of the State be asked to examine the currant and gooseberry leaves in their own and neighbors' yards. Colored pictures of leaves affected with the blister rust were provided, and the children were asked to collect any leaves that they thought resembled the pictures and to send the specimens, through their teachers, to the Pennsylvania Department of Agriculture. Schools in 53 of the 57 counties invited to cooperate did so. Children in 1,761 schools examined 13,061 gardens and sent in 465 envelopes of specimens that were identified as affected with the blister rust.

The area in which the disease was found extends nearly to the Ohio border on the west, and on the south to the Maryland line.

Water Conservation and Timber Growing at Urania

In the country surrounding Urania, La., writes Henry E. Hardtner, it is impossible to get good water from wells, whether shallow or deep. The Strickland spring, in the southeast quarter of section 6, township 10, range 1, 30 years ago was the main dependence of many families. Section 6 and sections 5 and 8 have a sandy clay soil that is good pine land, and at that time were covered with a dense virgin forest of longleaf pine. In the period 1898-1905 the timber was cut clean. Within a short time the spring was of little service, going dry periodically. In 1910 Mr. Hardtner began reforesting the denuded lands, and by 1915 these lands were occupied by a complete stand of young trees. Since then the spring has come back. It now furnishes more water than ever before, and never fails even in periods of severest drought.

On 28,000 acres of land at Urania, Mr. Hardtner is carrying out the oldest reforestation contract in Louisiana. The area includes 10,000 acres of cut-over longleaf pine land, 15,000 acres of brush woods (loblolly), and 3,000 acres of swamp lands. The logging of this land was begun in 1890. Mr. Hardtner began sawmilling on it in 1896 and completed the cutting of the merchantable timber in 1913. It was in 1913 that he contracted with the State to devote the land for a period of 40 years to experimental timber growing, the State agreeing that the assessment on the property should remain constant during that period. A 6 per cent severance tax will be levied when the new growth of timber is cut.

Many experimental plots have been established on this land, especially for study of rate of tree growth. The work has attracted much interest on the part of foresters, and for years each class graduated from the Yale Forest School has been brought to the Urania Forest for its spring camp work. Fire prevention has been practiced with a high degree of success, all bare areas have been reforested, and thinnings have been begun. Mr. Hardtner estimates that during the 15 years that the contract has been in effect he has cut from the area \$6,000 worth of timber and has spent \$25,000 in caring for the forest.



The Michigan-California Lumber Co. has announced that all its future operations will be on a sustained production basis. With the assistance of the research department of the Western Forestry and Conservation Association the company has estimated that the rate of growth of the timber on its 16,000 acres of cut-over land averages about 400 board feet per acre per year. The company's property includes 62,000 acres of virgin timber.

Coated Match Stems Lessen Fire Danger

A match that burns only so far as useful purposes require, going out automatically with part of its stem still unconsumed, is a recent fire-prevention suggestion from P. D. Sale, of the United States Bureau of Standards. Mr. Sale, whose experiments with F. M. Hoffheins to show the fire hazard involved in burning cigar and cigarette butts were described in the *FOREST WORKER* of May, 1928, has now carried out a series of tests to determine the extent of the hazard represented by matches that are discarded while still burning.

Tests were made to discover the burning life of four types of match: Swedish safety, American safety, "strike anywhere," and paper book. Half the matches of each of the four kinds used were made noncombustible for part of their length by dipping them in a solution of 60 per cent 1.39 specific gravity sodium silicate (water glass) and 40 per cent water. The protective coating was allowed to extend to a point $1\frac{1}{2}$ centimeters from the tip. Before being used in the tests the matches were all dried at a little above room temperature.

Untreated, the four kinds of matches showed an average burning time of 21.8, 26.6, 32.1, and 34.1 seconds, respectively; treated, they averaged 11, 14.4, 18.6, and 21 seconds.

About 2,000 trials were made in dropping and throwing lighted matches from 3 to 9 feet into a pile of dry grass 2 feet in diameter and 4 inches thick, which was dried before each day's tests so that its moisture content averaged about 5 per cent. The time required to light smoking materials had been determined to be 5 seconds for cigarettes and 10 seconds for cigars and pipes, so after the matches were struck periods of from 5 to 10 seconds were allowed to elapse before they were dropped or thrown. When dropped on the grass pad matches of the four different types having uncoated stems ignited it in 10.8, 22.1, 38.3, and 50 per cent of the cases, whereas those with coated stems ignited it in 14.2, 18.3, 31.6, and 33.7 per cent of the trials. When thrown, uncoated matches caused ignition in 13.3, 15, 33.3, and 61.7 per cent of the instances, while those with coated stems ignited the material in but 4.2, 10.8, 21.7, and 31 per cent of the trials. Thus it would appear that a protective coating on the stem caused a material reduction in the number of ignitions resulting when the lighted matches came in contact with the dried grass pad, especially when instead of being dropped the matches were thrown.

The need and possibility of lessening the hazard from matches discarded while still burning appear on the basis of these tests to be greater for the matches with large wood stems and those with paper stems than for the smaller wood-stem safety matches.

It can be premised with good reason, Mr. Sale points out, that the conditions under which these tests were carried out were more favorable for ignition than the

conditions that generally obtain for burning matches that alight in grass, brush, waste paper, and similar materials. If that is the case, under usual conditions the probability of ignition is more dependent on the length of stem that is free to burn than it was in the tests, and fire hazards could be reduced by the suggested modification of the match to an even greater degree than is indicated by the results obtained in the tests.

New Fire Pump Designed by Morgan

A new fire pump for use in the woods has been designed by Ralph L. Morgan, of Fitzwilliam Depot, N. H. Morgan is an enthusiastic tree-planter and forest protectionist as well as a mechanical engineer. In designing his pump, therefore, he has brought to bear on the problem first-hand experience in both lines of work and has produced a piece of fire equipment that is light and efficient and carefully planned so as to avoid the drawbacks usually found in commercial pumps. Some of the things Morgan had encountered in his experience with other pumps and that he determined to avoid in his own were "hot boxes, hard starting, close-fitted pumps that grind out when grit and sand get into them, lack of power, and small amounts of water delivered per minute."

As finally perfected, the Morgan pump weighs 350 pounds, is 5 feet long over all, $20\frac{3}{4}$ inches wide, and 32 inches high from the ground. It is mounted on white-ash runners. The pump is of the centrifugal type with $\frac{1}{8}$ -inch clearance, which permits the pumping of sandy or muddy water without injury. It has a capacity of 250 gallons a minute. Four $1\frac{1}{2}$ -inch outlets are provided. The maximum pressure is 180 pounds. Fine steel and duralumin are used extensively to give strength, reliability, and lightness to the machine. Further details in regard to specifications can be obtained from the Niagara Motors Corporation, Dunkirk, N. Y.

In writing about the pump Mr. Morgan states:

I am not in this game to make money. A large part of what I get from the results will go into forestry work here in Richmond [N. H.]. I want to make this town a bright, outstanding example of the application of modern forestry to a back town.

Increased Appropriation for Naval Stores Study

Under the agricultural appropriation act for 1929 the Bureau of Chemistry and Soils is allowed \$15,000 for "inaugurating studies of new processes and equipment for the production of naval stores, in cooperation with producers and the Forest Service, as well as a study of the adaptability of naval stores for various uses." This is an increase of \$5,000 over the previous appropriation to the bureau for work to promote better producing methods in the naval stores industry.

Squirrels and Blister Rust Cankers

For several years it has been noted that squirrels eat the bark at the cankers caused by blister rust on the twigs, branches, and trunks of the northern white pine. L. E. Newman, State blister rust control leader for New Hampshire, tells of a heavily infected northern white pine area of about 35 or 40 acres in the town of Northwood in which nearly every infected pine had been gnawed by squirrels. In other towns Mr. Newman found similar conditions. Although this activity had resulted in girdling twigs, branches, and stems down to the live wood, not all the diseased tissue had been eaten by the squirrels, for acia were found fruiting along the edges of the gnawed portions.

An unusual number of gnawed cankers was observed during the past winter. Mr. Newman suggests that this may be explained by the extraordinary mildness of the winter and the lack of heavy snows. A large percentage of the cankers gnawed were at or near the base of the tree—that is, at points generally covered with snow. The mild weather, he believes, encouraged the squirrels to unusually prolonged prowlings.

An interesting conjecture arises as to whether the destruction of so much fruiting area will assist materially in reducing the volume of acia that otherwise might be spread broadcast by the wind.

Blister Rust Quarantine Modification

Under a revision of the white pine blister rust quarantine effective August 15, 1928, 5-leaved pines may be moved under permit from the New England States and New York into the more lightly infected States east of the Mississippi Valley quarantine line and from Washington into Oregon and Idaho, if the trees have been raised from seed in a nursery free from currant and gooseberry plants and surrounded with a Ribes-free zone. The prohibition of movement from Wisconsin and Minnesota to Michigan, Pennsylvania, and New Jersey is removed. Cultivated red and white and mountain currant and cultivated gooseberry plants may be shipped from infected States without Federal permit and without environs inspection if they have been dipped in lime-sulphur solution of specified strength, maintain the required conditions as to dormancy and defoliation, and are shipped within the prescribed period. No change is made in the quarantine order itself.

The reasons for these modifications are, first, the demonstrated effectiveness of the Ribes-free zone as a permanent protection to 5-leaved pine stands, and proof of the value of the lime-sulphur dip as a measure for the disinfection of currant and gooseberry plants; and second, evidence that the blister rust is now distributed in Michigan, Pennsylvania, and New Jersey to a degree comparable to its prevalence in Wisconsin and Minnesota, so that prohibition of movement of

plants between these two groups of States is no longer of value in preventing the spread of infection.

The shipping dates for currant and gooseberry plants are slightly modified as related to dormancy and defoliation, in such a way that it is believed they will correlate more closely with commercial nursery needs as related to climatic conditions without any increase in the danger of dissemination of the rust to new localities.

Among the quarantine requirements retained without material change are those prohibiting the shipment of five-leaved pines from infected to noninfected States, and from the Eastern States to the Rocky Mountain and Pacific coast regions; limiting the interstate movement of European black currant plants to 12 Great Plains and Southern States where five-leaved pines are not economically important; and requiring the use of control-area permits when currant or gooseberry plants are to be shipped into States having legally established blister rust control areas.

Fifteen States are now known to be infected with the white pine blister rust—Connecticut, Idaho, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, and Wisconsin. Most of these are carrying on active control measures in cooperation with the Department of Agriculture.

German Foresters Order Douglas Fir Seed by Site

German foresters ordering Douglas fir seed from the Long-Bell Lumber Co. are now enabled to specify from which of five types of site they desire the seed to be taken. In order that the seed supplied for planting in Germany may be of strains adapted to the conditions of the various planting sites J. B. Woods, forester of the Long-Bell Co., in conference with the German Forestry Council and with members representing the various State forest services and forest owners' associations, has evolved for German use a scheme of site classification for the Douglas fir region of the western United States. Frost-free period is considered the dominant site condition. The three other conditions considered are precipitation, soil characteristics, and exposure factors.

The principle of selecting seed on the basis of similarity between site of origin and planting site, which the Long-Bell Co. applies in its own planting work and has thus extended to its German trade, is also followed by the company in supplying seed to Australasia.



The importation of Christmas trees and greens from the Province of Quebec, Canada, into the United States is no longer banned by the Department of Agriculture. The quarantine was lifted July 1, on the basis of evidence that the gypsy moth has now been eradicated from Quebec.

Selective Logging Indorsed by Lumbermen

CORRECTIONS

Testimony in favor of selective logging was given at the midsummer meeting of the Northern Hemlock & Hardwood Manufacturers' Association, held July 20-21 in Rhinelander, Wis., by lumbermen who have put it into practice. C. A. Goodman, speaking for the Sawyer-Goodman Co., Marinette, Wis., said: "We think we are a little ahead on the proposition, besides perpetuating our operations." This company is taking off its land about 50 per cent of the timber, representing about 70 per cent of the value of the stand. On this basis the company has cut its tie production in half, but despite the reduction in easy sawing both mill production and operating costs are practically the same as before. A trained forester employed by the company marks all the trees to be cut. W. A. Holt said that the selective logging of his company, the Holt Lumber Co., Oconto, Wis., has not resulted in the blowing down of the thinned timber. "Selective logging costs no more," he said, "for it costs less to log big logs than small ones. It is a good thing; I only wish we had started it 25 years ago, then we would have had something worth while by now."

Charles F. Irish, arborist of Cleveland, Ohio, points out an error in the item "Transplants treated with compressed air" which appeared on page 17 of the FOREST WORKER of May, 1928. Mr. Irish states that the method of treating transplanted trees with compressed air forced in among their roots was originated by his firm, the Chas. F. Irish Co. (Inc.), instead of being suggested to it by botanists of the Ohio Agricultural Experiment Station, as was stated in that item. He adds that this method of supplying oxygen to tree roots was developed primarily for the correction of injurious conditions caused by filling in earth over areas occupied by the roots of trees. The editor regrets the misunderstanding through which he failed to give proper credit to the originator of this method.

C. E. P. Brooks, whose article in the Meteorological Magazine on the influence of forests on rainfall and run-off was quoted on page 17 of the July, 1928, FOREST WORKER, is a member of the meteorological staff of the British Meteorological Office, London. In identifying him with Clark University the FOREST WORKER confused him with Charles F. Brooks.

Foreign Notes

Japanese Measure Effect of Forest on Run-off

Observations of run-off from forested and deforested land were made by foresters of the Japanese Ministry of Agriculture and Forestry on a watershed at Hatuhata, Ibaraki Prefecture, from 1906 to 1919. The area, of 15.68 hectares (about 39 acres), is situated on a small tributary of the River Naka. It slopes to the south-west and has elevations of from 1,073 to 1,247 feet. In 1906 about 30 per cent of the area was covered with an old stand of conifers and the remainder with a young stand of broad-leaved trees. In 1916 all the trees were cut down. Within the nine years of the observations the annual precipitation ranged from 53 to 70 inches.

For the three years 1911-1913, when the watershed was wooded, the ratio of run-off to precipitation averaged 57.5 per cent. For the 3-year period 1917-1919, following the cutting of the timber, the corresponding ratio was 60.3 per cent. Before deforestation the ratio of run-off to precipitation (observations being taken about every 10 days) showed practically no variation as between the warm season, April-November, and the cold season, December-March. After deforestation the ratio was twice as great in the cold months, the season of snow, as in the warm months.

A summary of the results of this study of watershed protection has now been made available in English in a publication of the Japanese Ministry of Agriculture and Forestry entitled "Outline of the Work of the Forest Meteorological Stations."

Temperature Affects Probable Success with Pine Seed

Studies by the Swedish Forest Experiment Station in selection of Scotch pine seed according to similarity of conditions in the place where the seed are grown and the place where they are to be planted have led to the following conclusion: If pine seed are used from a locality the mean temperature of which for the months of June to September or of September alone is 1° C. higher than that of the planting site, there is probability of a loss in survival of 35 per cent (June-September) or 27 per cent (September), respectively, greater than if the seed had been gathered in the locality where they were to be planted. The difference in mean temperature may be due to a difference in latitude, a difference in altitude, or both.

On this basis the experiment station is advising forest owners not to mix cones or seed of pine from different districts and different levels, and not to use pine seed if the mean temperature of their source is not known.

Bringing Up the Forest Planting Idea in France

In 1920 the French Administration of Forests and Waters began an active campaign for reforestation of denuded lands in the Department of Corrèze, in southern France. Wars, invasions, and civil conflicts reaching back to Cæsar's campaign against Vercingetorix, grazing, tree diseases, and destructive cutting, had all contributed to the formation of a denuded area of 140,000 hectares. The French foresters in their endeavor to restore the forest by interesting landowners in the project used tracts, conferences, and the delivery of planting stock. To smooth the way for those whose interest was aroused they cut down Government red tape to a minimum and provided special assistance in drawing up applications for Government subventions. The first year 168 applications were received, and by the eighth year the applications had grown in number to 726. In 1920, 627,000 little trees were planted; in 1927 the number planted was 2,728,700. About 1,048 hectares a year is the average area reforested during the eight years. In the early years a good deal of seed sowing was done also, but the amount of seed sown was reduced four-fifths by the last year. The effect of active propaganda for reforestation is shown in the figures for the years before 1920 and those after. From 1869 to 1919 only 7,449 hectares were reforested; for the eight years from 1920 to 1927 the total is 8,386 hectares.

The first nursery in the Department of Corrèze was established in 1921. The next year a new nursery was established in the neighboring Department of Lot to furnish stock for both departments. Two others followed in 1925 and a fifth in 1927. The nurseries are all in cities to which fairs or markets attract the neighboring landowners, many of whom come to the nursery for their planting stock themselves and get with it information on choice of species and methods of planting and caring for the trees.

In addition small nurseries have been established in five communes on a cooperative basis, the commune usually bearing 25 per cent of the expense. These communal nurseries have certain advantages. They grow the species wanted in the commune; the stock is acclimated and it is taken from the nursery and planted the same day, giving in some instances 100 per cent survival. They help the work of the forestry service by presenting it to local people in the light of an active agent of agricultural betterment. They arouse a special interest in reforestation in the local overseer who becomes an active worker in his community. They are also valuable as object lessons to the young people and are visited by the pupils of the schools. There are also in the department 12 school nurseries.

The reforestation work that has already been done has made a decided change in the landscape in certain

parts of the department. To a traveler along the road from Tulle to Clermont, for instance, there are vistas where the wooded areas so inclose and hide the fields that they give the landscape the general appearance of unbroken forest. In another region, on the route from Tulle to Aurillac, there is a great expanse of territory where the recently established plantations give the appearance of a dense forest stand. A forest officer 68 years old who has spent his whole life in this region says: "When I was a boy there were nothing but prairies and a few birch trees all the way to the horizon. I do not recognize the place any more."

Movable Nurseries

The advantages of what he calls "movable nurseries" are enumerated by N. I. Crahay in the May number of the Bulletin of the Central Forestry Society of Belgium. On chosen parcels of land on the site to be reforested, strips about 1 meter wide are cleared and worked and planted with seed. Three, four, or five years afterwards the plants are taken up with a ball of earth around the roots of each and set out. Instead of seed, 1-year seedlings from a regular nursery may be used in the strips and transplanted 2, 3, or 4 years later. The scheme of raising the planting stock on the planting site avoids all the risks incident to packing and shipping and the many handlings involved. Transportation costs are reduced to the minimum. The plants can be taken from nursery to planting site in wheelbarrows. Wider spacing is possible because the planting stock is larger. The chances of survival are greatly increased. If care is taken to figure out in advance where planting will be needed time can be gained by starting the stock four or five years early.

M. Crahay states that the pineries of the forest of Soignes were all established by this method and with great success. The method is recommended for unfavorable conditions such as abundant herbaceous vegetation competing with the trees, or where the trees are apt to be attacked by rabbits, because the greater age and size of the trees that can be used give them a better chance. The nursery strips themselves can be closed against rabbits or other game animals.

This method may be used for other species but is recommended especially for the pines.



The report of the Burma Forest Department for 1926-27 indicates that during that year the department had working plans under preparation for areas totaling 6,926 square miles. Areas under sanctioned plans had been increased from 10,855 square miles in 1920-21 to 15,573 square miles in 1926-27. Areas for which plans were required and not yet under preparation amounted to 4,301 square miles.

The areas that had been successfully reforested by planting, by the beginning of that year, were reported as more than 123,000 acres.

American Trees in Manchuria

American trees are being grown in Manchuria, according to a communication from one of the agricultural experiment stations of the Southern Manchuria Railroad. The black walnut is very hardy but grows slowly. The boxelder is hardy, grows rapidly on deep, loamy soil, and in the gardens and parks is one of the most common trees. The black locust is extremely hardy and is spreading rapidly by means of root suckers. The white ash grows better than any of the Manchurian native ash species and appears to be desirable for propagation in Manchuria. The butternut, hickory, and sugar maple have not proved hardy. The jack pine makes a good growth, but so far has been planted only as an occasional tree. The pitch pine is hardy, but until it is four or five years old needs protection against frost. Under what severe conditions these trees are growing in Manchuria may be realized from the fact that the minimum temperature during the winter is around 60° below zero, and that during the summer a maximum temperature of 90° is experienced. Most of the precipitation comes in the form of rain during the summer; during the winter period only a very small amount of snow covers the ground. Tree survival under such conditions is decidedly unusual.

Forests of Russia

In a recent report by the chief of the Russian forest administration, summarized by A. Arnould in the June number of *Revue des Eaux et Forêts*, the forest lands of Russia are estimated as follows:

often merely to supply local demands, especially in north Siberia and the Orient, the exhaustion of the forests in parts of the country that have great need for fuel wood, the lack of roads, and the scattered population. The cut in the Far East, Siberia, the Caucasus, and the region of the North and the Oural is only about 16.3 per cent, 41.7 per cent, 75 per cent, and 78 per cent, respectively, of the amount that could be taken out annually.

Logging operations on lands managed directly by the Government are carried on on an area of 95,000,000 hectares—65,000,000 hectares in Europe, 20,000,000 in Siberia, and 10,000,000 in the Far East. The volume of timber from these forests transported far from the place of production is 45,322,000 cubic meters of lumber and 43,819,400 cubic meters of fuel wood.

The accessible lands actually forested amount to 297,689,400 hectares. Areas covered by different species are estimated as follows, the basis being theoretical pure stands:

	Government forests (thousand hectares)	Community forests (thousand hectares)
Scotch pine.....	47,374	2,619
Spruce.....	64,860	2,013
Other conifers.....	44,047	111
Oak.....	1,690	20
Other hardwoods.....	39,418	1,983
Species not classified.....	93,549
	290,938	6,746

How Temperature Affects Oak and Beech Distribution

The distribution limits of beech and oak have been correlated with temperature by Doctor Wladimir Köppen in his studies of these two genera in Europe. In Madeira, where the temperature the middle of every month is above 59° F., the beech retains its leaves only 7 months and the oak somewhat over 10 months. Wherever the duration of temperatures above 40° F. is less than 7 months in the case of beech and 10 months in the case of oak, both trees put out leaves as soon as the temperature reaches 40° in spring and change their color when it reaches 40° in the autumn. The oak requires 3½ months with temperatures over 40° to carry on assimilation, whereas beech requires 4 months in the plains and 3 months in the mountains with temperatures above 40°. For those internal processes which continue within the plant after leaf fall the oak requires 5 months with temperatures above 35°, and beech in the plains requires 8—in the mountains 7—months above 33°. These internal processes appear to cease at about this temperature. The oak can endure nearly 7, but the beech only 3 months below this temperature; however, neither tree requires such low temperatures.

Region	Total forest land	Government forest land		Total accessible forest land	Per cent of land area forested
		Total	Under administration		
	<i>Thousand hectares</i>	<i>Thousand hectares</i>	<i>Thousand hectares</i>	<i>Thousand hectares</i>	
Northwest.....	12,083	100,270	99,957	8,575	37.4
North.....	79,708	77,824	75,688	60,374	49.7
West.....	3,607	2,519	2,468	2,764	24.2
Center.....	11,909	8,804	8,716	10,444	31.9
Viatka.....	11,995	10,670	10,314	10,700	45.5
Oural.....	80,700	77,249	71,076	37,980	22.9
Middle Volga.....	3,147	2,597	2,546	2,844	11.8
Lower Volga.....	1,440	934	921	1,150	4.2
Center Tchernozem.....	1,471	940	922	1,364	7.3
Caucase.....	3,127	1,961	1,954	2,709	10
Siberia.....	255,965	252,643	252,359	133,019	30.5
Kirghiz.....	1,992	1,992	1,992	1,042	4.2
Far East.....	102,561	100,646	100,513	80,656	31.6
Total.....	569,705	639,049	629,426	353,621	29.7

The annual growth of the accessible forests is about 314,030,000 cubic meters and the output about 203,028,800 cubic meters. The reasons for the failure to cut as much as the annual growth in the country as a whole are the difficulties of logging in the important forest stands, the object of management which is

Forest Vegetation in Turkestan

Excerpts from article by V. PELTS in the Indian Forester

In Turkestan forestlike desert vegetation is met usually only far away from towns, big roads, and railways. All easily accessible places are usually devoid of big dendroid vegetation and are covered with moving sand dunes. About the terrors of these, travelers have circulated much exaggerated tales. Usually the belt of moving sand dunes is only 30 to 50 kilometers (20 to 30 miles) wide and is due mainly to extermination of vegetation by concentrated action of animals belonging to villagers inhabiting adjoining cultivated lands. In the desert there is a much larger nomadic population than the traveler suspects, but such nomads live in tents near their wells which are situated far from big roads. They avoid the neighborhood of big roads for two reasons: The vegetation near roads is poor owing to damage by animals belonging to caravans; and, secondly, being Mohammedans they adhere to the old law of the desert in offering hospitality to travelers. They are fond of society, but on the roadside the number of guests entertained would be beyond their means. No man can live in the desert without large flocks of sheep and many camels to transport his camp, but he migrates systematically in the area near his well and the vegetation does not suffer as it does from the concentrated action of animals belonging to settled villagers and caravans. The guides taken by travelers from villages never find any nomads in the desert because they themselves are afraid to leave the main roads. The dendroid vegetation consists of *Art. arborescens* and *Art. haloxylon*, *Salsola richteri*, *Ammodendron conollyi*,¹ and *Am. karelini*.

Excellent results have been obtained in afforestation of sand dunes along the Central-Asian Railway. A stretch of about 200 miles, where trains were formerly obstructed by moving sand dunes, has been fixed by cultivating saksaul and other plants such as *Am. conollyi*, *Salsola richteri*, *Calligonum caputmedusæ*, and desert grasses. By restricting the grazing of animals, up to 100 tons of firewood can be produced per hectare (2.47 acres) each 20 years, on suitable soil. The established conception that saksaul was growing very slowly was founded on the well-known fact that you can count on a cut tree the yearly (annual) rings (layers) of growth. However, the procedure proved to be wrong in the case of saksaul, for evidence discovered through cultivation showed that a tree 10 inches in diameter with 80 or more "rings" might be only 15 to 20 years old. This tree baffled the botanists, therefore, until the forest service found it out by cultivation. The "rings" correspond merely to periods of increased growth, due either to rains (5 inches per annum) or to periods of increased differences of maximum and minimum temperatures in 24 hours, when desert

sand condenses more moisture from the air at night and salines do the same. A similar phenomenon is likely to be met also, with some other desert plants.

Where Forests Mean Tombs

R. K. Beattie, pathologist of the Bureau of Plant Industry, has written from Keijo, Korea, that "the Koreans strip every bit of ground of every tree and shrub and burn everything down to the needles. Then in winter they dig up the roots and burn them. The soil here is a coarse decomposed granite and washes badly, so when the forest cover is gone the erosion is tremendous. The rains, when they come, come in torrents.

"When you want to find a virgin forest here you look for a Korean king's tomb; and, conversely, when you want to find a tomb, you look for a forest. For when one stands at a Korean king's tomb everything in sight must be green.

"At Koryo there is a tomb and also a forest. In the forest are chestnut trees $1\frac{1}{2}$ to $4\frac{1}{2}$ feet in diameter. They branch rather low and would not make very good logs, but they would cut up into a lot of extract wood. They are *Castanea crenata*. The experts differ as to whether they are native. It is the same species as in Japan. There are lots of *C. crenata* trees planted around here and we'll probably be able to get nuts this fall. I'm getting fine cooperation from the Japanese scientists."

Schlich Memorial Gets Subscriptions

Subscriptions toward a memorial to Sir William Schlich by June of this year amounted to £1,725, of which £278 was subscribed in the United States. At the request of the committee in charge of the memorial the British forestry authorities have agreed to set aside a forest area to be named the Schlich Forest, situated if possible within easy reach of Oxford. This area is to be available for experimental work, and on it a group of oak trees are to be planted and maintained. A bronze portrait plaque of Sir William has been ordered at a cost of about £24, which is to be erected in the School of Forestry, Oxford. The remainder of the sum subscribed, after payment of incidental expenses, is to be placed in trust and invested, and the proceeds are to be devoted to the payment of an annual personal grant for the furtherance of study or research in forestry. This grant is to be awarded by the trustees to different parts of the British Empire and to the United States in rotation. The selection of the country in which the award is to be made in any year is made discretionary with the trustees.



One-third of all the forest-fire outbreaks recorded by the provincial government of Ontario last year were first reported by the public.

¹ *Ammodendron conollyi* and *karelini* belong to the family *Leguminosæ* (*Papilionaceæ*).

Elementary Forestry Schools in Finland Carbide Lamps for Night Fire Fighting

Finland has five elementary forestry schools, to which students may be admitted on completion of the general elementary school course. Instruction is given in Finnish at four of these schools and in Swedish at the fifth. The course covers two years. Advanced education in forestry is offered by the university, which gives a course of theoretic and practical instruction that lasts three or four years and is followed by one year of practice. The university also offers graduate courses leading to higher degrees. A technical school of saw-milling at Viborg, privately maintained but in receipt of Government grants, trains foremen for the sawmills and other woodworking mills.

The forest research institute, established in 1917, employs three professors, with assistants, who engage in research in silviculture, forest mensuration and management, and forest soils. A second forest research organization is the society of forestry, founded in 1909.

Airplanes for Fire Fighting and Surveying in Canada

A fleet of 22 airplanes is maintained by the Province of Ontario to detect forest fires and carry men and equipment to fires in isolated forest regions. When not needed for these purposes the planes are used in survey work. The Province has now surveyed and mapped 52,496,000 acres of land. The surveys show that 49 per cent of this area supports stands of mature timber, 34 per cent is occupied by young growth, and only 6 per cent is waste land.



Tank cars are maintained by the Canadian Pacific Railway at six different points for forest protection. Each car holds 7,000 gallons of water and is equipped with steam pumps, a mile of hose, and Siamese connections and nozzles.



Three new forest reserves have recently been created in British Columbia, two including 65 square miles on Redona Island and one of 925 square miles on the Morice River. There are now 18 forest reserves in the Province, with a total area of 6,400,000 acres.



The New Zealand Government has removed all restrictions on the export of timber produced in the Dominion. A notable feature of the restrictions thus lifted was the limitation on shipment of kauri pine, which in recent years has been drawn closer each year.

Experiments of the Canadian Forest Service with "headlights" for use by fire fighters have resulted in favor of carbide lamps such as are used by miners. The electric safety lamps tried were objected to because of their weight of 5½ pounds, the recharging facilities needed, and the cost. The carbide lamp, writes James Smart in the Forestry Chronicle of the Canadian Society of Forest Engineers, gives very nearly as much light as the electric lamp and weighs only 6 ounces. It needs a recharge of carbide about every 1½ hours. A convenient canister fitting the hip pocket holds several hours' supply of carbide. The outfit of lamp, cap, and canister costs less than \$2. The danger involved in using a naked flame does not seem to the Canadians to be serious, and it is pointed out that to inclose the flame under glass results in concentrating the light rays to a beam, thus lessening the efficiency of the lamp for fire-fighting use.

The manufacturer of the lamp adopted is now producing for the use of the Canadian Forest Service a lamp with an improved nicked reflector, flame wind protector, and a cap that is adjustable to the size of the head. The 5 and 10 men units in which the lamp equipment is assembled by the service include, with the lamps, caps, and pocket canisters, two large airtight canisters holding several days' supply of carbide nested in a container handy for transportation and back packing.

A crew equipped with these lamps, Mr. Smart points out, not only is enabled to carry on suppression activities at night, under better working conditions than those of the daytime, but can be led to a fire at night.

Local Fire Protection in France

The fire protection association of the Canton of Mezin, Department of Lot-et-Garonne in southwestern France, with a membership of 182 proprietors and turpentine operators, reports that in five years seven fires have occurred and hardly 20 hectares have burned in its territory. Intensive fire prevention propaganda is carried on and in addition there is a competent and well-organized suppression system. In every house in the wooded communes a printed card bearing fire-control instructions is posted. Thirty-one crews, each with a chief deputized by the mayor, have been organized. Tools and equipment have been furnished each crew and also placed in convenient depots. Twelve observatories with telephones and alarm horns are manned during the fire season. The association provisions the workmen who take part in fire suppression and indemnifies them for the time taken from their regular employment. This association is one of 20 or more in the Departments of Gironde, Landes, Lot-et-Garonne, and Dordogne, near Bordeaux in southwestern France.

Personals

Joseph H. Faul, of the Department of Botany, University of Toronto, has been appointed professor of forest pathology at Harvard University.

D. B. De Merritt has resigned as extension forester of Louisiana to accept a position in the Forestry Department of the Pennsylvania State College, where he will teach forest management and mensuration. Before he entered extension work in Louisiana in 1926 Mr. De Merritt was an instructor in the University of Maine.

Arthur I. Weinstein, physiological plant anatomist at the Forest Products Laboratory, has resigned to accept a position with the Sturgeon Bay Fruit Co.

A. J. Stamm, colloid chemist of the Forest Products Laboratory, has gone on leave to avail himself of an International Education Board fellowship. He will engage in research at the University of Upsala, Sweden, under the direction of Prof. The Svedburg.

C. L. Marlatt, Chief of the Bureau of Entomology, has been designated as Chief of the Plant Quarantine and Control Administration of the Department of Agriculture, established July 1, 1928. S. A. Rohwer has been designated assistant chief of this administration.

J. E. Graf has been made Assistant Chief of the Bureau of Entomology. He will continue his assignment as leader of the truck crop division of the bureau.

Forman T. McLean has resigned as head of the plant physiology department of the Agricultural Experiment Station at the Rhode Island State College.

Jesse C. Nellis has been appointed chief of the lumber division of the Bureau of Foreign and Domestic Commerce, the position in which he has been acting since Axel H. Oxholm became director of the National Committee on Wood Utilization. Mr. Nellis joined the division in 1922 as assistant chief.

John D. Coffman, supervisor of the California National Forest, has been detailed to assist officers of the National Park Service in developing fire-control plans for the national parks. His detail will probably extend over a year.

Ferdinand W. Haasis has resigned as assistant silviculturist of the Appalachian Forest Experiment Station to accept a position at the University of Idaho. There he will be associate professor in the school of forestry and associate forester of the university's forest experiment station.

Carlos Avery has succeeded John B. Burnham as president of the American Game Protective Association. Mr. Avery, who was formerly game commissioner of Minnesota, has been secretary and treasurer of the association for the past five years.

E. E. Horn, associate biologist of the Bureau of Biological Survey, formerly stationed at Phoenix, Ariz., as a field investigator in eradication methods, has been assigned to duty at the California Forest Experiment Station.

Gerhard Kempff, assistant silviculturist of the Northern Rocky Mountain Forest Experiment Station, has been appointed associate professor at the School of Forestry of the University of Idaho. Mr. Kempff has for a number of years had charge of the Priest River Experimental Forest.

Ralph M. Lindgren, of the office of forest pathology, Bureau of Plant Industry, has been assigned to duty at the Southern Forest Experiment Station.

H. A. Smith, district forester in charge of the Pottsville district, Pennsylvania, has been chosen as assistant State forester of Florida.

Gilbert Y. Bell has been appointed assistant State forester of Kentucky. Mr. Bell is a graduate of the Pennsylvania State College and has served for the past year as a ranger on the Shenandoah National Forest.

T. A. MacElhanney has been appointed director of the Forest Products Laboratories of the Dominion of Canada, at Ottawa, succeeding William Kynoch, now associate professor of forestry in the School of Forestry and Conservation, University of Michigan. His successor as director of the forest products laboratory at Vancouver is R. M. Brown, formerly district inspector of forest reserves for the Railway Belt, stationed at Kamloops, British Columbia.

C. J. Maneja, assistant chief of the branch of lands, Philippine Bureau of Forestry, after his graduation from the Yale Forest School in June of this year visited a number of the national forest districts of the United States and spent two months in Washington, D. C., studying the work of the Forest Service. Vincent C. Ramos, chief clerk of the Philippine Bureau of Forestry, has likewise been making an extended visit in this country studying the Forest Service organization and administrative methods.

C. H. McLees, of the faculty of the North Dakota School of Forestry, has been elected to the executive committee of the North Dakota Academy of Science.

Newly elected officers of the biological sciences section, Southwestern Division, American Association for the Advancement of Science, are chairman, F. J. Crider, Boyce Thompson Southwestern Arboretum, Superior, Ariz.; vice chairman, Quincy Randles, United States Forest Service, Albuquerque, N. Mex.; and secretary, W. G. McGinnies, University of Arizona.

Officers recently elected by the Appalachian section of the Society of American Foresters are C. F. Korstian, Appalachian Forest Experiment Station, chairman; M. A. Mattoon, Pisgah National Forest, vice chairman; F. W. Haasis, Appalachian Forest Experiment Station, secretary.

Donald R. Brewster has been assigned as manager of the field office newly established by the National Lumber Manufacturers' Association at Memphis, Tenn. Mr. Brewster was educated as a forester and had 10 years' experience in the United States Forest Service, including three years in research and extension work as a member of the staff of the Forest Products Laboratory. Since 1920 he has been engaged as a dry kiln specialist in woodworking plants.

David H. Madsen has resigned as State fish and game commissioner of Utah to accept the superintendency of the new migratory bird refuge to be established at Bear River Bay, Utah, under the provisions of a law passed at the recent session of Congress.

John P. Wentling, formerly of the division of forestry in the University of Minnesota, has been appointed director of the research division of the Western Red Cedar Association, with headquarters at Minneapolis.

Ralph C. Bryant, professor of lumbering in the Yale Forest School, received the honorary degree of doctor of science from Middlebury College at its commencement of June, 1928.

Frank S. Moore, formerly assistant supervisor of the Payette National Forest, Idaho, has been made supervisor of the Caribou National Forest, Idaho.

Arthur L. Nelson, technical assistant on the Colorado National Forest, has been made supervisor of the Leadville National Forest, Colo. Lewis R. Rist, formerly supervisor of the Leadville Forest, has been transferred to the White River National Forest, Colo., as supervisor.

E. M. Eutsler has accepted appointment as district forester in charge of district 4, North Carolina. Mr. Eutsler has been employed by the Montgomery Lumber Co. for the past eight years.

Paul D. Kemp, senior forest ranger on the Washakie National Forest, Wyo., has gone on leave of absence to take advantage of a fellowship in wood technology at the University of Idaho.

Henry Charles Hulett, senior forest ranger in the Portland, Oreg., office of the United States Forest Service, has gone on leave of absence to attend the University of Michigan, where he will work for the master's degree in forestry.

Glen Meginnis, one of this year's forestry graduates of the Iowa State College, has taken the teaching fellowship in the forestry department of the college for the coming school year. A. A. McCutcheon, a 1928 graduate of the Colorado Agricultural College, has accepted the research fellowship in the Iowa school.

Bibliography

A Manual of Woodland Management

By C. R. TILLOTSON, United States Forest Service

Anyone interested in the management of timberlands in Illinois or adjacent States will find real help in C. J. Telford's bulletin, *A Manual of Woodlot Management*, published by the Division of the Natural History Survey, Illinois Department of Registration and Education. To the student of forestry this publication is a treat because it gets away from generalizations and down to specific cases. Written by a trained man who has spent a number of years in field work in the woods of the State, it gives the impression that the author knows what he is talking about. Illinois is fortunate in having a woodsman who can successfully put in writing so much that he has learned through study and experience in her woodlands.

The big appeal of this bulletin is the understandable manner in which it outlines and discusses the problems involved in the management of Illinois timberland. It

covers the usual run of subjects—cutting systems, growth and yield, planting, protection, and measuring and marketing. In every case the discussion deals specifically with the existing timber or with present forest conditions in Illinois.

At the outset there is given a summary of general measures in the management of natural woods, which ends with the remark that "in forest management judgment rather than rules must be followed." Mr. Telford might have added that good judgment in forestry is acquired only through years of experience in the woods. A short discussion of the woodland as a source of supply for the farm gives a picture of farm needs and of the area of woodland required to supply those needs. In the discussion of protection it is brought out that the injury from pasturing the woods is greater than the injury from all other sources combined. A chapter on the adaptation of trees to soil gives the average rates of growth of various trees on six easily recognized general soil types. It definitely recommends species to be grown on these individual

soil types. Two kinds of silvicultural management are discussed, the "even-aged" system and the "selection" system. These two systems are discussed primarily because even-aged woodlands are common through parts of Illinois and uneven-aged stands are common throughout the State. Such points are brought out as the number of trees that will start on an acre and the number that will normally be there after 40 years, after 80 years, etc. A plea is made for growing timber to the larger sizes, particularly for tie production. Mr. Telford shows that if a tree is cut at the age of 52 years, when it will produce but one tie, the gross annual return is approximately 1 cent, whereas if the tree is left standing until it is 103 years old and will produce five ties, the gross annual return is about 5½ cents.

Planting is discussed under the headings of planting to reinforce hardwood stands and planting cleared areas. The author takes the position that in plantings to reinforce hardwood stands hardwood trees should be used rather than conifers. There is a brief discussion of Christmas tree plantations and a longer one of plantations for post production.

In his chapter on measuring and marketing woodland products Mr. Telford provides tables which will give the owner an idea of just how far he can profitably ship his products, whether they be mine timbers, cross-ties, veneer logs, or something else. He appends a list of consumers and dealers in the State, by counties, which should be a big help to the prospective seller.

A Book on Malay Trees

By E. N. MUNNS, United States Forest Service

F. W. Foxworthy's *Commercial Timber Trees of the Malay Peninsula* should prove of great value to forest officers and others concerned with the timber trees and forest resources of the Malay Peninsula and the related East Indies, and be widely welcomed as an important addition to tropical forest literature. The author has provided a handbook that will aid in identifying the more important trees of Malaya and that furnishes information regarding each of these species. Since the tree species of Malaya are very numerous, it was found necessary to restrict the work to those that can be regarded as commercial timber trees or that are so conspicuous in appearance as to compel attention in the forest. The book lays the foundation for further detailed study of trees that are likely to become an important source of revenue.

Three main classes of forest are recognized—the littoral forests of the beaches and mangrove swamps, which produce relatively few timber trees; the hill forests, occurring at elevations above 2,000 feet, which at present are not economically important; and the lowland forests, comprising the fresh-water swamp forests and the inland "rain" forests. The forests of the fresh-water swamps contain a comparatively small number of species; the rain forests, made up of a very

large number of species, include most of the commercial timber trees of the country. It is with rain forests, therefore, that the author is chiefly concerned.

The area occupied by commercial forests in Malaya is estimated at about 30,000 square miles, in addition to the considerable areas on which the original forest has been destroyed and is now being replaced in part by second growth.

Although a wealth of tree species is contained in the complex forests of Malaya, only a small proportion of these are economically important. About 2,500 species are known to occur in the peninsula, and it is estimated that the number actually occurring is one-third greater than this; but Foxworthy describes only 65, and of these probably less than 20 are of outstanding importance.

After a general description of the forests of the Malay Peninsula, the book gives a key to the identification of the species described. The key is a very practical one, based largely upon those characters that are likely to be the only ones observable unless trees are felled. These are the character and structure of the outer bark and of the inner bark and sapwood, the occurrence of buttresses, and characteristics observable in fallen leaves. Alternative names of the trees are given, information as to their abundance and manner of distribution, and descriptions of their botanical characters. The commercial products of the species, and their silviculture, are briefly discussed. In the case of each of the more important species, useful information is given regarding other forms likely to be confused with it.

The methods used in collecting the information here presented are such that the book commands confidence. Extensive collections of herbarium material were made as a basis for establishing the botanical identity of trees and particularizing as to the trees' distribution. Information as to the relative and actual abundance of the different forms was obtained through special valuation surveys covering more than 1,000,000 acres in different tracts, and this work was supplemented with a careful field study of the species themselves. Information available in the records of the Malayan forest department regarding silvicultural treatment was incorporated into this book only after careful revision and comparison with records of experience in other countries.

The volume is very fully illustrated with photographs of the trunk and bark of species described, and, wherever feasible, of their foliage, flowers, and fruits. Both in manner of presentation and in quality of printing and illustrations, the book sets a standard rarely reached in government publications.

(F. W. Foxworthy: *Commercial Timber Trees of the Malay Peninsula*. Malayan Forest Records No. 3. Pp. 194, 10½ by 7¼ inches. Conservator of Forests, F. M. S. and S. S., Kuala Lumpur, Federated Malay States, 1927.)

Pruning White Pine for Profit

By W. R. MATTOON, United States Forest Service

In a bulletin entitled "Pruning White Pine for Profit" the Harvard Forest and the Massachusetts Forestry Association have published a summary by A. C. Cline and E. D. Fletcher of conclusions arrived at by themselves and by a number of woodland owners and other foresters through observation and experiment. A foreword by R. T. Fisher, director of the Harvard Forest, and Harris A. Reynolds, secretary of the Massachusetts Forestry Association, states that "in pure [northern white] pine stands clear lumber can be secured only by the removal of side branches when the trees are small. This report is a preliminary study of pruning as a means of increasing profit." The authors' first word, however, is a warning to owners of northern white pine woodlands not to let alarm over the prospect of a low-grade yield tempt them into unjustifiable pruning. Pruning is unprofitable, they say, if applied to stands composed of badly weeviled trees having large limbs, to boles 6 inches or more in diameter, or to every tree in a stand. The results of such practices will be on the wrong side of the ledger because of the heavy initial cost of the work and because of the low grade of the product—which may be even lower than if the trees had not been pruned.

Pruning northern white pine is a very profitable undertaking, these authors tell us, if it is limited (1) to stands composed of straight trees with small limbs (averaging under 1 inch in diameter); (2) to selected trees of the dominant class which are to compose the final crop; and (3) to trunks of relatively small diameter, preferably not more than 4 inches at breast height. Timely and skillful pruning of northern white pine stands within these limitations may increase profits by from \$15 to \$35 or more per 1,000 board feet, in addition to yielding 6 per cent compound interest as an investment.

Results are given of time studies by the Harvard Forest in pruning a badly weeviled plantation and a densely stocked stand of natural origin. Rates were found to range from 50 to 200 linear feet of bole per man-hour, varying with factors such as degree of weeviling and limb size. On the basis of 50 cents an hour as the cost of labor and 14 feet as the length of the pruned butt logs, costs of pruning per 1,000 board feet are estimated at the end of the rotation (at 6 per cent for an average of 35 years) to amount to \$11.04 if pruning is done with the minimum speed and to \$2.76 if it is done at the maximum rate. A table shows estimated net values per 1,000 board feet of lumber sawed from 12-inch pruned logs 14 feet long having central knotty cores ranging from 2 to 7 inches in diameter. At assumed prices of \$25 for knotty and \$50 for clear lumber, the total returns per 1,000 board feet from pruned trees are \$49.23 for logs with 2-inch cores and

\$39.83 for logs with 7-inch cores, as compared with \$30 for logs of the same size from unpruned trees.

The factors of growth, form, and soil quality that influence the practice of pruning northern white pine trees are discussed, also the effect of pruning on growth and on quality of lumber. Recommendations are made as to the stage of development at which pruning may well be begun, the choice of season, the number and kind of trees to prune, methods and tools to use, the desirable degree of severity, the time for making subsequent prunings, and thinning of the pruned stand.

This 24-page bulletin, well illustrated with photographs and charts, is available on payment of 50 cents to either of the joint publishers.

Why Grow Timber?

A 14-page circular by W. N. Sparhawk, of the United States Forest Service, just issued by the Department of Agriculture under the title "Why Grow Timber?" gives in condensed but readable form the facts about the amount of timber needed in the United States and the possibilities of obtaining supplies from foreign countries and of growing adequate supplies at home. The chief conclusions reached by the author are that our need for timber is not likely to decrease in the future; that as the virgin forests are more and more depleted the very factors that might cause us to use less will tend to insure prices sufficient to make timber growing profitable; that nature unaided will not grow timber for us in sufficient quantity; and that the deficiency in our supplies can not be made up from foreign sources. To insure supplies sufficient for our needs we must undertake to grow our own timber.

Copies of this circular may be obtained from the Forest Service, Washington, D. C.

Facts About Outdoor Recreation Areas and Their Uses

A brief survey covering the greater part of the field of outdoor recreation in the United States is given in Senate Document 158, recently issued by the Government Printing Office. This publication, entitled "National Conference on Outdoor Recreation," is a handy reference book for anyone interested in the recreational use of forests or parks. It epitomizes the results of major fact-finding surveys and projects undertaken under the auspices of the National Conference on Outdoor Recreation. It not only gives facts and figures in regard to recreational areas, and their development and use, on National, State, municipal, and county parks and Federal lands like national forests, the public domain, and Indian reservations, but discusses the policies under which these areas are administered and the facilities available in this country for the training of leaders in recreation. It contains also chapters on the conservation of the elk of Jackson Hole, Wyo., and the contribution that museums can make to outdoor recreation.

A Note on Volume Table Construction

By LESTER H. REINEKE, United States Forest Service

Reports on the use of Forest Service Tree Measurements Form 558a suggest the need of a little further explanation as to how it should be used. This form, which was described in the November, 1927, number of the FOREST WORKER, consists in a specially designed graph paper on which the tree measurements are plotted as they are taken in the field. A curve drawn through these points shows the form of the entire tree stem, and volume in cubic feet can be accurately determined by measuring the area under the curve with a planimeter. Volume in board feet can be quickly read from a transparent scale placed over the graph.

In using this form it should be kept in mind that the taper curve fitted to the plotted points should be a curved line rather than a series of straight lines connecting the points. If straight lines are used two types of error will be introduced. The first is an error in volume and is proportionate to the area of the graph between the straight lines and the curved line through those same points. The volume of the straight-line taper graph may be greater or less than the true volume shown by the curve taper graph. (The straight-line taper graph shows the volume by the Smalian, or paraboloid, formula, since on this paper straight lines represent paraboloids.) The second type of error enters in determining the merchantable length, or height to a given diameter. The straight-line form of taper curve may increase or decrease this measurement, according to the taper curve's degree and direction of curvature.

The magnitude of the errors will depend on the form of the tree, its size, and the relative length of the sections. As the sections decrease in length the errors become smaller. In one group of trees individual errors were as large as 12 or 13 per cent. In the group of second-growth trees tested the average error was 4 per cent.

Form 558a is available to the public by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the rate of \$1 per 100 copies and \$7 per 1,000 copies.

Directions for Forest Planting on the Great Plains

Tree Planting in the Great Plains Region, Farmers' Bulletin No. 1312, presents detailed directions for establishing windbreaks and woodlots. The authors are Fred R. Johnson, Forest Service, and F. E. Cobb, Bureau of Plant Industry. The subjects they discuss include the selection of planting stock, ways of obtaining it, preparation of the soil, time and methods of planting, and care of the plantations. Copies of the bulletin can be obtained free of charge, while the supply lasts, by writing to the Department of Agriculture, Washington, D. C.

A Pamphlet of Experience and Opinion on Growing Southern Pine

A recent publication of the United States Forest Service entitled "Growing Pine Timber for Profit in the South" contains statements of actual experience with the growing of pine by landowners and of opinion by recognized authorities in regard to the possibilities in timber growing in the southern pine region. By reading this pamphlet the owner of pine land in the South can learn what his neighbor is doing about timber growing and what practical men think of the outlook for profit in pine. The pamphlet is Department of Agriculture Miscellaneous Publication No. 24. It may be obtained as long as the supply lasts from the Forest Service, Washington, D. C.

Black Locust for Idaho

By PERKINS COVILLE, United States Forest Service

In a bulletin entitled "Black Locust and How to Grow It," published by the University of Idaho School of Forestry, Dean F. G. Miller recommends the black locust as a profitable crop for land in southern Idaho that is under 4,000 feet in elevation. Where annual rainfall is less than 15 inches the trees require irrigation. Dean Miller's recommendations are based on a study of 17 farm woodlands in southern Idaho. On the basis of 5 per cent compound interest and without subtracting taxes and water rents, he estimates the average returns from these woodlands for the 13-year rotation as \$31.88 per acre per year. He gives estimates of the present value of the individual woodlands for fence posts, gross and net, and of the annual returns upon initial investment in such woodlands. Information is given, also, as to correct methods of raising black locust trees from seed and planting them in the field, caring for the plantation, and harvesting the crop.

No mention is made in this bulletin of the danger of invasion of Idaho by the locust borer as affecting the prospects of black locust plantations in the State.

Central States Bibliography

A bibliography on forestry, botany, and related subjects for the Central States region, comprising 35 mimeographed pages of titles, has been prepared by the Central States Forest Experiment Station and is available for distribution. Requests should be addressed to the Library, United States Forest Service, Washington, D. C.

Bibliography on Communal Forests

A bibliography on communal forests recently completed by Helen E. Stockbridge, librarian of the United States Forest Service, is available for distribution from the Washington office of the service.

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Recent Publications of the Forest Service

- National Forest Map Folders: Kaniksu, Mono, Arapaho, Stanislaus, Monterey Division of the Santa Barbara.
- National Forest Administrative Maps: $\frac{1}{4}$ -inch, Allegheny, Black Hills, Coconino, Deschutes, Lolo, Medicine Bow, Ozark, Superior, Tahoe; $\frac{3}{8}$ -inch, Cherokee; $\frac{1}{2}$ -inch, Black Hills, Deschutes, Medicine Bow.
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