

graphs which requires only a minimum of costly supplemental ground work. In somewhat oversimplified terms, that means the ability to identify tree species, to measure diameter, height, and width of crown, and to determine factors of tree condition, such as soundness, quality, and thrift, on aerial photos with accuracy and adequacy. The results could then be applied to special tables to get volume, quality, defect, and possibly growth, without any on-the-ground measurements.

To summarize: We need to know much more about taking and reading aerial photographs, but present techniques are good enough to aid greatly in the Forest Survey and to meet emergency needs for a quick inventory.

An example is the inventory of the forest fire in Maine in 1947, when 220,000 acres burned over in a few days

and a critical situation developed because it was felt that the fire-killed timber had to be utilized within a year before insects and storms could destroy it. A map and timber inventory to show the location, kind, and volume of the timber was immediately needed to aid in the necessary salvage plans. The area was flown, maps were prepared from the photographs, ground plots were measured, and reports made ready in only 8 weeks.

RAYMOND D. GARVER is director of the Nation-wide Forest Survey, Division of Forest Economics, in the Forest Service. He is a graduate of the University of Nebraska and holds a master's degree in forestry from Iowa State College. For more than 30 years he has worked in forest research and administration of national forests.

RAILROADS AND FORESTERS

ROBERT N. HOSKINS

Railroads have always run on wood. Wooden rails made the road over which the horse-drawn vehicles hauled brick and clay products up Beacon Hill in Boston in 1795. Three miles of wooden track was the total length of the first railroad incorporated in Massachusetts in 1826. When new frontiers opened, railroads pushed across the continent; for the 227,355 miles of track they laid, they needed wood—wood for cross ties, wood for piling, wood for switch ties, wood for a hundred other uses. Their need for wood continues in an age of steel, plastics, and glass; actually, in Class I railway track today there are 994,516,000 wooden cross ties.

The history of railroading can be told as the history of the use of wood. With mechanization, notably the steam locomotives, the use of horses for the motive power was discontinued. As heavier equipment moved greater and greater distances, the originally de-

signed wooden rails, capped by strips of iron, became obsolete and were replaced by all-steel rails. The demands of the lusty, growing giants, the railroads, and the expanding Nation they served and, indeed, nourished, grew as the railroads grew. To meet the necessities of a growing Nation, our virgin forests were cut over rapidly. The effort was little and the need small to carry on any program of conservation to insure future operations on those timberlands.

The real demand for action to be taken came much later. One reason for it when the need did arise was that durable species were declining in the volumes needed. Maintenance costs increased yearly because the materials needed for operation had to come from the less durable species like the red oak, gum, and pine. To meet the rising costs, extensive studies were undertaken in wood preservation. Railroads, aware of their problem, which was one

of constant tie replacement, naturally became one of the first organizations in the country to establish wood preservation plants whose function was to impregnate wood with chemicals which guarded them against decay, lengthened their useful life, and reduced the volume of wood needed.

The companies that supply the railroads conduct research to find better ways to use wood; the railroads themselves are continually making tests to prove or disprove the adaptability of new products, to find superior materials and to improve old methods, and further the forest-products research. A typical example of increasing the life of the forest products is that of treating cross ties with creosote.

In 1937, Class I railroads required in maintenance of their tracks 9,594,370 untreated cross ties and 35,554,782 treated cross ties. In 1946 the number of untreated ties dropped to 1,840,765, with the treated ties used for replacement totaling 35,429,179. The greater use of treated ties has had a direct bearing on replacement; within this 10-year period, 7,879,208 fewer ties were placed in service. An indication of the amount of money involved is the outlay of \$64,274,000 the first 8 months of 1947 by Class I railroads for cross ties. Another example: One railroad, the Seaboard Air Line Railroad Company, in 1946 alone, purchased 997,000 cross ties, 5,083,000 board feet of treated and untreated switch ties, 12,419,000 board feet of lumber, and 337,000 feet of piling for its 4,000 miles.

Railroads, which are among the largest users of forest products, have an enormous stake in the future timber supply. No satisfactory substitute has been developed for the wood ties.

The railroads derive millions of dollars in revenue from forest products in their many forms which they transport, such as logs, lumber, shingles, lath, pulpwood, rosin and turpentine, printing paper, paper bags, wrapping paper, paperboard, pulpboard, wallboard, and wood pulp.

In the southern district (those States

east of the Mississippi, and south of the Ohio and Potomac Rivers, including Virginia, North and South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama and Mississippi), Class I railroads, with a total mileage of 35,000, loaded 741,716 cars with forest products in 1944 and 823,146 cars in 1947.

In turn, the railroads spend large sums to develop equipment to facilitate the movement of this class of tonnage, to lower costs, and to provide more safely for the loads. One of the results of this endeavor is the woodrack car, which is used in hauling pulpwood. When the pulp and paper industry began its initial construction in the South, low-side gondolas, high-side gondolas, and box cars were used to move pulpwood. The woodrack car has effected cost savings in both loading and unloading pulpwood. The Seaboard Air Line Railroad has in construction enough woodrack cars to serve all paper mills along its lines. More than 2,000 such cars are in use.

Because railroads recognize the importance of forest products as a source of income and of material for operation and maintenance, they are interested in the management of forests. Some of the earliest hand-plantings of trees were made by railroads. The employment of foresters by railroads dates from the turn of the century, largely, at first, in the fields of wood utilization, preservation, and purchasing. Now railroads employ foresters to manage company-owned lands, assist landowners, youth groups, and others with their woodland problems, and to further the work of conservation of timber resources, planning in reforestation, and fire prevention.

Fourteen railroads now employ 24 foresters. They are the Atlantic Coast Line Railroad; Central of Georgia Railway Company; Chicago and North Western Railway; Erie Railroad; Gulf, Mobile and Ohio Railroad; Illinois Central Railroad; New York Central System; New York, New Haven and Hartford Railroad Com-

pany; Northern Pacific Railway; Pennsylvania Railroad; Seaboard Air Line Railroad Company; Soo Line; Southern Railway System, and the Southern Pacific Company.

The railroad foresters, in a meeting in Washington, D. C., in 1946, adopted the following program to promote better forestry practices:

To identify the railroads as one of the industries actively engaged in the perpetuation of our forests.

To encourage reforestation on forest lands not now producing revenue.

To encourage forest-fire prevention.

To promote forest conservation.

To assist actively all forest agencies in forestry education.

To encourage use of proper grades and species of wood by the railroads.

A NEW POSITION in railroading is that of the industrial forester, whose work is to encourage the development and better utilization of forest lands. To that end, he cooperates with the farm youth, the farmer, the forestry associations, State and Federal, civic organizations, State departments of education, and the States served by the railroad.

The Seaboard Air Line Railroad was the first to engage in such activity. Its lines serve six Southeastern States, which have more than 100 million acres in forest lands and in which numerous pulp and paper mills have located since 1937. The Seaboard initiated a forestry program in 1937. In cooperation with the State forest services, extension services, the United States Forest Service, and State departments of vocational agriculture, this company has conducted woodland-improvement demonstrations throughout the Southeast. The demonstrations have been well attended by adult farmers, the veterans who receive on-the-farm training, students of vocational agriculture, and representatives of wood-using industries. In them, stress is placed on the proper marking and cutting of the small farm woodlands and the use of varied types of

equipment which can facilitate economic efficiency in the farm woods. Some of the equipment demonstrated includes mechanical power saws and tree planters.

The Seaboard has given full cooperation to wood industries and others in forming associations to work for improvement in cutting practices and to present facts on forestry to legislative committees. The need to protect forests from fires, a vital part of the program, is presented in exhibits, news articles, contests, and meetings with civic organizations, farm groups, and railroad maintenance forces.

The Seaboard operated a forestry train over its system in 1941. At more than fifty stops the message of better protection and improved cutting practices was brought to people in the Southeast. Menus in Seaboard dining cars have featured information about trees along the route. Radio broadcasts on aspects of this railroad's forestry activities have reached large audiences. Since 1946 a forestry bulletin has been published quarterly for 12,000 readers. It has featured articles on various activities of Federal, State, and extension forest services, departments of vocational agriculture, and other forestry associations. Outstanding work in forestry by farmers, farm youth, and others is given recognition in each issue.

In cooperation with the vocational agriculture departments of the six Southeastern States, through the State supervisors of vocational agriculture and wood-using industries, the company has carried on a program with young farmers since 1945. It includes trips, scholarships to forestry training camps, and bonds that have been awarded to representatives of the national organization—Future Farmers of America—for their work on their own home wood lots. Classroom instruction and on-the-ground assistance is a part of the plan. Plantings in Florida alone amounted to 1,000,000 seedlings during the 1947-48 planting season, and in Alabama 1,400,000 seedlings were set out by students enrolled

in vocational agriculture. The anticipated result of this industry-sponsored program can be attested by the fact that participation in all Southeastern States has increased 75 to 200 percent. Some States have organized voluntary fire crews, with the assistance of the State divisions of forestry. The men in charge believe that if forestry is to develop on a progressive basis, the education of young people must receive greater support from railroads as well as from other agencies.

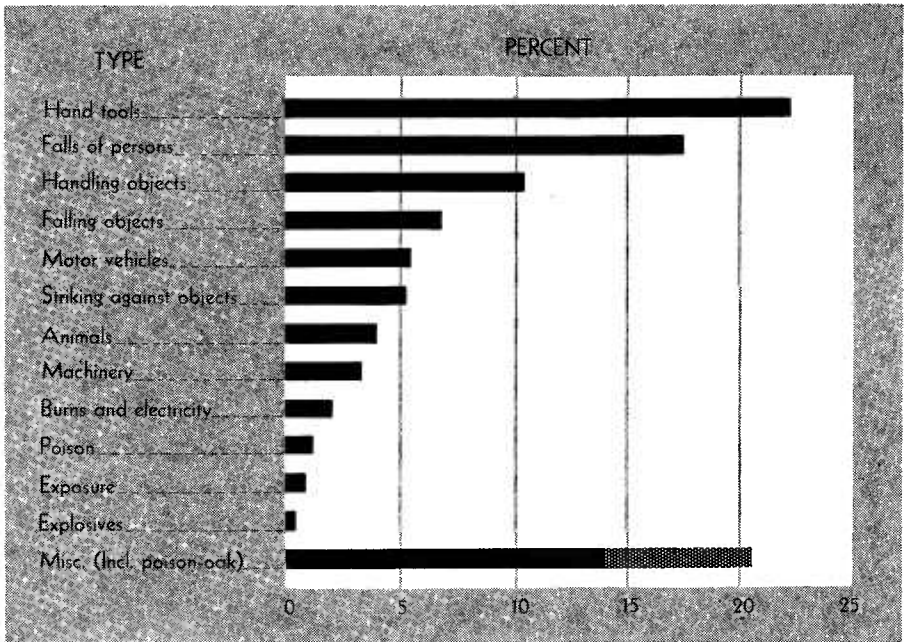
Other railroads are setting up similar programs in the States they serve. Their aim is the same as that of any wood industry, State or Federal forest agency—sufficient timber to meet to-

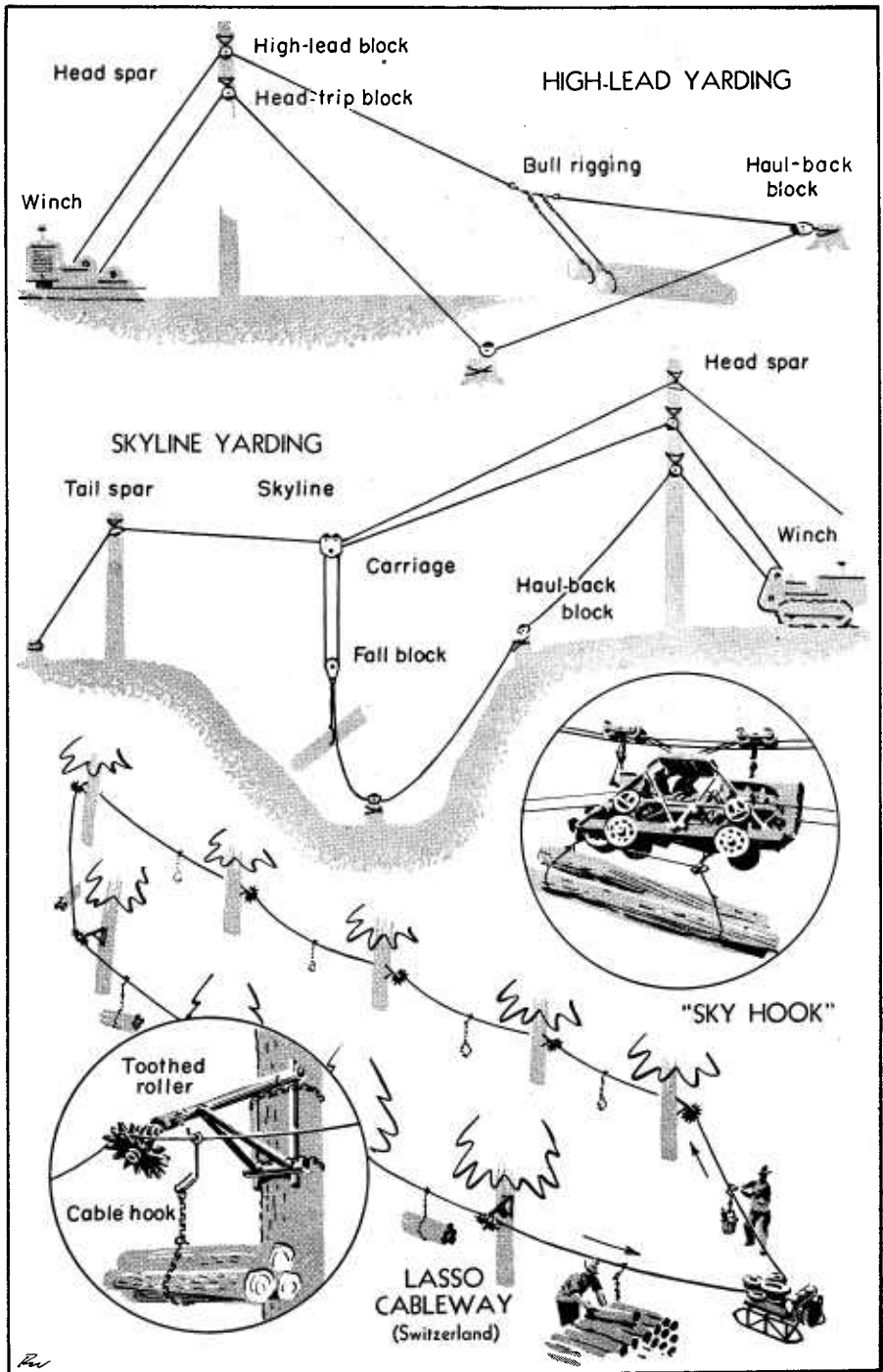
day's and tomorrow's requirements. An integral part of the activity is on-the-ground training for students of vocational agriculture, with awards of prizes and trips to those who make the most progress. It is one of several indications that more and more railroads recognize the value of forestry programs and the importance of wood.

ROBERT N. HOSKINS is employed as industrial forester by the Seaboard Air Line Railroad Company. After he received a bachelor's degree in forestry from Iowa State College in 1939, he was employed with the Missouri Conservation Commission and the Florida Forest Service, in Tallahassee.

THE CAUSES OF ACCIDENTS AMONG WOODS WORKERS

About one out of four injuries involves the unskilled use of hand tools. The ax is the main offender. Most of the serious accidents are due to the operation of motor vehicles, tractors, and graders at speeds too fast for existing conditions, even though the actual speed may be only 15 miles an hour or less.





These logging machines and methods are discussed in the following chapter.