

eventually become licensed chief engineers on large commercial vessels, after meeting the Coast Guard's experience, physical, and academic requirements. Experienced, reliable deckhands who display supervisory qualities may become boatswains. Boatswains may, in turn, become second mates, first mates, and finally captains. Almost all captains become self-employed, and the overwhelming majority eventually own, or have an interest in, one or more fishing ships. Some may choose to run a sport or recreational fishing operation. When their seagoing days are over, experienced individuals may work in or, with the necessary capital, own stores selling fishing and marine equipment and supplies. Some captains may assume advisory or administrative positions in industry trade associations or government offices, such as harbor development commissions or in teaching positions in industry-sponsored workshops or educational institutions. Divers in fishing operations can enter commercial diving activity—for example, repairing ships or maintaining piers and marinas—usually after completion of a certified training program sponsored by an educational institution or industry association.

### Job Outlook

Employment of fishers and fishing vessel operators is expected to decline through the year 2010. These occupations depend on the natural ability of fish stocks to replenish themselves through growth and reproduction, as well as on governmental regulation of fisheries. Many operations are currently at or beyond maximum sustainable yield, partially because of habitat destruction, and the number of workers who can earn an adequate income from fishing is expected to decline. Job openings will arise from the need to replace workers who retire or leave the occupation. Some fishers and fishing vessel operators leave the occupation because of the strenuous and hazardous nature of the job and the lack of steady, year-round income.

In many areas, particularly the North Atlantic and Pacific Northwest, damage to spawning grounds and excessive fishing have adversely affected the stock of fish and, consequently, the employment opportunities for fishers. In some areas, States have greatly reduced permits to fishers, to allow stocks of fish and shellfish to replenish themselves, idling many fishers. Other factors contributing to the projected decline in employment of fishers include the use of sophisticated electronic equipment for navigation, communication, and fish location; improvements in fishing gear, which have greatly increased the efficiency of fishing operations; and the use of highly automated floating processors, where the catch is processed aboard the vessel. Sport fishing boats will continue to provide some job opportunities.

### Earnings

The majority of fishers earn between \$300 and \$750 per week. Earnings of fishers and fishing vessel operators normally are highest in the summer and fall—when demand for services peaks and environmental conditions are favorable—and lowest during the winter. Many full-time and most part-time workers supplement their income by working in other activities during the off-season. For example, fishers may work in seafood processing plants, establishments selling fishing and marine equipment, or in construction, or in a number of non-related, seasonal occupations.

Earnings of fishers vary widely, depending upon their position, ownership percentage of the vessel, size of ship, and the amount and value of the catch. The costs of the fishing operation—the physical aspects of operating the ship such as the fuel costs, repair and maintenance of gear and equipment, and the crew's supplies—are deducted from the sale of the catch. Net proceeds are distributed among the crew members in accordance with a prearranged

percentage. Generally, the ship's owner—usually its captain—receives half of the net proceeds. From this, the owner pays for depreciation, maintenance and repair, replacement and insurance costs of the ship and equipment; the money remaining is the owner's profit.

### Related Occupations

Other occupations that involve outdoor work with fish and watercraft include water transportation occupations and fish and game wardens.

### Sources of Additional Information

Names of postsecondary schools offering fishing and related marine educational programs are available from:

► Marine Technology Society, 1828 L St. NW., Suite 906, Washington, DC 20036-5104. Internet: <http://www.mtsociety.org>

Information on licensing of fishing vessel captains and mates, and requirements for merchant mariner documentation, is available from the U.S. Coast Guard Marine Inspection Office or Marine Safety Office in your State, or:

► Office of Compliance, Commandant (G-MOC-3) 2100 Second St. SW., Washington, DC 20593.

► Licensing and Evaluation Branch, National Maritime Center, 4200 Wilson Blvd., Suite 630, Arlington, VA 22203-1804.

## Forest, Conservation, and Logging Workers

(O\*NET 45-4011.00, 45-4021.00, 45-4022.01, 45-4023.00)

### Significant Points

- Workers spend all their time outdoors, sometimes in poor weather and often in isolated areas.
- Most jobs are physically demanding and can be hazardous.
- A small decline is expected in overall employment.

### Nature of the Work

The Nation's forests are a rich natural resource, providing beauty and tranquillity, varied recreational areas, and wood for commercial use. Managing forests and woodlands requires many different kinds of workers. Forest and conservation workers help develop, maintain, and protect these forests by growing and planting new tree seedlings, fighting insects and diseases that attack trees, and helping to control soil erosion. Timber cutting and logging workers harvest thousands of acres of forests each year for the timber that provides the raw material for countless consumer and industrial products.

*Forest and conservation workers* perform a variety of tasks to reforest and conserve timberlands and maintain forest facilities, such as roads and campsites. Some forest workers, called tree planters, use digging and planting tools called "dibble bars" and "hoedads" to plant tree seedlings to reforest timberland areas. Forest workers also remove diseased or undesirable trees with a powersaw or hand-saw and spray trees with insecticides to kill insects and to protect against disease and herbicides to reduce competing vegetation. Forest workers in private industry usually work for professional foresters and paint boundary lines, assist with prescribed burning, and aid in tree marking and measuring by keeping a tally of the trees examined and counted. Those who work for State and local governments or under contract to the Federal Government also clear

away brush and debris from jurisdictional camp trails, roadsides, and camping areas. Some clean kitchens and restrooms at recreational facilities and campgrounds.

Other forest and conservation workers work in forest nurseries, sorting out tree seedlings and discarding those that do not meet prescribed standards of root formation, stem development, and foliage condition.

Some forest workers are employed on tree farms, where they plant, cultivate, and harvest many different kinds of trees. Duties vary depending on the type of tree farm. Those who work on specialty farms, such as those growing Christmas or ornamental trees for nurseries, are responsible for shearing tree tops and limbs to control growth, increase limb density, and improve tree shape. In addition, duties include planting, spraying to control surrounding weed growth and insects, and harvesting.

Other forest workers gather, by hand or using hand tools, products from the woodlands such as decorative greens, tree cones and barks, moss, and other wild plant life. Still others tap trees for sap to make syrup or to produce chemicals.

The timber cutting and logging process is carried out by a variety of workers who make up a logging crew. *Fallers* cut down trees with hand-held power chain saws or occasionally axes. Usually using gas-powered chain saws, *buckers* trim off the tops and branches and buck (cut) the resulting logs into specified lengths.

*Choke setters* fasten chokers (steel cables or chains) around logs to be skidded (dragged) by tractors or forwarded by the cable yarding system to the landing or deck area where logs are separated by species and product type, such as pulpwood, sawlogs, or veneer logs, and loaded onto trucks. *Rigging slingers* and *chasers* set up and dismantle the cables and guy wires of the cable yarding system. *Log sorters, markers, movers,* and *debarkers* sort, mark, and move logs, based on species, size, and ownership, and tend machines that debark logs.

*Logging equipment operators* on a logging crew perform a number of duties. They drive crawler or wheeled tractors called skidders, or forwarders, which drag or transport logs from the felling site in the woods to the log landing area for loading. They operate grapple loaders, which lift and load logs into trucks, and tree fellers or shears, which cut the trees. They use tree harvesters to shear the tops off of trees, cut and limb the trees, and then cut the logs into desired lengths. Some logging equipment operators use tracked or wheeled equipment similar to a forklift to unload logs and pulpwood off trucks or gondola railroad cars, usually in a sawmill or pulpmill woodyard.

*Log graders* and *scalers* inspect logs for defects, measure logs to determine their volume, and estimate the marketable content or value of logs or pulpwood. These workers often use hand-held data collection terminals to enter data about individual trees, which can later be downloaded or sent, via modem, from the scaling area to a central computer.

Other timber cutting and logging workers have a variety of responsibilities. Some workers hike through forests to assess logging conditions. Laborers clear areas of brush and other growth to prepare for logging activities or to promote growth of desirable species of trees.

The timber cutting and logging industry is characterized by a large number of small crews of four to eight workers. A typical crew might consist of one or two fallers or one feller machine operator, one bucker, two logging tractor operators to drag cut trees to the loading deck, and one equipment operator to load the logs onto trucks. Most crews work for self-employed logging contractors who possess substantial logging experience, the capital to purchase equipment, and skills needed to run a small business successfully. Most contractors work alongside their crews as working supervisors and often operate one of the logging machines, such as the grapple loader



*Forest, conservation, and logging workers spend most of their time outdoors, often operating heavy logging equipment.*

or the tree harvester. Many manage more than one crew and function as owner-supervisors.

Although timber cutting and logging equipment has greatly improved and operations are becoming increasingly mechanized, many logging jobs are still labor intensive. These jobs require various levels of skill, ranging from the unskilled task of manually moving logs, branches, and equipment to skillfully using chain saws, peavies (hooked poles), and log jacks to cut and position logs for further processing or loading. To keep costs down, some timber cutting and logging workers maintain and repair the equipment they use. A skillful, experienced logger is expected to handle a variety of logging operations.

### **Working Conditions**

Forestry and logging jobs are physically demanding. These workers spend all their time outdoors, sometimes in poor weather and often in isolated areas. The increased use of enclosed machines has decreased some of the discomforts caused by inclement weather. A few lumber camps in Alaska house workers in bunkhouses or company towns. Workers in sparsely populated western States commute long distances between their homes and logging sites. In the more densely populated eastern and southern States, commuting distances are much shorter.

Most logging occupations involve lifting, climbing, and other strenuous activities, although machinery has eliminated some of the heavy labor. Loggers work under unusually hazardous conditions. Falling trees and branches are a constant menace, as are the dangers associated with log handling operations and use of sawing equipment, especially delimiting devices. Special care must be taken during strong winds, which can even halt operations. Slippery or muddy ground and hidden roots or vines not only reduce efficiency but also present a constant danger, especially in the presence of moving vehicles and machinery. Poisonous plants, brambles, insects, snakes, and heat and humidity are minor annoyances. If safety precautions are not taken, the high noise level of sawing and skidding operations over long periods of time may impair hearing. Experience, exercise of caution, and use of proper safety measures and equipment—such as hardhats, eye and ear protection, and safety clothing and boots—are extremely important to avoid injury.

The jobs of forest and conservation workers generally are much less hazardous. It may be necessary for some forestry aides or forest workers to walk long distances through densely wooded areas to do their work.

## Employment

Forest, conservation, and logging workers held about 90,000 jobs in 2000, distributed among the following occupations:

Logging equipment operators .....	47,000
Forest and conservation workers .....	21,000
Fallers .....	13,000
Log graders and scalers .....	8,000

Additional employment of choke setters, buckers, rigging slingers, and other logging workers is not included in the employment above.

Most wage and salary fallers and logging equipment operators are employed in the logging camps and logging contractors industry, although some work in sawmills and planing mills. Employment of log graders and scalers is largely concentrated in sawmills and planing mills. Although logging operations are found in most States, the Southeast employs the most, about 37 percent of all logging workers, followed by the Northwest, which employs 30 percent.

About 2 in 5 wage and salary forest and conservation workers are employed by companies that operate timber tracts, tree farms, or forest nurseries, or for establishments that supply forestry services. Some of those employed in forestry services work on a contract basis for the U.S. Department of Agriculture's Forest Service. Most of the remainder of forest and conservation workers are employed by State or local governments; about 4,300 work for State governments, and 1,900 work for local governments. A small number work in sawmills and planing mills. Although forest and conservation workers are located in every State, employment is concentrated in the West and Southeast where many national and private forests and parks are located.

Self-employed forestry, conservation, and logging workers account for about 1 of every 5 logging workers—a much higher proportion of self-employment than for most occupations.

Seasonal demand for forest, conservation, and logging workers varies by region. For example, in the northern States, winter work is common because the frozen ground facilitates logging. In the Southeast, logging and related activities occur year round.

## Training, Other Qualifications, and Advancement

Most forest, conservation, and logging workers develop skills through on-the-job training with instruction coming primarily from experienced workers. Logging workers must familiarize themselves with the character and potential dangers of the forest environment and the operation of logging machinery and equipment. However, large logging companies and trade associations, such as the Northeastern Loggers Association and the Forest Resources Association, Inc., offer special programs, particularly for workers training to operate large, expensive machinery and equipment. Often, a representative of the manufacturer or company spends several days in the field explaining and overseeing the operation of newly purchased machinery. Safety training is a vital part of instruction for all logging workers.

Many State forestry or logging associations provide training sessions for fallers, whose job duties require more skill and experience than other positions on the logging team. Sessions may take place in the field, where trainees, under the supervision of an experienced logger, have the opportunity to practice various felling techniques. Fallers learn how to manually cut down extremely large or expensive trees safely and with minimal damage to the felled or surrounding trees.

Training programs for loggers are becoming common in many States, in response to a collaborative effort by the American Forest and Paper Association and others in the forestry industry. Such

programs are designed to encourage the health and productivity of the Nation's forests through the Sustainable Forest Initiative (SFI) program. Logger training programs vary by State, but generally include some type of classroom or field training in a number of areas—best management practices, safety, endangered species, reforestation, and business management. Some programs lead to logger certification.

Experience in other occupations can expedite entry into some logging occupations. For example, equipment operators, such as truck drivers and bulldozer and crane operators, can assume skidding and yarding functions. Some loggers have worked in sawmills or on family farms with extensive wooded areas. Some logging contractors were formerly crew members of family-owned businesses operated over several generations.

Generally, little formal education is required for most forest, conservation, and logging occupations. Many secondary schools, including vocational and technical schools, and some community colleges offer courses or a 2-year degree in general forestry, wildlife, conservation, and forest harvesting, which could be helpful in obtaining a job. A curriculum that includes field trips to observe or participate in forestry or logging activities provides a particularly good background. There are no educational requirements for forest worker jobs. Many of these workers are high school or college students who are hired on a part-time or seasonal basis to perform short-term, labor-intensive tasks, such as planting tree seedlings.

Forest, conservation, and logging workers must be in good health and able to work outdoors every day. They also must be able to work as part of a team. Many logging occupations require physical strength and stamina. Maturity and good judgment are important in making quick, intelligent decisions in dealing with hazards as they arise. Mechanical aptitude and coordination are necessary qualities for operators of machinery and equipment, who often are responsible for repair and maintenance as well. Initiative and managerial and business skills are necessary for success as a self-employed logging contractor.

Experience working at a nursery or as a laborer can be useful in obtaining a job as a forest or conservation worker. Logging workers generally advance from occupations involving primarily manual labor to those involving the operation of expensive, sometimes complicated, machinery and other equipment. Inexperienced entrants usually begin as laborers, who carry tools and equipment, clear brush, and load and unload logs and brush. For some, familiarization with logging operations may lead to jobs such as log handling equipment operator. Further experience may lead to jobs involving the operation of more complicated machinery and yarding towers to transport, load, and unload logs. Those who have the motor skills required for the efficient use of power saws and other equipment may become fallers and buckers.

## Job Outlook

Overall employment of forest, conservation, and logging workers is expected to decline slightly through the year 2010. Most job openings will result from replacement needs. Many logging workers are older and will retire, or transfer to other jobs that are less physically demanding and dangerous. In addition, some forestry workers are young workers who are not committed to the occupation on a long-term basis. Some take jobs to earn money for school; others only work in this occupation until they find a better paying job.

Slower-than-average employment growth is expected for forest and conservation workers. Environmental concerns may spur limited demand for these workers, especially at the State and local government levels. If more land is set aside to protect natural resources or wildlife habitats, more forest and conservation workers will be needed to maintain these lands.

Despite steady demand for lumber and other wood products, employment of timber cutting and logging occupations is expected to decline. Forest conservation efforts may restrict the volume of public timber available for harvesting, particularly in Federal forests in the West and Northwest, dampening demand for timber cutting and logging workers. The best job opportunities will be with privately owned forests and tree farms, which are not subject to the same restrictions in timber harvesting as forests on Federal land. Domestic timber producers also face increasing competition from foreign producers who can harvest the same amount of timber at lower cost. As competition increases, the logging industry is expected to continue to consolidate in order to reduce costs, eliminating some jobs.

Increased mechanization of logging operations and improvements in logging equipment will also continue to depress demand for many timber cutting and logging workers. Employment of fallers, buckers, choke setters, and other workers—whose jobs are labor intensive—should decline, as safer, laborsaving machinery and other equipment are increasingly used. Employment of machinery and equipment operators, such as logging tractor and log handling equipment operators, should be less adversely affected.

Weather can force curtailment of logging operations during the muddy spring season and cold winter months, depending on the geographic region. Changes in the level of construction, particularly residential construction, also affect logging activities in the short term. In addition, logging operations must be relocated when timber harvesting in a particular area has been completed. During prolonged periods of inactivity, some workers may stay on the job to maintain or repair logging machinery and equipment; others are forced to find jobs in other occupations or be without work.

### Earnings

Earnings vary depending on the particular forestry or logging occupation and experience, ranging from the minimum wage in some beginning forestry and conservation positions to about \$27.00 an hour for some experienced fallers. Median hourly earnings in 2000 for forest, conservation, and logging occupations were as follows:

Log graders and scalers .....	\$13.07
Fallers .....	12.33
Logging equipment operators .....	12.07
Forest and conservation workers .....	8.97

Earnings of logging workers vary by size of establishment and by geographic area. Workers in the largest establishments earn more than those in the smallest establishments. Workers in Alaska and the Northwest earn more than those in the South, where the cost of living is generally lower.

Forest and conservation workers who work for State and local governments and large private firms generally enjoy more generous benefits than workers in smaller firms. Small logging contractors generally offer timber cutting and logging workers few benefits. However, some employers offer full-time workers basic benefits, such as medical coverage, and provide safety apparel and equipment.

### Related Occupations

Other occupations concerned with the care of trees and their environment include conservation scientists and foresters, forest and conservation technicians, and grounds maintenance workers. Logging equipment operators have skills similar to material moving equipment operators, such as industrial truck and tractor operators and crane and tower operators.

### Sources of Additional Information

For information about timber cutting and logging careers and secondary and postsecondary programs offering training for logging occupations, contact:

- ▶ Northeastern Loggers Association, P.O. Box 69, Old Forge, NY 13420. Internet: <http://www.loggertraining.com>
- ▶ Forest Resources Association, Inc., 600 Jefferson Plaza, Suite 350, Rockville, MD 20852. Internet: <http://www.forestresources.org>

For information on the Sustainable Forestry Initiative (SFI) training programs, contact:

- ▶ American Forest and Paper Association, 1111 19th St. NW., Suite 800, Washington, DC 20036. Internet: <http://www.afandpa.org>

Schools of forestry at States' land-grant colleges or universities also should be able to provide useful information.

A list of State forestry associations and other forestry-related State associations is available at most public libraries.