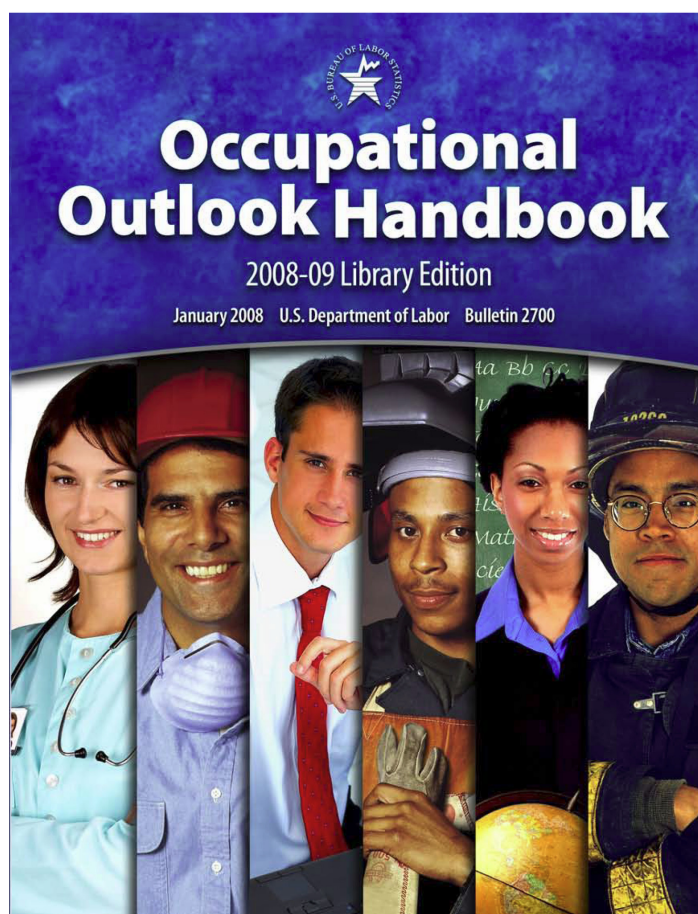


Farming, Fishing, Forestry, and Transportation Occupations



Reprinted from the
Occupational Outlook Handbook, 2008-09 Edition

U.S. Department of Labor
Bureau of Labor Statistics



Occupations Included in this Reprint

- Agricultural workers
- Air traffic controllers
- Aircraft pilots and flight engineers
- Bus drivers
- Farmers, ranchers, and agricultural managers
- Fishers and fishing vessel operators
- Forest, conservation, and logging workers
- Material moving occupations
- Rail transportation occupations
- Taxi drivers and chauffeurs
- Truck drivers and driver/sales workers
- Water transportation occupations

Agricultural Workers

(O*NET 45-2011.00, 45-2021.00, 45-2041.00, 45-2091.00, 45-2092.00, 45-2092.01, 45-2092.02, 45-2093.00, and 45-2099.99)

Significant Points

- Duties vary widely, from raising plants and livestock to inspecting agricultural products at border crossings.
- Farmworkers learn their jobs through short-term on-the-job training; agricultural inspectors and animal breeders require more work experience or a college degree.
- Most farmworkers receive relatively low pay and do strenuous work in all kinds of weather, but many enjoy the rural lifestyle.
- Job openings are expected to be numerous for some types of work.

Nature of the Work

Agricultural workers play a large role in getting food, plants, and other agricultural products to market. Working mostly on farms or ranches, but also in nurseries, slaughterhouses, and even ports of entry, these workers have numerous and diverse duties. Among their activities are planting and harvesting crops, installing irrigation, delivering animals, and inspecting our food for safety. While most agricultural workers have relatively few technical skills, some have college degrees that train them to breed animals with specific traits or to inspect food, protecting us from harmful bacteria.

More than 80 percent of agricultural workers are farmworkers and laborers. *Crop, nursery, and greenhouse farmworkers* and laborers perform numerous activities related to growing and harvesting grains, fruits, vegetables, nuts, fiber, trees, shrubs, and other crops. They plant and seed, prune, irrigate, harvest, and pack and load crops for shipment. Farmworkers also apply pesticides, herbicides, and fertilizers to crops and repair fences and some farm equipment. Nursery and greenhouse workers prepare land or greenhouse beds for growing horticultural products, such as trees, plants, flowers, and sod. Their duties include planting, watering, pruning, weeding, and spraying the plants. They may cut, roll, and stack sod; stake trees; tie, wrap, and pack plants to fill orders; and dig up or move field-grown and containerized shrubs and trees.

Farm and ranch animal farmworkers care for live farm, ranch, or water animals that may include cattle, sheep, swine, goats, horses, poultry, finfish, shellfish, and bees. The animals are usually raised to supply meat, fur, skins, feathers, eggs, milk, or honey. Duties may include feeding, watering, herding, grazing, castrating, branding, debeaking, weighing, catching, and loading animals. On dairy farms, farmworkers operate milking machines; they also may maintain records on animals, examine animals to detect diseases and injuries, assist in delivering animals at their birth, and administer medications, vaccinations, or

insecticides. Many workers clean and maintain animal housing areas every day.

Other agricultural workers known as *agricultural equipment operators* use a variety of farm equipment to plow, sow seeds, and maintain and harvest crops. Equipment may include tractors, fertilizer spreaders, haybines, raking equipment, balers, combines, threshers, and trucks. These workers also operate machines, such as conveyor belts, loading machines, separators, cleaners, and dryers, used in moving and treating crops after their harvest. As part of the job, workers may make adjustments and minor repairs to equipment.

Agricultural inspectors, another type of agricultural worker, are employed by Federal and State governments to ensure compliance with laws and regulations governing the health, safety, and quality of agricultural commodities. Inspectors also make sure that the facilities and equipment used in processing the commodities meet legal standards. Meat safety is a prime responsibility. Inspectors work to ensure that meat is free of harmful ingredients or bacteria. In meat-processing facilities, inspectors may collect samples of meat suspected to be diseased or contaminated and send them to a laboratory for identification and analysis. They also may inspect livestock to help determine the effectiveness of medication and feeding programs. Some inspectors are stationed at export and import sites to weigh and inspect agricultural shipments leaving and entering the country to ensure the quality and quantity of the shipments. A few work at logging sites, making sure that safety regulations are enforced.

Graders and sorters of agricultural products examine agricultural commodities being prepared for market, classifying them according to quality or size: they grade, sort, or classify unprocessed food and other agricultural products by size, weight, color, or condition and discard inferior or defective products. For example, graders sort eggs by color and size and also examine the fat content; others examine the marbling of beef, classifying the meat as “Prime,” “Choice,” or a lower grade, as appropriate. The grade assigned determines the meat’s price.

Animal breeders select and breed animals using their knowledge of genetics and animal science to produce offspring with desired traits and characteristics, such as chickens that lay more eggs, pigs that produce leaner meat, and sheep with more desirable wool. Some animal breeders also breed and raise cats, dogs, and other household pets. Larger and more expensive animals, such as horses and cattle, are usually bred through artificial insemination, which requires the taking of semen from the male and then inseminating the female. This process ensures better results than conventional mating and also enables one prized male to sire many more offspring. To know which animals to breed and when, animal breeders keep detailed records, including the health of the animals, their size and weight, and the amount and quality of the product produced by them. They also keep track of the traits of the offspring. Some animal breeders work as consultants for a number of farmers, but others breed and raise their own animals for sale or future breeding. For those who raise animals, tasks might include fixing and cleaning animal shelters, feeding and watering the animals, and overseeing animals’ health. Some breeders supervise others who perform these tasks. Animal breeders also read journals and newsletters to learn the latest information on breeding and veterinary practices.

Work environment. Working conditions for agricultural workers vary widely. Much of the work of farmworkers and laborers on farms and ranches is physically strenuous and takes place outdoors in all kinds of weather. Harvesting fruits and vegetables, for example, may require much bending, stooping, and lifting. Workers may have limited access to sanitation facilities while working in the field and drinking water may also be limited. Nevertheless, some agricultural workers enjoy the variety of their work, the rural setting, the satisfaction of working the land, and raising animals.

Farm work does not lend itself to a regular 40-hour workweek. Work cannot be delayed when crops must be planted or harvested or when animals must be sheltered and fed. Long hours and weekend work is common in these jobs. For example, farmworkers and agricultural equipment operators may work 6- or 7 days a week during planting and harvesting seasons. Some graders and sorters may work evenings or weekends because of the perishable nature of the products they inspect. Agricultural inspectors may also work long and irregular schedules.

Many agricultural worker jobs are seasonal in nature, so some workers also do other jobs during slow seasons. Migrant farmworkers, who move from location to location as crops ripen, live an unsettled lifestyle, which can be stressful. Work also is seasonal for farmworkers in nurseries; spring and summer are the busiest times of the year. Greenhouse workers enjoy relatively comfortable working conditions while tending to plants indoors. However, during the busy seasons, when landscape contractors need plants, work schedules may be more demanding, requiring weekend work. Moreover, the transition from warm weather to cold weather means that nursery workers might have to work overtime with little notice given in order to move plants indoors to protect them from a frost. Farmworkers who work with animals usually have a more regular schedule; their work is steadier and year round, but they sometimes must come to work on short notice to help handle emergencies.

Farmworkers risk exposure to pesticides and other hazardous chemicals sprayed on crops or plants. However, exposure can be minimal if safety procedures are followed. Those who work on mechanized farms must take precautions to avoid injury when working with tools and heavy equipment. Those who work directly with animals risk being bitten or kicked.

Federal meat inspectors may work in highly mechanized plants or with poultry or livestock in confined areas with extremely cold temperatures and slippery floors. Inspectors' jobs often require working with sharp knives, moderate lifting, and walking or standing for long periods. Inspectors may find themselves in adversarial roles when the organization or individual being inspected objects to the inspection or its potential consequences. Some inspectors travel frequently to visit farms and processing facilities. Others work at ports, inspecting cargo on the docks or on boats.

Graders and sorters may work with similar products for an entire shift, or they may be assigned a variety of items. They may be on their feet all day and may have to lift heavy objects, but others may sit during most of their shift and do little strenuous work. Some graders work in clean, air-conditioned environments, suitable for carrying out controlled tests.

Animal breeders spend most of their time outdoors around animals but can also work in offices or laboratories. Breeders who consult may travel from farm to farm. If they need to sell offspring, breeders may travel to attend shows and meet potential buyers. While tending to the animals, breeders may be bitten or kicked.

Training, Other Qualifications, and Advancement

The majority of agricultural workers learn their skills on the job in less than a month. Some occupations, however, require more work experience or formal education.

Education and training. Most farmworkers learn their jobs quickly as they work; many do not have a high school diploma. People without a high school diploma are particularly common in the crop production sector, which is more labor-intensive and employs more migrant farmworkers. Other agricultural workers require a month to a year of training on the job and, maybe, coursework in related subjects. For graders and sorters, training requirements vary on the basis of their responsibilities. For those who perform tests on agricultural products, a high school diploma is preferred and may be required. Simple jobs requiring mostly visual inspection might be filled by those without a high school diploma.

The education and training requirements for animal breeders vary with the type of breeding they do. For those who breed livestock and other large or expensive animals, a bachelor's or



Agricultural workers tend to flowers or crops in nurseries and greenhouses.

graduate degree in animal science is recommended. Courses include genetics, animal breeding, and animal physiology. For those with experience raising animals or who are breeding their own animals, a bachelor's degree often is not needed, but an associate degree or other training in animal breeding is recommended.

Agricultural inspector jobs require relevant work experience or some college coursework in biology, agricultural science, or a related subject. Inspectors also must be trained in the applicable laws and regulations governing inspection before they can start their jobs.

Other qualifications. Experience working on a farm or around animals is helpful but not necessary to qualify for many jobs. For those who operate equipment on the road or drive a truck as part their job, a driver's license or commercial driver's license is required.

Nursery workers who deal directly with customers must be friendly and tactful. Employers also look for responsible, self-motivated individuals because nursery workers sometimes work with little supervision. People who want to become agricultural inspectors should be responsible, able to communicate well, and like detailed work.

Advancement. Farmworkers who work hard and quickly, have good communication skills, and take an interest in the business may advance to crew leader or other supervisory positions. The ability to speak both English and Spanish is quite helpful in supervisory work as well.

Some agricultural workers aspire to become farm, ranch, or other agricultural managers, or own farms or ranches themselves. (Farmers, ranchers, and agricultural managers are discussed elsewhere in the *Handbook*.) In addition, their knowledge of raising and harvesting produce may provide an excellent background for becoming purchasing agents and buyers of farm products. Knowledge of working a farm as a business can also help agricultural workers become farm and home management advisors. Those who earn a college degree in agricultural science could become agricultural and food scientists.

Federal Government inspectors whose job performance is satisfactory advance through a career ladder to a specified level. Positions above this level are usually supervisory, and advancement to them is competitive and based on agency needs and individual merit. Advancement opportunities in State and local governments and in the private sector often are similar to those in the Federal Government.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Agricultural workers	45-2000	859,000	838,000	-21,000	-2
Agricultural inspectors	45-2011	16,000	16,000	-200	-1
Animal breeders	45-2021	11,000	11,000	500	4
Graders and sorters, agricultural products	45-2041	42,000	41,000	-800	-2
Miscellaneous agricultural workers	45-2090	790,000	769,000	-20,000	-3
Agricultural equipment operators	45-2091	59,000	56,000	-3,000	-5
Farmworkers and laborers, crop, nursery, and greenhouse	45-2092	603,000	583,000	-20,000	-3
Farmworkers, farm and ranch animals	45-2093	107,000	110,000	2,900	3
Agricultural workers, all other	45-2099	20,000	20,000	0	0

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

Employment

Agricultural workers held about 859,000 jobs in 2006. More than 68 percent of all agricultural workers worked for crop and livestock producers, while about 5 percent worked for agricultural service providers, mostly farm labor contractors. Agricultural inspectors are employed mainly by Federal, State, and local governments.

By far, the State with the largest employment of farmworkers is California, followed by Oregon and Washington. Though these States produce a multitude of agricultural products, they are particularly known for raising grapes, potatoes, tomatoes, lettuce, apples, citrus, and nursery and greenhouse products.

Job Outlook

Job opportunities for agricultural workers occupations should be abundant because large numbers of workers leave these jobs due to their low wages and physical demands. Overall employment of agricultural workers is projected to undergo little or no change over the 2006-16 decade, reflecting in large part the outlook for farmworkers in crops, nurseries, and greenhouses, who make up the large majority of all agricultural workers.

Employment change. Overall employment of agricultural workers is expected to decline about 2 percent, which is considered little or no change. Employment of farmworkers who work in crops, nurseries, or greenhouses and those who work with farm and ranch animals are projected to decline moderately, about 3 percent. Fewer farmworkers will be needed overall because of continued consolidation of farms and technological advancements in farm equipment that make existing farmworkers more efficient. Farmworkers will increasingly work for farm labor contractors rather than being hired directly by a farm. The agriculture industry also is expected to face increased competition from foreign countries and rising imports, particularly from Central America and China because of free trade agreements with those regions. Nursery and greenhouse workers should experience some job growth in this period, reflecting the increasing demand for landscaping plants.

Employment of agricultural inspectors is expected show little or no change. Governments at all levels are not expected to hire significant numbers of new inspectors, and instead to leave more of the routine inspections to businesses. Little or no change in employment is also expected for graders and sorters. Employment of agricultural equipment operators is expected to decline moderately, reflecting the agriculture industry's continuing

ability to produce more with fewer workers overall. Consolidation is resulting in fewer small farmers and greater need to hire equipment operators, but on a temporary basis. Animal breeders will grow more slowly than average, around 4 percent over the 2006-16 period, as large commercial farmers continue to try to improve their animals. However, because the occupation is so small, few new jobs are expected.

Job prospects. Job openings should be plentiful because of relatively large numbers of workers who leave these jobs for other occupations. This is especially true for jobs as agricultural inspectors, graders and sorters, agricultural equipment operators, and crop, greenhouse, and nursery farmworkers. Job prospects will not be as good for animal breeders and ranch and animal farmworkers because fewer workers leave these jobs. Those who work with animals tend to have a more settled lifestyle, as the work does not require them to follow crops for harvest.

Earnings

Agricultural workers had the following median hourly earnings in May 2006:

Agricultural inspectors.....	\$18.32
Animal breeders.....	13.02
Agricultural equipment operators.....	9.72
Farmworkers, farm and ranch animals.....	9.17
Graders and sorters, agricultural products.....	8.27
Farmworkers and laborers, crop, nursery, and greenhouse.....	7.95

Farmworkers in crop production often are paid piece rates, with earnings based on how much they do instead of how many hours they work. Farmworkers tend to receive fewer benefits than those in many other occupations. Some employers supply seasonal workers with room and board. Agricultural inspectors employed by State and Federal Governments tend to have very good benefits.

Related Occupations

The duties of farmworkers who perform outdoor labor are similar to the duties of grounds maintenance workers; fishers and operators of fishing vessels; and forest, conservation, and logging workers. Farmworkers who work with farm and ranch animals perform tasks similar to those of animal care and service workers. Animal breeders may perform some work similar to those of veterinary technologists or veterinarians.

Sources of Additional Information

Information on agricultural worker jobs is available from:

► National FFA Organization, The National FFA Center, Attention: Career Information Requests, P.O. Box 68690, Indianapolis, IN 46268-0960. Internet: <http://www.ffa.org>

Information on obtaining positions as an agricultural inspector with the Federal Government is available from the Office of Personnel Management through USAJOBS, the Federal Government's official employment information system. This resource for locating and applying for job opportunities can be accessed through the Internet at <http://www.usajobs.opm.gov> or through an interactive voice response telephone system at

(703) 724-1850 or TDD (978) 461-8404. These numbers are not toll free, and charges may result.

Air Traffic Controllers

(O*NET 53-2021.00)

Significant Points

- Nearly all air traffic controllers are employed by the Federal Aviation Administration (FAA), an agency of the Federal Government.
- Replacement needs will continue to account for most job openings, reflecting the large number of air traffic controllers who will be eligible to retire over the next decade.
- Competition to get into FAA training programs is expected to remain keen; however, graduates of these programs have good job prospects.
- Air traffic controllers earn relatively high pay and have good benefits.

Nature of the Work

The air traffic control system is a vast network of people and equipment that ensures the safe operation of commercial and private aircraft. Air traffic controllers coordinate the movement of air traffic to make certain that planes stay a safe distance apart. Their immediate concern is safety, but controllers also must direct planes efficiently to minimize delays. Some regulate airport traffic through designated airspaces; others regulate airport arrivals and departures.

Although *airport tower controllers* or *terminal controllers* watch over all planes traveling through the airport's airspace, their main responsibility is to organize the flow of aircraft into and out of the airport. Relying on radar and visual observation, they closely monitor each plane to ensure a safe distance between all aircraft and to guide pilots between the hangar or ramp and the end of the airport's airspace. In addition, controllers keep pilots informed about changes in weather conditions such as wind shear, a sudden change in the velocity or direction of the wind that can cause the pilot to lose control of the aircraft.

During arrival or departure, several controllers direct each plane. As a plane approaches an airport, the pilot radios ahead to inform the terminal of the plane's presence. The controller in the radar room, just beneath the control tower, has a copy of the plane's flight plan and already has observed the plane on radar. If the path is clear, the controller directs the pilot to a runway; if the airport is busy, the plane is fitted into a traffic pattern with other aircraft waiting to land. As the plane nears the runway, the pilot is asked to contact the tower. There, another controller, who also is watching the plane on radar, monitors the aircraft the last mile or so to the runway, delaying any departures that would interfere with the plane's landing. Once the plane has landed, a ground controller in the tower directs it along the taxiways to its assigned gate. The ground controller usually works entirely by sight, but may use radar if visibility is very poor.

The procedure is reversed for departures. The ground controller directs the plane to the proper runway. The local controller then informs the pilot about conditions at the airport, such as weather, speed and direction of wind, and visibility. The local controller also issues runway clearance for the pilot to take off. Once in the air, the plane is guided out of the airport's airspace by the departure controller.

After each plane departs, airport tower controllers notify *enroute controllers* who will next take charge. There are 21 air route traffic control centers located around the country, each employing 300 to 700 controllers, with more than 150 on duty during peak hours at the busiest facilities. Airplanes usually fly along designated routes; each center is assigned a certain airspace containing many different routes. Enroute controllers work in teams of up to three members, depending on how heavy traffic is; each team is responsible for a section of the center's airspace. A team, for example, might be responsible for all planes that are between 30 and 100 miles north of an airport and flying at an altitude between 6,000 and 18,000 feet.

To prepare for planes about to enter the team's airspace, the radar associate controller organizes flight plans coming off a printer. If two planes are scheduled to enter the team's airspace at nearly the same time, location, and altitude, this controller may arrange with the preceding control unit for one plane to change its flight path. The previous unit may have been another team at the same or an adjacent center, or a departure controller at a neighboring terminal. As a plane approaches a team's airspace, the radar controller accepts responsibility for the plane from the previous controlling unit. The controller also delegates responsibility for the plane to the next controlling unit when the plane leaves the team's airspace.

The radar controller, who is the senior team member, observes the planes in the team's airspace on radar and communicates with the pilots when necessary. Radar controllers warn



Air traffic controllers are primarily concerned with safety, but they also must direct planes efficiently to minimize delays.

pilots about nearby planes, bad weather conditions, and other potential hazards. Two planes on a collision course will be directed around each other. If a pilot wants to change altitude in search of better flying conditions, the controller will check to determine that no other planes will be along the proposed path. The team responsible for the aircraft notifies the next team in charge of the airspace ahead as the flight progresses. Through team coordination, the plane arrives safely at its destination.

Both airport tower and enroute controllers usually control several planes at a time; often, they have to make quick decisions about completely different activities. For example, a controller might direct a plane on its landing approach and at the same time provide pilots entering the airport's airspace with information about conditions at the airport. While instructing these pilots, the controller also might observe other planes in the vicinity, such as those in a holding pattern waiting for permission to land, to ensure that they remain well separated.

The FAA has implemented an automated air traffic control system, called the National Airspace System (NAS) Architecture. The NAS Architecture is a long-term strategic plan that will allow controllers to more efficiently deal with the demands of increased air traffic. It encompasses the replacement of aging equipment and the introduction of new systems, technologies, and procedures to enhance safety and security and support future aviation growth. The NAS Architecture facilitates continuing discussion of modernization between the FAA and the aviation community.

In addition to airport towers and enroute centers, air traffic controllers also work in flight service stations at more than 35 locations, including 17 locations in Alaska. These *flight service specialists* provide pilots with preflight and inflight weather information, suggested routes, and other aeronautical information important to the safety of a flight. Flight service specialists relay air traffic control clearances to pilots not in direct communications with a tower or center, assist pilots in emergency situations, and initiate and coordinate searches for missing or overdue aircraft. At certain locations where there is no airport tower or the tower has closed for the day, flight service specialists provide airport advisory services to landing and departing aircraft. However, they are not involved in actively managing and separating air traffic.

Some air traffic controllers work at the FAA's Air Traffic Control Systems Command Center in Herndon, VA, where they oversee the entire system. They look for situations that will create bottlenecks or other problems in the system and then respond with a management plan for traffic into and out of the troubled sector. The objective is to keep traffic levels in the trouble spots manageable for the controllers working at enroute centers.

Work environment. During busy times, controllers must work rapidly and efficiently. Total concentration is required to keep track of several planes at the same time and to make certain that all pilots receive correct instructions. The mental stress of being responsible for the safety of several aircraft and their passengers can be exhausting. Unlike tower controllers, radar controllers also have the extra stress of having to work in semi-darkness, never seeing the actual aircraft they control except as a small "bleep" on the radarscope. Controllers who

work in flight service stations work in offices close to the communications and computer equipment.

Controllers work a basic 40-hour week; however, they may work additional hours, for which they receive overtime, or premium pay, or equal time off. Because most control towers and centers operate 24 hours a day, 7 days a week, controllers rotate night and weekend shifts. Contract flight service station working conditions may vary somewhat from the FAA.

Training, Other Qualifications, and Advancement

To become an air traffic controller, a person must complete an FAA-approved education program; pass a pre-employment test; receive a school recommendation; meet the basic qualification requirements in accordance with Federal law; and achieve a qualifying score on the FAA-authorized pre-employment test. Candidates also must pass a medical exam, undergo drug screening, and obtain a security clearance before they can be hired.

Education and training. Individuals must enroll in an FAA-approved education program and pass a pre-employment test that measures the applicant's ability to learn the controller's duties. Exceptions are air traffic controllers with prior experience and military veterans. The pre-employment test is currently offered only to students in the FAA Air Traffic Collegiate Training Initiative Program or the Minneapolis Community and Technical College, Air Traffic Control Training Program. The test is administered by computer and takes about 8 hours to complete. To take the test, an applicant must apply under an open advertisement for air traffic control positions and be chosen to take the examination. When there are many more applicants than available positions, applicants are selected to take the test through random selection. In addition to the pre-employment test, applicants must have 3 years of full-time work experience, have completed a full 4 years of college, or a combination of both. In combining education and experience, 1 year of undergraduate study—30 semester or 45 quarter hours—is equivalent to 9 months of work experience. Certain kinds of aviation experience also may be substituted for these requirements.

Upon successful completion of an FAA-approved program, individuals who receive school recommendation, meet the basic qualification requirements (including being less than 31 years of age) in accordance with Federal law, and achieve a qualifying score on the FAA-authorized pre-employment test become eligible for employment as an air traffic controller.

Upon selection, employees attend the FAA Academy in Oklahoma City, OK, for 12 weeks of training, during which they learn the fundamentals of the airway system, FAA regulations, controller equipment, and aircraft performance characteristics, as well as more specialized tasks.

After graduation from the FAA Academy in Oklahoma City, candidates are assigned to an air traffic control facility and are classified as "developmental controllers" until they complete all requirements to be certified for all of the air traffic control positions within a defined area of a given facility. Generally, it takes new controllers with only initial controller training between 2 and 4 years, depending on the facility and the availability of facility staff or contractors to provide on-the-job training, to complete all the certification requirements to become certified professional controllers. Individuals who have had prior controller experience normally take less time to become fully certified. Controllers who fail to complete either the academy or the on-the-job portions of the training usually are dismissed. Controllers must pass a physical examination each year and a job performance examination twice each year. Failure to become certified in any position at a facility within a specified time also may result in dismissal. Controllers also are subject to drug screening as a condition of continuing employment.

Other qualifications. Air traffic controllers must be articulate to give pilots directions quickly and clearly. Intelligence and a good memory also are important because controllers constantly receive information that they must immediately grasp, interpret, and remember. Decisiveness also is required because controllers often have to make quick decisions. The ability to concentrate is crucial because controllers must make these decisions in the midst of noise and other distractions.

Advancement. At airports, new controllers begin by supplying pilots with basic flight data and airport information. They then advance to the position of ground controller, then local controller, departure controller, and, finally, arrival controller. At an air route traffic control center, new controllers first deliver printed flight plans to teams, gradually advancing to radar associate controller and then to radar controller.

Controllers can transfer to jobs at different locations or advance to supervisory positions, including management or staff jobs—such as air traffic control data systems computer specialist—in air traffic control, and top administrative jobs in the FAA. However, there are only limited opportunities for a controller to switch from a position in an enroute center to a tower. Contract flight service station working conditions may vary somewhat from the FAA.

Employment

Air traffic controllers held about 25,000 jobs in 2006. The vast majority were employed by the FAA. Air traffic controllers work at airports—in towers and flight service stations—and in air route traffic control centers. Some professional controllers conduct research at the FAA's national experimental center near Atlantic City, NJ. Others serve as instructors at the FAA Academy in Oklahoma City. A small number of civilian

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Air traffic controllers.....	53-2021	25,000	28,000	2,600	10

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

controllers work for the U.S. Department of Defense. In addition to controllers employed by the Federal Government, some work for private air traffic control companies providing service to non-FAA towers and contract flight service stations.

Job Outlook

Most employment opportunities are expected to result from the need to replace workers who retire or leave the occupation for other reasons; graduates of an FAA training program have good prospects.

Employment change. Employment of air traffic controllers is projected to grow 10 percent from 2006 to 2016, about as fast as the average for all occupations. Increasing air traffic will require more controllers to handle the additional work. Job growth, however, is not expected to keep pace with the increasing number of aircraft flying. New computerized systems will assist the controller by automatically making many of the routine decisions. This will allow controllers to handle more traffic, thus increasing their productivity. In addition, Federal budget constraints may limit hiring of air traffic controllers.

Job prospects. Most job opportunities are expected as the result of replacement needs from workers leaving the occupation. The majority of today's air traffic controllers will be eligible to retire over the next decade, although not all are expected to do so. Nevertheless, replacement needs will result in job opportunities each year for those graduating from the FAA training programs. Despite the increasing number of jobs coming open, competition to get into the FAA training programs is expected to remain keen, as there generally are many more applicants to get into the schools than there are openings, but those who graduate have good prospects of getting a job as a controller.

Air traffic controllers who continue to meet the proficiency and medical requirements enjoy more job security than do most workers. The demand for air travel and the workloads of air traffic controllers decline during recessions, but controllers seldom are laid off.

Earnings

Air traffic controllers earn relatively high pay and have good benefits. Median annual earnings of air traffic controllers in May 2006 were \$117,240. The middle 50 percent earned between \$86,860 and \$142,210. The lowest 10 percent earned less than \$59,410, and the highest 10 percent earned more than \$145,600. The average annual salary, excluding overtime earnings, for air traffic controllers in the Federal Government—which employs 90 percent of all controllers—was \$122,220 in May 2006.

The Air Traffic Control pay system classifies each air traffic facility into one of eight levels with corresponding pay bands. Under this pay system, controllers' salaries are determined by the rating of the facility. Higher ratings usually mean higher controller salaries and greater demands on the controller's judgment, skill, and decision-making ability.

Depending on length of service, air traffic controllers receive 13 to 26 days of paid vacation and 13 days of paid sick leave each year, in addition to life insurance and health benefits. Controllers also can retire at an earlier age and with fewer years of service than other Federal employees. Air traffic controllers are eligible to retire at age 50 with 20 years of service as an active air traffic controller or after 25 years of active service at any age. There

is a mandatory retirement age of 56 for controllers who manage air traffic. However, Federal law provides for exemptions to the mandatory age of 56, up to age 61, for controllers having exceptional skills and experience. Earnings and benefits for controllers working in contract towers or flight service stations may vary.

Related Occupations

Airfield operations specialists also are involved in the direction and control of traffic in air transportation.

Sources of Additional Information

For further information on how to qualify and apply for a job as an air traffic controller, contact the FAA:

► Federal Aviation Administration, 800 Independence Ave. SW., Washington, DC 20591. Internet: <http://www.faa.gov>

Aircraft Pilots and Flight Engineers

(O*NET 53-2011.00, 53-2012.00)

Significant Points

- Regional and low-cost airlines offer the best opportunities; pilots attempting to get jobs at the major airlines will face strong competition.
- Pilots usually start with smaller commuter and regional airlines to acquire the experience needed to qualify for higher paying jobs with national or major airlines.
- Many pilots have learned to fly in the military, but growing numbers have college degrees with flight training from civilian flying schools that are certified by the Federal Aviation Administration (FAA).
- Earnings of airline pilots are among the highest in the Nation.

Nature of the Work

Pilots are highly trained professionals who either fly airplanes or helicopters to carry out a wide variety of tasks. Most are *airline pilots*, *copilots*, and *flight engineers* who transport passengers and cargo. However, 1 out of 5 pilots is a commercial pilot involved in dusting crops, spreading seed for reforestation, testing aircraft, flying passengers and cargo to areas not served by regular airlines, directing firefighting efforts, tracking criminals, monitoring traffic, and rescuing and evacuating injured persons.

Before departure, pilots plan their flights carefully. They thoroughly check their aircraft to make sure that the engines, controls, instruments, and other systems are functioning properly. They also make sure that baggage or cargo has been loaded correctly. They confer with flight dispatchers and aviation weather forecasters to find out about weather conditions en route and at their destination. Based on this information, they choose a route, altitude, and speed that will provide the safest, most economical, and smoothest flight. When flying under instrument flight rules—procedures governing the operation of

the aircraft when there is poor visibility—the pilot in command, or the company dispatcher, normally files an instrument flight plan with air traffic control so that the flight can be coordinated with other air traffic.

Takeoff and landing are the most difficult parts of the flight, and require close coordination between the two pilots. For example, as the plane accelerates for takeoff, the pilot who is flying the take off concentrates on the runway while the other pilot scans the instrument panel. To calculate the speed they must attain to become airborne, pilots consider the altitude of the airport, outside temperature, weight of the plane, and speed and direction of the wind. The moment the plane reaches takeoff speed, the nonflying pilot informs the flying pilot, who then pulls back on the controls to raise the nose of the plane. Captains and first officers usually alternate flying each leg from takeoff to landing.

Unless the weather is bad, the flight itself is relatively routine. Airplane pilots, with the assistance of autopilot and the flight management computer, steer the plane along their planned route and are monitored by the air traffic control stations they pass along the way. They regularly scan the instrument panel to check their fuel supply; the condition of their engines; and the air-conditioning, hydraulic, and other systems. Pilots may request a change in altitude or route if circumstances dictate. For example, if the ride is rougher than expected, pilots may ask air traffic control if pilots flying at other altitudes have reported better conditions; if so, they may request an altitude change. This procedure also may be used to find a stronger tailwind or a weaker headwind to save fuel and increase speed. In contrast, because helicopters are used for short trips at relatively low altitude, helicopter pilots must be constantly on the lookout for trees, bridges, power lines, transmission towers, and other dangerous obstacles as well as low-flying general aviation aircraft. Regardless of the type of aircraft, all pilots must monitor warning devices designed to help detect sudden shifts in wind conditions that can cause crashes.

Pilots must rely completely on their instruments when visibility is poor. On the basis of altimeter readings, they know how high above ground they are and whether they can fly safely over mountains and other obstacles. Special navigation radios give pilots precise information that, with the help of special charts, tells them their exact position. Other very sophisticated equipment provides directions to a point just above the end of a runway and enables pilots to land completely without an outside visual reference. Once on the ground, pilots must complete records on their flight and the aircraft maintenance status for their company and the FAA.

The number of nonflying duties that pilots have depends on the employment setting. Airline pilots have the services of large support staffs and, consequently, perform few nonflying duties. However, because of the large numbers of passengers, airline pilots may be called upon to coordinate handling of disgruntled or disruptive passengers. Also, under the Federal Flight Deck Officer program airline pilots who undergo rigorous training and screening are deputized as Federal law enforcement officers and are issued firearms to protect the cockpit against intruders and hijackers. Pilots employed by other organizations, such as charter operators or businesses, have many other duties.

They may load the aircraft, handle all passenger luggage to ensure a balanced load, and supervise refueling; other nonflying responsibilities include keeping records, scheduling flights, arranging for major maintenance, and performing minor aircraft maintenance and repairs.

Except on small aircraft, two pilots usually make up the cockpit crew. Generally, the most experienced pilot, the *captain*, is in command and supervises all other crew members. The pilot and the copilot, often called the first officer, share flying and other duties, such as communicating with air traffic controllers and monitoring the instruments. Some large aircraft have a third crewmember, the flight engineer, who assists the pilots by monitoring and operating many of the instruments and systems, making minor in-flight repairs, and watching for other aircraft. The flight engineer also assists the pilots with the company, air traffic control, and cabin crew communications. New technology can perform many flight tasks, however, and virtually all new aircraft now fly with only two pilots, who rely more heavily on computerized controls.

Some pilots are flight instructors. They teach their students in ground-school classes, in simulators, and in dual-controlled planes and helicopters. A few specially trained pilots are examiners or check pilots. They periodically fly with other pilots or pilot's license applicants to make sure that they are proficient.

Work environment. Most pilots spend a considerable amount of time away from home because the majority of flights involve overnight layovers. When pilots are away from home, the airlines provide hotel accommodations, transportation between the hotel and airport, and an allowance for meals and other expenses.

Airline pilots, especially those on international routes, often experience jet lag—fatigue caused by many hours of flying through different time zones. To guard against pilot fatigue, which could result in unsafe flying conditions, the FAA requires airlines to allow pilots at least 8 hours of uninterrupted rest in the 24 hours before finishing their flight duty.

Commercial pilots face other types of job hazards. The work of test pilots, who check the flight performance of new and experimental planes, may be dangerous. Pilots who are crop-dusters may be exposed to toxic chemicals and seldom have the



Pilots have many nonflying duties that include keeping records, scheduling flights, arranging for major maintenance, and performing minor aircraft maintenance and repairs.

benefit of a regular landing strip. Helicopter pilots involved in rescue and police work may be subject to personal injury.

Although flying does not involve much physical effort, the mental stress of being responsible for a safe flight, regardless of the weather, can be tiring. Pilots must be alert and quick to react if something goes wrong, particularly during takeoff and landing.

FAA regulations limit flying time of airline pilots of large aircraft to a maximum of 100 hours a month or 1,000 hours a year. Most airline pilots fly an average of 65 to 75 hours a month and work at least an additional 65 to 75 hours a month performing nonflying duties. Most pilots have variable work schedules, working several days on, then several days off. Airlines operate flights at all hours of the day and night, so work schedules often are irregular. Flight assignments are based on seniority; the sooner pilots are hired, the stronger their bidding power is for preferred assignments.

Commercial pilots also may have irregular schedules, flying 30 hours one month and 90 hours the next. Because these pilots frequently have many nonflying responsibilities, they have much less free time than do airline pilots. Except for corporate flight department pilots, most commercial pilots do not remain away from home overnight. But, they may work odd hours. However, if the company owns a fleet of planes, pilots may fly a regular schedule.

Flight instructors may have irregular and seasonal work schedules, depending on their students' available time and the weather. Instructors frequently work in the evening or on weekends.

Training, Other Qualifications, and Advancement

All pilots who are paid to transport passengers or cargo must have a commercial pilot's license with an instrument rating issued by the FAA. Helicopter pilots also must hold a commercial pilot's license with a helicopter rating.

Education and training. Although some small airlines hire high school graduates, most airlines require at least 2 years of college and prefer to hire college graduates. In fact, most entrants to this occupation have a college degree. Because the number of college-educated applicants continues to increase, many employers are making a college degree an educational requirement. For example, test pilots often are required to have an engineering degree.

Pilots also need flight experience to qualify for a license. Completing classes at a flight school approved by the FAA can reduce the amount of flight experience required for a pilot's license. In 2006, the FAA certified about 600 civilian flying schools, including some colleges and universities that offer degree credit for pilot training. Initial training for airline pilots typically includes a week of company indoctrination; 3 to 6 weeks of ground school and simulator training; and 25 hours of initial operating experience, including a check-ride with an FAA aviation safety inspector. Once trained, pilots are required to attend recurrent training and simulator checks once or twice a year throughout their career.

Licensure. To qualify for FAA licensure, applicants must be at least 18 years old and have at least 250 hours of flight experience.

The U.S. Armed Forces have always been an important source of experienced pilots because of the extensive flying time and experience on jet aircraft and helicopters. Those without Armed Forces training may become pilots by attending flight schools or by taking lessons from FAA-certified flight instructors. Applicants also must pass a strict physical examination to make sure that they are in good health and have 20/20 vision with or without glasses, good hearing, and no physical handicaps that could impair their performance. They must pass a written test that includes questions on the principles of safe flight, navigation techniques, and FAA regulations, and must demonstrate their flying ability to FAA or designated examiners.

To fly during periods of low visibility, pilots must be rated by the FAA to fly by instruments. Pilots may qualify for this rating by having the required hours of flight experience, including 40 hours of experience in flying by instruments; they also must pass a written examination on procedures and FAA regulations covering instrument flying and demonstrate to an examiner their ability to fly by instruments. Requirements for the instrument rating vary depending on the certification level of flight school.

Airline pilots must fulfill additional requirements. Captains must have an airline transport pilot's license. Applicants for this license must be at least 23 years old and have a minimum of 1,500 hours of flying experience, including night and instrument flying, and must pass FAA written and flight examinations. Usually, they also have one or more advanced ratings depending on the requirements of their particular job. Because pilots must be able to make quick decisions and accurate judgments under pressure, many airline companies reject applicants who do not pass required psychological and aptitude tests. All licenses are valid so long as a pilot can pass the periodic physical and eye examinations and tests of flying skills required by the FAA and company regulations.

Other qualifications. Depending on the type of aircraft, new airline pilots start as first officers or flight engineers. Although some airlines favor applicants who already have a flight engineer's license, they may provide flight engineer training for those who have only the commercial license. Many pilots begin with smaller regional or commuter airlines, where they obtain experience flying passengers on scheduled flights into busy airports in all weather conditions. These jobs often lead to higher paying jobs with bigger, national or major airlines.

Companies other than airlines usually require less flying experience. However, a commercial pilot's license is a minimum requirement, and employers prefer applicants who have experience in the type of craft they will be flying. New employees usually start as first officers, or fly less sophisticated equipment.

Advancement. Advancement for pilots usually is limited to other flying jobs. Many pilots start as flight instructors, building up their flying hours while they earn money teaching. As they become more experienced, these pilots occasionally fly charter planes or perhaps get jobs with small air transportation firms, such as air-taxi companies. Some advance to flying corporate planes. A small number get flight engineer jobs with the airlines.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Aircraft pilots and flight engineers	53-2010	107,000	121,000	14,000	13
Airline pilots, copilots, and flight engineers	53-2011	79,000	90,000	10,000	13
Commercial pilots	53-2012	28,000	31,000	3,600	13

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

In the airlines, advancement usually depends on seniority provisions of union contracts. After 1 to 5 years, flight engineers advance according to seniority to first officer and, after 5 to 15 years, to captain. Seniority also determines which pilots get the more desirable routes. In a nonairline job, a first officer may advance to captain and, in large companies, to chief pilot or director of aviation in charge of aircraft scheduling, maintenance, and flight procedures.

Employment

Civilian aircraft pilots and flight engineers held about 107,000 jobs in 2006. About 79,000 worked as airline pilots, copilots, and flight engineers. The rest were commercial pilots who worked as flight instructors at local airports or for large businesses that fly company cargo and executives in their own airplanes or helicopters. Some commercial pilots flew small planes for air-taxi companies, usually to or from lightly traveled airports not served by major airlines. Others worked for a variety of businesses, performing tasks such as dusting crops, inspecting pipelines, or conducting sightseeing trips.

Pilots are located across the country, but airline pilots usually are based near major metropolitan airports or airports operating as hubs for the major airlines.

Federal, State, and local governments employed pilots. A few pilots were self-employed.

Job Outlook

Regional airlines and low-cost carriers will present the best opportunities; pilots attempting to get jobs at the major airlines will face strong competition.

Employment change. Employment of aircraft pilots and flight engineers is projected to grow 13 percent from 2006 to 2016, about as fast as the average for all occupations. Population growth and an expanding economy are expected to boost the demand for air travel, contributing to job growth. New jobs will be created as airlines expand their capacity to meet this rising demand by increasing the number of planes in operation. However, employment growth will be limited by productivity improvements as airlines switch to larger planes and adopt the low-cost carrier model that emphasizes faster turnaround times for flights, keeping more pilots in the air rather than waiting on the ground. Also, fewer flight engineers will be needed as new planes requiring only two pilots replace older planes that require flight engineers.

Job prospects. Job opportunities are expected to continue to be better with the regional airlines and low-cost carriers, which are growing faster than the major airlines. Opportunities with air cargo carriers also should arise because of increasing security requirements for shipping freight on passenger air-

lines, growth in electronic commerce, and increased demand for global freight. Business, corporate, and on-demand air taxi travel also should provide some new jobs for pilots.

Pilots attempting to get jobs at the major airlines will face strong competition, as those firms tend to attract many more applicants than the number of job openings. Applicants also will have to compete with laid-off pilots for any available jobs. Pilots who have logged the greatest number of flying hours using sophisticated equipment typically have the best prospects. For this reason, military pilots often have an advantage over other applicants.

In the long run, demand for air travel is expected to grow along with the population and the economy. In the short run, however, employment opportunities of pilots generally are sensitive to cyclical swings in the economy. During recessions, when a decline in the demand for air travel forces airlines to curtail the number of flights, airlines may temporarily furlough some pilots.

Earnings

Earnings of aircraft pilots and flight engineers vary greatly depending whether they work as airline or commercial pilots. Earnings of airline pilots are among the highest in the Nation, and depend on factors such as the type, size, and maximum speed of the plane and the number of hours and miles flown. For example, pilots who fly jet aircraft usually earn higher salaries than pilots who fly turboprops. Airline pilots and flight engineers may earn extra pay for night and international flights. In May 2006, median annual earnings of airline pilots, copilots, and flight engineers were \$141,090.

Median annual earnings of commercial pilots were \$57,480 in May 2006. The middle 50 percent earned between \$40,780 and \$83,760. The lowest 10 percent earned less than \$28,450, and the highest 10 percent earned more than \$115,220.

Airline pilots usually are eligible for life and health insurance plans. They also receive retirement benefits and, if they fail the FAA physical examination at some point in their careers, they get disability payments. In addition, pilots receive an expense allowance, or "per diem," for every hour they are away from home. Some airlines also provide allowances to pilots for purchasing and cleaning their uniforms. As an additional benefit, pilots and their immediate families usually are entitled to free or reduced-fare transportation on their own and other airlines.

More than half of all aircraft pilots are members of unions. Most of the pilots who fly for the major airlines are members of the Air Line Pilots Association, International, but those employed by one major airline are members of the Allied Pilots Association.

Related Occupations

Although they are not in the cockpit, air traffic controllers and airfield operations specialists also play an important role in making sure flights are safe and on schedule, and participate in many of the decisions that pilots must make.

Sources of Additional Information

For information about job opportunities, salaries, and qualifications, write to the personnel manager of the particular airline.

For information on airline pilots, contact:

- AirLinePilotsAssociation, International, 1625 Massachusetts Ave. NW., Washington, DC 20036.
- Air Transport Association of America, Inc., 1301 Pennsylvania Ave. NW., Suite 1100, Washington, DC 20004.
- Federal Aviation Administration, 800 Independence Ave. SW., Washington, DC 20591. Internet: <http://www.faa.gov>

For information on helicopter pilots, contact:

- Helicopter Association International, 1635 Prince St., Alexandria, VA 22314.

For information about job opportunities in companies other than airlines, consult the classified section of aviation trade magazines and apply to companies that operate aircraft at local

hicles from 15-passenger buses to 60-foot articulated buses that can carry more than 100 passengers.

Local transit and intercity bus drivers stock up on tickets or transfers and prepare trip reports after reporting to their assigned terminal or garage. In some transportation firms, maintenance departments are responsible for keeping vehicles in good condition; in others, drivers check their vehicle's tires, brakes, windshield wipers, lights, oil, fuel, and water supply before beginning their routes. Drivers usually verify that the bus has safety equipment, such as fire extinguishers, first aid kits, and emergency reflectors.

During their shift, local transit and intercity bus drivers collect fares; answer questions about schedules, routes, and transfer points; and sometimes announce stops. Intercity bus drivers may make only a single one-way trip to a distant city or a round trip each day. They may stop at towns just a few miles apart or only at large cities hundreds of miles apart. Local transit bus drivers may make several trips each day over the same city and suburban streets, stopping as frequently as every few blocks.

Local transit bus drivers submit daily trip reports with a record of trips, significant schedule delays, and mechanical problems. Intercity drivers who drive across State or national boundaries must comply with U.S. Department of Transportation regulations. These include completing vehicle inspection reports and recording distances traveled and the times they spend driving, performing other duties, and off duty.

Some intercity drivers operate motor coaches which transport passengers on chartered trips and sightseeing tours. Drivers routinely interact with customers and tour guides to make the trip as comfortable and informative as possible. They are directly responsible for keeping to strict schedules, adhering to the guidelines of the tour's itinerary, and ensuring the overall success of the trip. These drivers act as customer service representatives, tour guides, program directors, and safety guides. Trips frequently last more than a day. The driver may be away for more than a week if assigned to an extended tour.

School bus drivers usually drive the same routes each day, stopping to pick up pupils in the morning and returning them to their homes in the afternoon. Some school bus drivers also transport students and teachers on field trips or to sporting events. In addition to driving, some school bus drivers work part time in the school system as janitors, mechanics, or classroom assistants when not driving buses.

Bus drivers must be alert to prevent accidents, especially in heavy traffic or in bad weather, and to avoid sudden stops or swerves that jar passengers. School bus drivers must exercise particular caution when children are getting on or off the bus. They must maintain order on their bus and enforce school safety standards by allowing only students to board. In addition, they must know and enforce the school system's rules regarding student conduct. As the number of students with physical or behavioral disabilities increases, school bus drivers must learn how to accommodate their special needs.

Some school bus drivers can take their bus home or park it in a more convenient area rather than reporting to an assigned terminal or garage. School bus drivers do not collect fares. Instead, they prepare weekly reports on the number of students, trips or "runs," work hours, miles, and fuel consumption. Their supervisors set time schedules and routes for the day or week.

Bus Drivers

(O*NET 53-3021.00, 53-3022.00)

Significant Points

- Opportunities should be good, particularly for school bus drivers; applicants for higher paying public transit bus driver positions may encounter competition.
- State and Federal governments establish bus driver qualifications and standards, which include a commercial driver's license.
- Work schedules vary considerably among various types of bus drivers.
- Bus drivers must possess strong customer service skills, including communication skills and the ability to manage large groups of people with varying needs.

Nature of the Work

Bus drivers provide transportation for millions of people, from commuters to school children to vacationers. There are two major kinds of bus drivers. *Transit and intercity bus drivers* transport people within or across States, along routes run within a metropolitan area or county, or on chartered excursions and tours. *School bus drivers* take children to and from schools and related events.

Bus drivers pick up and drop off passengers at bus stops, stations, or—in the case of students—at regularly scheduled neighborhood locations, all according to strict time schedules. Drivers must operate vehicles safely, sometimes in heavy traffic. They also cannot let light traffic put them ahead of schedule so that they miss passengers. Bus drivers drive a range of ve-

Work environment. Driving a bus through heavy traffic while dealing with passengers is more stressful and fatiguing than physically strenuous. Many drivers enjoy the opportunity to work without direct supervision, with full responsibility for their bus and passengers. To improve working conditions and retain drivers, many bus lines provide ergonomically designed seats and controls for drivers. Many bus companies use Global Positioning Systems to help dispatchers manage their bus fleets and help drivers navigate.

Work schedules vary considerably among various types of bus drivers. Intercity bus drivers may work nights, weekends, and holidays and often spend nights away from home, during which they stay in hotels at company expense. Senior drivers with regular routes have regular weekly work schedules, but others do not have regular schedules and must be prepared to report for work on short notice. They report for work only when called for a charter assignment or to drive extra buses on a regular route. Intercity bus travel and charter work tend to be seasonal. From May through August, drivers might work the maximum number of hours per week that regulations allow. During winter, junior drivers might work infrequently, except for busy holiday travel periods, and may be furloughed at times.

School bus drivers work only when schools are in session. Many work 20 hours a week or less, driving one or two routes in the morning and afternoon. Drivers taking field or athletic trips, or who also have midday kindergarten routes, may work more hours a week.

Regular local transit bus drivers usually have a 5-day workweek; Saturdays and Sundays are considered regular workdays. Some drivers work evenings and after midnight. To accommodate commuters, many work “split shifts”—for example, 6 a.m. to 10 a.m. and 3 p.m. to 7 p.m., with time off in between.

Intercity bus drivers operating tour and charter buses may work any day and all hours of the day, including weekends and holidays. Their hours are dictated by the destinations, schedules, and itineraries of chartered tours. Like all commercial drivers, their weekly hours must be consistent with the Department of Transportation’s rules and regulations concerning hours of service. For example, drivers may drive for 10 hours and work for up to 15 hours—including driving and non-driving duties—before having 8 hours off duty. Drivers may only drive for 60 hours in 7 days or 70 hours in 8 days. They are required to document their time in a logbook.

Training, Other Qualifications, and Advancement

State and Federal governments establish bus driver qualifications and standards, which include a commercial driver’s license (CDL) with the proper endorsements. Many employers provide several weeks of training and help new employees obtain their CDL. Other employers prefer those with truck or other driving experience.

Education and training. Many employers prefer high school graduates and require a written test of ability to follow complex bus schedules. Some intercity and public transit bus companies require several years of experience driving a bus or truck. Most intercity bus companies and local transit systems give driver trainees 2 to 8 weeks of classroom and behind-the-wheel instruction. In the classroom, trainees learn Department of Transportation and company work rules, safety regulations, State and

municipal driving regulations, and safe driving practices. They also learn to read schedules, determine fares, keep records, and deal courteously with passengers.

School bus drivers receive between 1 and 4 weeks of driving instruction and classroom training on State and local laws, regulations, and policies; safe driving practices; driver-pupil relations; first aid; emergency evacuation procedures; and the special needs of students who are disabled or emotionally troubled. School bus drivers also must be aware of the school system’s rules for discipline and conduct for bus drivers and the students they transport. Many people who become school bus drivers have never driven any vehicle larger than an automobile.

During training, all bus drivers practice driving on set courses. They practice turns and zigzag maneuvers, backing up, and driving in narrow lanes. Then, they drive in light traffic and, eventually, on congested highways and city streets. They also make trial runs without passengers to improve their driving skills and learn the routes. Local transit trainees memorize and drive each of the runs operating out of their assigned garage. New drivers make regularly scheduled trips with passengers, accompanied by an experienced driver who gives helpful tips, answers questions, and evaluates the new driver’s performance. Most bus drivers get brief supplemental training periodically to stay informed of safety issues and regulatory changes.

Licensure. Bus driver qualifications and standards are established by State and Federal regulations. All drivers must comply with Federal regulations and with any State regulations that exceed Federal requirements. Federal regulations require drivers who operate commercial motor vehicles in excess of 26,000 pounds gross vehicle weight rating or designed to carry 16 or more people, including the driver, to hold a commercial driver’s license with the appropriate endorsements from the State in which they live. As with all commercial drivers, bus drivers who drive across State or national boundaries, as motor coach drivers frequently do, must comply with U.S. Depart-



Bus drivers are responsible for the safety of passengers.

ment of Transportation regulations, State regulations, and the regulations of other countries.

To qualify for a commercial driver’s license, applicants must pass a knowledge test on rules and regulations and then demonstrate in a skills test that they can operate a bus safely. A national database records all driving violations incurred by people who hold commercial licenses, and a State may not issue a license to a person who has already had a license suspended or revoked in another State. To be issued a commercial license, a driver must surrender all other driver’s licenses. All bus drivers must also have a passenger endorsement for their license, which requires passing a knowledge test and demonstrating the necessary skills in a vehicle of the same type as the one they would be driving on the job. Information on how to apply for a commercial driver’s license and each type of endorsement can be obtained from State motor vehicle administrations.

Although many States allow those who are 18 years of age and older to drive buses within State borders, the U.S. Department of Transportation establishes minimum qualifications for bus drivers engaged in interstate commerce. Federal Motor Carrier Safety Regulations require drivers to be at least 21 years old and to pass a physical examination once every 2 years. The main physical requirements include good hearing, at least 20/40 vision with or without glasses or corrective lenses, and a 70-degree field of vision in each eye. Drivers cannot be colorblind. They must be able to hear a forced whisper in one ear at not less than 5 feet, with or without a hearing aide. Drivers must have normal blood pressure and normal use of their arms and legs. They may not use any controlled substances, unless prescribed by a licensed physician. People with epilepsy or with diabetes controlled by insulin are not permitted to be interstate bus drivers. Federal regulations also require employers to test their drivers for alcohol and drug use as a condition of employment and require periodic random tests of the drivers while they are on duty. In addition, a driver must not have been convicted of a felony involving the use of a motor vehicle or a crime involving drugs, driving under the influence of drugs or alcohol, refusing to submit to an alcohol test required by a State or its implied consent laws or regulations, leaving the scene of a crime, or causing a fatality through negligent operation of a commercial vehicle.

All drivers also must be able to read and speak English well enough to read road signs, prepare reports, and communicate with law enforcement officers and the public. In addition, drivers must take a written examination on the Motor Carrier Safety Regulations of the U.S. Department of Transportation.

School bus drivers are required to obtain a commercial driver’s license with a school bus endorsement from the State in which they live. To receive this endorsement, they must pass a written test and demonstrate necessary skills in a bus of the

same type that they would be driving on their route. Both of these tests are specific to school buses and are in addition to the testing required to receive a commercial license and the passenger endorsement.

Other qualifications. Many intercity and public transit bus companies prefer applicants who are at least 24 years old. Because bus drivers deal with passengers, they must be courteous. They need an even temperament and emotional stability because driving in heavy, fast-moving, or stop-and-go traffic and dealing with passengers can be stressful. Drivers must have strong customer service skills, including communication skills and the ability to coordinate and manage large groups of people. In some States, school bus drivers must pass a background investigation to uncover any criminal record or history of mental problems.

Advancement. New intercity and local transit drivers usually are placed on an “extra” list to drive chartered runs, extra buses on regular runs, and special runs, such as those during morning and evening rush hours and to sports events. New drivers also substitute for regular drivers who are ill or on vacation. New drivers remain on the extra list and may work only part time, perhaps for several years, until they have enough seniority to get a regular run.

Senior drivers may bid for the runs that they prefer, such as those with more work hours, lighter traffic, weekends off, or—in the case of intercity bus drivers—higher earnings or fewer workdays per week.

Opportunities for promotion are generally limited. However, experienced drivers may become supervisors or dispatchers—assigning buses to drivers, checking whether drivers are on schedule, rerouting buses to avoid blocked streets or other problems, and dispatching extra vehicles and service crews to scenes of accidents and breakdowns. In transit agencies with rail systems, drivers may become train operators or station attendants. Some bus drivers become either instructors of new bus drivers or master-instructors, who train new instructors. Few drivers become managers. Promotion in publicly owned bus systems is often determined by competitive civil service examination. Some motor coach drivers purchase their own equipment and open their own business.

Employment

Bus drivers held about 653,000 jobs in 2006. About 34 percent worked part time. Around 70 percent of all bus drivers were school bus drivers working primarily for school systems or for companies providing school bus services under contract. Most of the remainder worked for private and local government transit systems; some also worked for intercity and charter bus lines.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Bus drivers	53-3020	653,000	721,000	67,000	10
Bus drivers, transit and intercity	53-3021	198,000	223,000	25,000	13
Bus drivers, school.....	53-3022	455,000	497,000	42,000	9

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

Job Outlook

Average job growth and good employment opportunities are expected for bus drivers. Those seeking higher paying public transit bus driver positions may encounter competition. Individuals who have good driving records and who are willing to work a part-time or irregular schedule will probably have the best job prospects.

Employment change. Overall employment of bus drivers is expected to grow 10 percent between 2006 and 2016, about as fast as the average for all occupations. New drivers will be needed primarily to meet the transportation needs of the growing general population and school-aged population.

Employment growth for local transit and intercity bus drivers is projected to be 13 percent over the 2006-16 decade, about as fast as average for all occupations, primarily because of the increasing popularity of mass transit due to congestion and rising fuel prices and the demand for transit services in expanding metropolitan areas. Competition from other modes of transportation—airplane, train, or automobile—will temper job growth among intercity bus drivers. Most growth in intercity bus transportation will occur in group charters to locations not served by other modes of transportation. Like automobiles, buses have a far greater number of possible destinations than airplanes or trains. Since they offer greater cost savings and convenience than automobiles do, buses usually are the most economical option for tour groups traveling to out-of-the-way destinations.

The number of school bus drivers is expected to increase 9 percent over the next 10 years, which is also about as fast as the average for all occupations. This growth is somewhat slower than in the past. School enrollments are projected to increase in 37 States, decrease in 12 States and stay constant in 1 State. However, the net effect will still be a slowdown in the rate of school enrollment and, therefore, in employment growth of school bus drivers. This, as well as the part-time nature of the occupation, will result in most openings for school bus drivers being to replace those who leave the occupation.

Job prospects. People seeking jobs as bus drivers likely will have good opportunities. Employment growth will create jobs, but most job openings are expected because of the need to replace workers who take jobs in other occupations or who retire or leave the occupation for other reasons.

Individuals who have good driving records and who are willing to work a part-time or irregular schedule probably will have the best job prospects. School bus driving jobs, particularly in rapidly growing suburban areas, should be easiest to acquire because most are part-time positions with high turnover and less training required than for other bus-driving jobs. Those seeking higher paying public transit bus driver positions may encounter competition. Opportunities for intercity driving positions should be good, although employment prospects for motor coach drivers will depend on tourism, which fluctuates with the economy.

Full-time bus drivers rarely are laid off during recessions. In local transit and intercity bus systems, if the number of passengers decreases, employers might reduce the hours of part-time bus drivers or consolidate routes since fewer buses would be required. Seasonal layoffs are common. Many intercity bus drivers with little seniority, for example, are furloughed during the winter when regularly scheduled and charter business

declines. School bus drivers seldom work during the summer or school holidays.

Earnings

Median hourly wage-and-salary earnings of transit and intercity bus drivers were \$15.43 in May 2006. The middle 50 percent earned between \$11.56 and \$19.86 per hour. The lowest 10 percent earned less than \$9.26, and the highest 10 percent earned more than \$24.08 per hour. Median hourly earnings in the industries employing the largest numbers of transit and intercity bus drivers were:

Interurban and rural bus transportation.....	\$17.16
Urban transit systems.....	14.07
School and employee bus transportation	12.35
Other transit and ground passenger transportation	11.51
Charter bus industry.....	11.50

Median hourly wage-and-salary earnings of school bus drivers were \$11.93 in May 2006. The middle 50 percent earned between \$8.99 and \$14.82 per hour. The lowest 10 percent earned less than \$6.58, and the highest 10 percent earned more than \$17.61 per hour. Median hourly earnings in the industries employing the largest numbers of school bus drivers were:

School and employee bus transportation	\$12.55
Elementary and secondary schools	11.59
Other transit and ground passenger transportation	11.11
Child day care services	9.50
Individual and family services	9.17

The benefits bus drivers receive from their employers vary greatly. Most intercity and local transit bus drivers receive paid health and life insurance, sick leave, vacation leave, and free bus rides on any of the regular routes of their line or system. School bus drivers receive sick leave, and many are covered by health and life insurance and pension plans. Because they generally do not work when school is not in session, they do not get vacation leave.

About 41 percent of bus drivers were members of or were covered by union contracts in 2006. Many intercity and local transit bus drivers are members of the Amalgamated Transit Union. Some drivers belong to the United Transportation Union or to the International Brotherhood of Teamsters.

Related Occupations

Other workers who drive vehicles on highways and city streets include taxi drivers and chauffeurs, and truck drivers and driver/sales workers. Some local transit bus drivers enter rail transportation occupations by becoming subway or light rail operators.

Sources of Additional Information

For information on employment opportunities, contact local transit systems, intercity bus lines, school systems, or the local offices of the State employment service.

General information on school bus driving is available from:
 ► National Association of State Directors of Pupil Transportation Services, P.O. Box 5446, Steamboat Springs, CO 80477. Internet: <http://www.nasdpts.org>

► National School Transportation Association, 113 South West St., 4th Floor, Alexandria, VA 22314.

Internet: <http://www.yellowbuses.org>

General information on motor coach driving is available from:

► United Motorcoach Association, 113 South West St., 4th Floor, Alexandria, VA 22314. Internet: <http://www.uma.org>

Farmers, Ranchers, and Agricultural Managers

(O*NET 11-9011.00 11-9011.01, 11-9011.02, 11-9011.03, 11-9012.00)

Significant Points

- Modern farming requires knowledge of new developments in agriculture, as well as work experience often gained through growing up on a farm or through post-secondary education.
- Overall employment is projected to decline because of increasing productivity and consolidation of farms.
- Horticulture and organic farming will provide better employment opportunities.
- Small-scale farming is a major growth area and offers the best opportunity for entering the occupation.

Nature of the Work

American farmers, ranchers, and agricultural managers direct the activities of one of the world's largest and most productive agricultural sectors. They produce enough food and fiber to meet the needs of the United States and for export. *Farmers and ranchers* own and operate mainly family-owned farms. They also may lease land from a landowner and operate it as a working farm. *Agricultural managers* manage the day-to-day activities of one or more farms, ranches, nurseries, timber tracts, greenhouses, or other agricultural establishments for farmers, absentee landowners, or corporations. Their duties and responsibilities vary widely but focus on the business aspects of running a farm. On small farms, they may oversee the entire operation; on larger farms, they may oversee a single activity, such as marketing.

Farmers, ranchers, and agricultural managers make many managerial decisions. Farm output and income are strongly influenced by the weather, disease, fluctuations in prices of domestic and foreign farm products, and Federal farm programs. In crop-production operations, farmers and managers usually determine the best time to plant seed, apply fertilizer and chemicals, and harvest and market the crops. Many carefully plan the combination of crops they grow, so that if the price of one crop drops, they will have sufficient income from another crop to make up the loss. Farmers, ranchers, and managers monitor the constantly changing prices for their products. They use different strategies to protect themselves from unpredictable changes in the markets for agricultural prod-

ucts. If they plan ahead, they may be able to store their crops or keep their livestock to take advantage of higher prices later in the year. Those who participate in the risky futures market buy contracts on future production of agricultural goods. These contracts can minimize the risk of sudden price changes by guaranteeing a certain price for farmers' and ranchers' agricultural goods when they are ready to sell.

While most farm output is sold directly to food-processing companies, some farmers—particularly operators of smaller farms—may choose to sell their goods directly to consumers through farmers' markets. Some use cooperatives to reduce their financial risk and to gain a larger share of the prices consumers pay. For example, in community-supported agriculture, cooperatives sell shares of a harvest to consumers prior to the planting season, thus freeing the farmer from having to bear all the financial risks and ensuring the farmer a market for the produce of the coming season. Farmers, ranchers, and agricultural managers also negotiate with banks and other credit lenders to get the best financing deals for their equipment, livestock, and seed.

Like other businesses, farming operations have become more complex in recent years, so many farmers use computers to keep financial and inventory records. They also use computer databases and spreadsheets to manage breeding, dairy, and other farm operations.

The type of farm farmers, ranchers, and agricultural managers operate determines their specific tasks. On crop farms—farms growing grain, cotton, other fibers, fruit, and vegetables—farmers are responsible for preparing, tilling, planting, fertilizing, cultivating, spraying, and harvesting. After the harvest, they make sure that the crops are properly packaged, stored, and marketed. Livestock, dairy, and poultry farmers and ranchers feed and care for animals and keep barns, pens, coops, and other farm buildings clean and in good condition. They also plan and oversee breeding and marketing activities. Both farmers and ranchers operate machinery and maintain equipment and facilities, and both track technological improvements in animal breeding and seeds, and choose new or existing products.

The size of the farm or ranch often determines which of these tasks farmers and ranchers handle themselves. Operators of small farms usually perform all tasks, physical and administrative. They keep records for management and tax purposes, service machinery, maintain buildings, and grow vegetables and raise animals. Operators of large farms, by contrast, have employees who help with the physical work that small-farm operators do themselves. Although employment on most farms is limited to the farmer and 1 or 2 family workers or hired employees, some large farms have 100 or more full-time and seasonal workers. Some of these employees are in nonfarm occupations, working as truck drivers, sales representatives, bookkeepers, and computer specialists.

Agricultural managers usually do not plant, harvest, or perform other production activities; instead, they hire and supervise farm and livestock workers, who perform most daily production tasks. Managers may establish output goals; determine financial constraints; monitor production and marketing; hire, assign, and supervise workers; determine crop trans-



Farmers need in-depth knowledge of many kinds of crops.

portation and storage requirements; and oversee maintenance of the property and equipment.

Two types of farmers that are growing in importance are horticultural specialty farmers and aquaculture farmers. *Horticultural specialty farmers* oversee the production of fruits, vegetables, flowers, and ornamental plants used in landscaping, including turf. They also grow nuts, berries, and grapes for wine. *Aquaculture farmers* raise fish and shellfish in marine, brackish, or fresh water, usually in ponds, floating net pens, raceways, or recirculating systems. They stock, feed, protect, and otherwise manage aquatic life sold for consumption or used for recreational fishing.

Work environment. The work of full-time farmers, ranchers, and agricultural managers is often strenuous; work hours are frequently long; and these workers rarely have days off during the planting, growing, and harvesting seasons. Nevertheless, for those who enter farming or ranching, the hard work is counterbalanced by their enjoyment of living in a rural area, working outdoors, being self-employed, and making a living off the land.

Farmers and farm managers on crop farms usually work from sunrise to sunset during the planting and harvesting seasons. The rest of the year, they plan next season's crops, market their output, and repair machinery.

On livestock-producing farms and ranches, work goes on throughout the year. Animals, unless they are grazing, must be fed and watered every day, and dairy cows must be milked two

or three times a day. Many livestock and dairy farmers monitor and attend to the health of their herds, which may include assisting in the birthing of animals. Such farmers and farm managers rarely get the chance to get away, unless they hire an assistant or arrange for a temporary substitute.

Farmers and farm managers who grow produce and perishables have different demands on their time depending on the crop grown and the season. They may work very long hours during planting and harvesting season, but shorter hours at other times. Some farmers maintain cover crops during the cold months, which keep them busy beyond the typical growing season.

On very large farms, farmers and farm managers spend substantial time meeting farm supervisors in charge of various activities. Professional farm managers overseeing several farms may divide their time between traveling to meet farmers or landowners and planning the farm operations in their offices. As farming practices and agricultural technology become more sophisticated, farmers and farm managers are spending more time in offices and at computers, where they electronically manage many aspects of their businesses. Some farmers also attend conferences exchanging information, particularly during the winter months.

Farm work can be hazardous. Tractors and other farm machinery can cause serious injury, and workers must be constantly alert on the job. The proper operation of equipment and handling of chemicals are necessary to avoid accidents, safeguard health, and protect the environment.

Training, Other Qualifications, and Advancement

Experience gained from growing up on or working on a family farm is the most common way farmers learn their trade. However, modern farming requires increasingly complex scientific, business, and financial decisions, so postsecondary education in agriculture is important even for people who were raised on farms.

Education and training. Most farmers receive their training on the job, often by being raised on a farm. However, the completion of a 2-year associate degree or a 4-year bachelor's degree at a college of agriculture is becoming increasingly important for farm managers and for farmers and ranchers who expect to make a living at farming. A degree in farm management or in business with a concentration in agriculture is important.

Students should select the college most appropriate to their interests and location. All State university systems have at least one land-grant college or university with a school of agriculture. Common programs of study include agronomy, dairy science, agricultural economics and business, horticulture, crop and fruit science, and animal science. For students interested in aquaculture, formal programs are available and include coursework in fisheries biology, fish culture, hatchery management and maintenance, and hydrology.

Agricultural colleges teach technical knowledge of crops, growing conditions, and plant diseases. They also teach prospective ranchers and dairy farmers the basics of veterinary science and animal husbandry. Students also study how the environment is affected by farm operations, for example, how the various pesticides affect local animals.

New farmers, ranchers, and agricultural managers often spend time working under an experienced farmer to learn how to apply the skills learned through academic training. Those without academic training often take many years to learn how weather, fertilizers, seed, feeding or breeding affect the growth of crops or the raising of animals in addition to other aspects of farming. A small number of farms offer formal apprenticeships to help young people learn the practical skills of farming and ranching.

Other qualifications. Farmers, ranchers, and agricultural managers need managerial skills to organize and operate a business. A basic knowledge of accounting and bookkeeping is essential in keeping financial records, and knowledge of credit sources is vital for buying seed, fertilizer, and other needed inputs. Workers must also be familiar with complex safety regulations and requirements of governmental agricultural support programs. Computer skills are becoming increasingly important, especially on large farms, where computers are widely used for recordkeeping and business analysis. In addition, skills in personnel management, communication, and conflict resolution are important in the operation of a farm or ranch business.

Mechanical aptitude and the ability to work with tools of all kinds also are valuable skills for a small-farm operator, who often maintains and repairs machinery or farm structures.

Certification and advancement. Because of rapid changes in the industry, farmers, ranchers, and agricultural managers need to stay informed about continuing advances in agricultural methods, both in the United States and abroad. They need to monitor changes in governmental regulations that may affect production methods or markets for particular crops. Besides print journals that inform the agricultural community, farmers and managers use the Internet for quick access to the latest developments in areas such as agricultural marketing, legal arrangements, and growing crops, vegetables, and livestock.

Agricultural managers can enhance their professional status through voluntary certification as an Accredited Farm Manager (AFM) by the American Society of Farm Managers and Rural Appraisers. Accreditation requires several years of farm management experience, the appropriate academic background—a bachelor’s degree or, preferably, a master’s degree in a field of agricultural science—and the passing of courses and examinations related to the business, financial, and legal aspects of farm and ranch management.

Employment

Farmers, ranchers, and agricultural managers held nearly 1.3 million jobs in 2006. About 80 percent are self-employed

farmers and ranchers, and the remainder is agricultural managers. Most farmers, ranchers, and agricultural managers oversee crop-production activities, while others manage livestock and dairy production. Most farmers and ranchers operate small farms on a part-time basis.

The soil, topography of the land, and climate often determine the type of farming and ranching done in a particular area. California, Texas, Iowa, Nebraska, and Kansas are the leading agricultural States in terms of agricultural output measured in dollars. Texas, Missouri, Iowa, Kentucky, and Tennessee are the leading agricultural States in terms of numbers of farms.

Job Outlook

The long-term trend toward the consolidation of farms into fewer and larger ones is expected to continue over the 2006–16 decade and to result in a continued, moderate decline in employment of self-employed farmers and ranchers and little or no change in employment of salaried agricultural managers. Nevertheless, a number of jobs will be available due to the need to replace the large number of farmers expected to retire or leave the profession over the next decade.

Employment change. Employment of self-employed farmers is expected to decline moderately by 8 percent over the 2006–2016 decade. The continuing ability of the agriculture sector to produce more with fewer workers will cause some farmers to go out of business as market pressures leave little room for the marginally successful farmer. As land, machinery, seed, and chemicals become more expensive, only well-capitalized farmers and corporations will be able to buy many of the farms that become available. These larger, more productive farms are better able to withstand the adverse effects of climate and price fluctuations on farm output and income. Larger farms also have advantages in obtaining government subsidies and payments because these payments are usually based on acreage owned and per-unit production.

In contrast, agricultural managers are projected to gain jobs, growing by 1 percent—effectively little or no change in the occupation. Owners of large tracts of land, who often do not live on the property they own, increasingly will seek the expertise of agricultural managers to run their farms and ranches in a business-like manner.

Despite the expected continued consolidation of farmland and the projected decline in overall employment of this occupation, an increasing number of small-scale farmers have developed successful market niches that involve personalized, direct contact with their customers. Many are finding opportunities in organic food production, which is the fastest growing segment in agriculture. Others use farmers’ markets that

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Agricultural managers.....	11-9010	1,317,000	1,230,000	-87,000	-7
Farm, ranch, and other agricultural managers.....	11-9011	258,000	261,000	2,900	1
Farmers and ranchers	11-9012	1,058,000	969,000	-90,000	-8

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

cater directly to urban and suburban consumers, allowing the farmers to capture a greater share of consumers' food dollars. Some small-scale farmers belong to collectively owned marketing cooperatives that process and sell their product. Other farmers participate in community-supported agriculture cooperatives that allow consumers to directly buy a share of the farmer's harvest.

Aquaculture may continue to provide some new employment opportunities over the 2006–16 decade. Concerns about overfishing and the depletion of the stock of some wild fish species will likely lead to more restrictions on deep-sea fishing, even as public demand for the consumption of seafood continues to grow. This has spurred the growth of aquaculture farms that raise selected aquatic species—such as shrimp, salmon, trout, and catfish—in pens or ponds. Aquaculture has increased even in landlocked States, as farmers attempt to diversify.

Job prospects. Job prospects are expected to be favorable for those who want to go into farming. With fewer people wanting to become farmers and a large number of farmers expected to retire or give up their farms in the next decade, there will be some opportunities to own or lease a farm. The market for agricultural products is projected to be good for most products over the next decade, and thus many farmers who retire will need to be replaced. Farmers who produce corn used to produce ethanol will be in particular demand as ethanol plays a greater role in energy production as fuel for automobiles. Farmers who grow crops used in landscaping, such as trees, shrubs, turf, and other ornamentals, also will have better job prospects, as people put more money into landscaping their homes and businesses.

Earnings

Incomes of farmers and ranchers vary greatly from year to year, because prices of farm products fluctuate with weather conditions and the other factors that influence the quantity and quality of farm output and the demand for those products. A farm that shows a large profit one year may show a loss the following year. According to the U.S. Department of Agriculture, the average net cash farm business income for farm operator households in 2005 was \$15,603. This figure, however, does not reflect that farmers often receive government subsidies or other payments that supplement their incomes and reduce some of the risk of farming. Additionally, most farmers—primarily operators of small farms—have income from off-farm business activities or careers, often greater than that of their farm income.

Full-time, salaried farm managers had median weekly earnings of \$1,001 in May 2006. The middle half earned between \$766 and \$1,382. The highest paid 10 percent earned more than \$1,924, and the lowest paid 10 percent earned less than \$572.

Self-employed farmers must procure their own health and life insurance. As members of farm organizations, they may receive group discounts on health and life insurance premiums.

Related Occupations

Farmers, ranchers, and agricultural managers strive to improve the quality of agricultural products and the efficiency of farms. Others whose work relates to agriculture include agricultural

engineers, agricultural and food scientists, agricultural workers, and purchasing agents and buyers of farm products.

Sources of Additional Information

For general information about farming and agricultural occupations, contact either of the following organizations:

► Center for Rural Affairs, P.O. Box 406, Walthill, NE 68067. Internet: <http://www.cfra.org>

► National FFA Organization, The National FFA Center, Attention Career Information Requests, P.O. Box 68690, Indianapolis, IN 46268. Internet: <http://www.ffa.org>

For information about certification as an accredited farm manager, contact:

► American Society of Farm Managers and Rural Appraisers, 950 Cherry St., Suite 508, Denver, CO 80222. Internet: <http://www.asfmra.org>

For information on the USDA's program to help small farmers get started, contact:

► Small Farm Program, U.S. Department of Agriculture, Cooperative State, Research, Education, and Extension Service, Stop 2220, Washington, DC 20250.

Internet: <http://www.csrees.usda.gov/smallfarms.cfm>

For information about organic farming, horticulture, and internships, contact:

► Alternative Farming System Information Center, NAL, 10301 Baltimore Ave., Room 132, Beltsville, MD 20705. Internet: <http://www.nal.usda.gov>

► ATTRA, National Sustainable Agriculture Information Service, P.O. Box 3657, Fayetteville, AR 72702.

Internet: <http://www.attra.ncat.org>

To learn more about how technological and other changes are affecting agricultural careers, see the *Occupational Outlook Quarterly* article "Farming in the 21st century: A modern business in the modern world," in print at many libraries and career centers and online at:

<http://www.bls.gov/opub/ooq/2005/spring/art02.pdf>

Fishers and Fishing Vessel Operators

(O*NET 45-3011.00)

Significant Points

- This occupation is characterized by strenuous work, long hours, seasonal employment, and some of the most hazardous conditions.
- About two out of three fishers are self-employed, among the highest proportion in the workforce.
- Fishers usually acquire their occupational skills on the job.
- Employment is projected to decline rapidly.

Nature of the Work

Fishers and fishing vessel operators catch and trap various types of marine life for human consumption, animal feed, bait, and other uses. (Aquaculture—the raising and harvesting, under

controlled conditions, of fish and other aquatic life in ponds or confined bodies of water—is covered in the *Handbook* statement on farmers, ranchers, and agricultural managers.)

Fishing hundreds of miles from shore with commercial fishing vessels—large boats capable of hauling a catch of tens of thousands of pounds of fish—requires a crew that includes a captain, or skipper, a first mate and sometimes a second mate, a boatswain (called a deckboss on some smaller boats), and deckhands with specialized skills.

The *fishing boat captain* plans and oversees the fishing operation, the fish to be sought, the location of the best fishing grounds, the method of capture, the duration of the trip, and the sale of the catch.

The captain ensures that the fishing vessel is seaworthy; oversees the purchase of supplies, gear, and equipment, such as fuel, netting, and cables; obtains the required fishing permits and licenses; and hires qualified crew members and assigns their duties. The captain plots the vessel's course using compasses, charts, and electronic navigational equipment, such as loran systems or GPS navigation systems. Ships also use radar and sonar to avoid obstacles above and below the water and to detect fish. Sophisticated tracking technology allows captains to better locate and analyze schools of fish. The captain directs the fishing operation through the officers' actions and records daily activities in the ship's log. In port, the captain sells the catch to wholesalers, food processors, or through a fish auction and ensures that each crew member receives the prearranged portion of the proceeds. Captains increasingly use the Internet to bypass processors and sell fish directly to consumers, grocery stores, and restaurants often even before they return to port.

The *first mate* is the captain's assistant and assumes control of the vessel when the captain is off duty. Duty shifts, called watches, usually last 6 hours. In this role, the first mate must be familiar with navigation requirements and the operation of all electronic equipment. The mate's regular duty though, with the help of the boatswain and under the captain's oversight, is to direct the fishing operations and sailing responsibilities of the deckhands, including the operation, maintenance, and repair of the vessel and the gathering, preservation, stowing, and unloading of the catch.

The *boatswain*, a highly experienced deckhand with supervisory responsibilities, directs the *deckhands* as they carry out the sailing and fishing operations. Before departure, the deckhands load equipment and supplies. When necessary, boatswains repair fishing gear, equipment, nets, and accessories. They operate the fishing gear, letting out and pulling in nets and lines, and extract the catch, such as cod, flounder, and tuna, from the nets or the lines' hooks. Deckhands use dip nets to prevent the escape of small fish and gaffs to facilitate the landing of large fish. They then wash, salt, ice, and stow away the catch. Deckhands also must ensure that decks are clear and clean at all times and that the vessel's engines and equipment are kept in good working order. Unless "lumpers" (laborers or longshore workers) are hired, the deckhands unload the catch.

Large fishing vessels that operate in deep water generally have technologically advanced equipment, and some may have facilities on board where the fish are processed and prepared for



Fishers often work near the coast.

sale. Such vessels are equipped for long stays at sea and can perform the work of several smaller boats.

Some fishers work on small boats in relatively shallow waters, often in sight of land. Navigation and communication needs are vital and constant for almost all types of boats. On these small boats crews usually are small, often only one or two, who work on all aspects of the fishing operation. Their work might include placing gill nets across the mouths of rivers or inlets, entrapment nets in bays and lakes, or pots and traps for fish or shellfish such as lobsters and crabs. Dredges and scrapes are sometimes used to gather shellfish such as oysters and scallops. A very small proportion of commercial fishing is conducted as diving operations. Depending upon the water's depth, divers wearing regulation diving suits with an umbilical (air line) or a scuba outfit and equipment use spears to catch fish and use nets and other equipment to gather shellfish, coral, sea urchins, abalone, and sponges. In very shallow waters, fish are caught from small boats with an outboard motor, from rowboats, or by wading from shore. Fishers use a wide variety of hand-operated equipment, for example, nets, tongs, rakes, hoes, hooks, and shovels, to gather fish and shellfish; catch amphibians and reptiles such as frogs and turtles; and harvest marine vegetation such as Irish moss and kelp.

Although most fishers are involved in commercial fishing, some captains and deckhands use their expertise in fishing for sport or recreational purposes. For this type of fishing, a group of people charter a fishing vessel with a captain, and possibly several deckhands, for periods ranging from several hours to a number of days and embark upon sportfishing, socializing, and relaxation.

Work environment. Fishing operations are conducted under various environmental conditions, depending on the region of the country and the kind of species sought. Storms, fog, and wind may hamper fishing vessels or cause them to suspend fishing operations and return to port. In relatively busy fisheries, boats have to take care to avoid collisions.

Fishers and fishing vessel operators work under some of the most hazardous conditions of any occupation, and transportation to a hospital or doctor is often not readily available when injuries occur. The crew must be on guard against the danger of injury from malfunctioning fishing gear, entanglement in fish-

ing nets and gear, slippery decks, ice formation in the winter, or being swept overboard by a wave. Malfunctioning navigation or communication equipment may lead to collisions or shipwrecks.

Fishers and fishing vessel operators face strenuous outdoor work and long hours. Commercial fishing trips may require a stay of several weeks or even months hundreds of miles away from one’s home port. The pace of work may vary, but even during travel between the home port and the fishing grounds, deckhands on smaller boats try to finish their cleaning and maintenance duties so that there are no chores remaining to be done at port. However, lookout watches are a regular responsibility, and crew members must be prepared to stand watch at prearranged times of the day or night. Although fishing gear has improved, and operations have become more mechanized, netting and processing fish are strenuous activities. Newer vessels have improved living quarters and amenities such as television and shower stalls, but crews still experience the aggravations of confined quarters, continuous close personal contact, and the absence of family.

Training, Other Qualifications, and Advancement

Fishers usually acquire their occupational skills on the job. There are no formal academic training requirements.

Education and training. Most fishers begin as deckhands and learn their trade on the job. Deckhands normally start by finding work through family, friends, or simply walking around the docks and asking for employment. Some larger trawlers and processing ships are run by larger companies. New workers can apply through the companies’ human resources department. Operators of large commercial fishing vessels are required to complete a Coast Guard-approved training course. Students can expedite their entrance into these occupations by enrolling in 2-year vocational-technical programs offered by secondary schools. In addition, some community colleges and universities offer fishery technology and related programs that include courses in seamanship, vessel operations, marine safety, navigation, vessel repair and maintenance, health emergencies, and fishing gear technology. Courses include hands-on experience. Secondary and postsecondary programs are normally offered in or near coastal areas.

Experienced fishers may find short-term workshops especially useful. These generally are offered through various postsecondary institutions and provide a good working knowledge of electronic equipment used in navigation and communication and offer information on the latest improvements in fishing gear.

Licensure. Captains and mates on large fishing vessels of at least 200 gross tons must be licensed. Captains of sportfishing boats used for charter, regardless of the boats’ size, must also be licensed. Crew members on certain fish-processing

vessels may need a merchant mariner’s document. The U.S. Coast Guard issues these documents and licenses to individuals who meet the stipulated health, physical, and academic requirements. States set licensing requirements for boats operating in State waters, defined as inland waters and waters within 3 miles of the coast.

Fishers need a permit to fish in almost any water. Permits are distributed by States for State waters and by regional fishing councils for Federal waters. The permits specify the season when fishing is allowed, the type of fish that may be caught, and sometimes the type of fishing gear that is permissible. (For information about merchant marine occupations, see the section on water transportation occupations elsewhere in the *Handbook*.)

Other qualifications. Fishers must be in good health and possess physical strength. Good coordination, mechanical aptitude, and the ability to work under difficult or dangerous conditions are necessary to operate, maintain, and repair equipment and fishing gear. Fishers need stamina to work long hours at sea, often under difficult conditions. On large vessels, they must be able to work as members of a team. Fishers must be patient, yet always alert, to overcome the boredom of long watches when they are not engaged in fishing operations. The ability to assume any deckhand’s functions on short notice is important. As supervisors, mates must be able to assume all duties, including the captain’s, when necessary. The captain must be highly experienced, mature, and decisive and also must possess the business skills needed to run business operations.

Advancement. On fishing vessels, most fishers begin as deckhands. Experienced, reliable deckhands who display supervisory qualities may become boatswains, who, in turn, may become second mates, first mates, and, finally, captains. Deckhands who acquire experience and whose interests are in ship engineering—the maintenance and repair of ship engines and equipment—can eventually become licensed chief engineers on large commercial vessels after meeting the Coast Guard’s experience, physical, and academic requirements. 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.

Employment

Fishers and fishing vessel operators held an estimated 38,000 jobs in 2006. About two out of three were self-employed. Most fishing takes place off the coasts, particularly off Alaska, the Gulf Coast, Virginia, California, and New England. Alaska ranks the highest in total volume of fish caught, according to the National Marine Fisheries Service. Many fishers are seasonal workers and positions are usually filled by people who work primarily in other occupations, such as teachers, or by students.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016		Change, 2006-16	
			Number	Percent	Number	Percent
Fishers and related fishing workers.....	45-3011	38,000	32,000	-6,200	-16	

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

For example, salmon season causes employment of fishers in Alaska to more than double during the summer. Because fishing is quite seasonal and workers are often self-employed, measuring total employment is quite difficult.

Job Outlook

Employment of fishers and fishing vessel operators is projected to decline rapidly as regulations relating to the replenishment of fish stocks reduce allowable fishing.

Employment change. Employment of fishers and fishing vessel operators is expected to decline rapidly by 16 percent through the year 2016. Fishers and fishing vessel operators depend on the natural ability of fish stocks to replenish themselves through growth and reproduction, as well as on governmental regulation to promote replenishment of fisheries. As the use of sophisticated electronic equipment for navigation, communication, and locating fish has raised the efficiency of finding fish stocks, the need for setting limits to catches has also risen. Additionally, improvements in fishing gear and the use of highly automated floating processors, where the catch is processed aboard the vessel, have greatly increased fish hauls.

Fisheries councils issue various types of restrictions to prevent over-harvesting and to allow stocks of fish and shellfish to naturally replenish. Fishing councils are shifting to an individual quota system that tends to reduce employment. However, such a system is beneficial for those who remain in the industry because it allows for longer fishing seasons, better investment returns, and steadier employment.

In addition, rising seafood imports and increasing competition from farm-raised fish are adversely affecting fishing income and is also causing some fishers to leave the industry. However, competition from farm-raised and imported seafood tends to be concentrated in specific species and should have more of an impact in some regions than others.

Governmental efforts to replenish stocks are having some positive results, which should increase the stock of fish in the future. Furthermore, efforts by private fishers' associations on the West Coast to increase government monitoring of the fisheries may help to prevent the type of decline in fish stocks found in waters off the East Coast. Nevertheless, fewer fishers and fishing vessel operators are expected to make their living from the Nation's waters in the years ahead.

Job prospects. Many 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. Thus, some job openings will arise from the need to replace workers who leave the occupation or retire. Sportfishing boats will also continue to provide some job opportunities.

Earnings

In May 2006, median annual earnings of wage-and-salary fishers were \$27,250. The bottom 10 percent earned less than \$15,280, while the top 10 percent earned more than \$45,480. Earnings of fishers and fishing vessel operators normally are highest in the summer and fall when demand for their catch 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.

Earnings of fishers vary widely, depending upon their position, their ownership percentage of the vessel, the size of their ship, and the amount and value of the catch. The costs of the fishing operation such as fuel, 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 amount, the owner pays for depreciation, maintenance and repair, and replacement and insurance costs of the ship and its equipment; the money that remains 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. Many ships not only catch the fish but also cut, trim, and preserve it. Seafood processing work done on land is performed by meat, poultry, and fish cutters and trimmers.

Sources of Additional Information

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

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

Internet:

http://www.access.gpo.gov/nara/cfr/waisidx_01/46cfr28_01.html

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

Internet: <http://www.uscg.mil/STCW/index.htm>

Forest, Conservation, and Logging Workers

(O*NET 45-4011.00, 45-4021.00, 45-4022.00, 45-4023.00, 45-4029.99)

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.
- Little to no change in overall employment is expected.

Nature of the Work

The Nation's forests are a rich natural resource, providing beauty and tranquility, varied recreational benefits, and wood for commercial use. Managing and harvesting the forests and woodlands require many different kinds of workers. Forest and conservation workers help develop, maintain, and protect the

forests by growing and planting new 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 to 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 seedlings in reforestation timberland areas. Forest workers also remove diseased or undesirable trees with power saws or handsaws, spray trees with insecticides and fungicides to kill insects and to protect against disease, and apply herbicides on undesirable brush to reduce competing vegetation. In private industry, forest workers usually working under the direction of professional foresters, paint boundary lines, assist with controlled burning, aid in marking and measuring trees, and keep tallies of trees examined and counted. Those who work for State and local governments or who are under contract with them also clear away brush and debris from camp trails, roadsides, and camping areas. Some forest workers clean kitchens and rest rooms at recreational facilities and campgrounds.

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

Some forest workers are employed on tree farms, where they plant, cultivate, and harvest many different kinds of trees. Their duties vary with the type of farm. Those who work on specialty farms, such as farms growing Christmas or ornamental trees for nurseries, are responsible for shearing treetops and limbs to control the growth of the trees under their care, to increase the density of limbs, and to improve the shapes of the trees. In addition, these workers’ duties include planting the seedlings, spraying to control surrounding weed growth and insects, and harvesting the trees.

Other forest workers gather, by hand or with the use of 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 chemicals.

Logging workers are responsible for cutting and hauling trees in large quantities. The timber-cutting and logging process is carried out by a logging crew. A typical crew might consist of one or two tree fallers or one tree harvesting machine operator to cut down trees, one buckler to cut logs, two logging skidder operators to drag cut trees to the loading deck, and one equipment operator to load the logs onto trucks.

Specifically, *fallers*, commonly known as *tree fallers*, cut down trees with hand-held power chain saws or mobile felling machines. Usually using gas-powered chain saws, bucklers 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 the logs are separated by species and type of product, such as pulpwood, saw logs, or veneer logs, and loaded onto trucks. *Rigging slingers and chasers* set up and dismantle the

cables and guy wires of the yarding system. *Log sorters, markers, movers, and chippers* sort, mark, and move logs, based on species, size, and ownership, and tend machines that chip up logs.

Logging equipment operators use tree harvesters to fell the trees, shear the limbs off, and then cut the logs into desired lengths. They drive tractors mounted on crawler tracks and operate self-propelled machines called skidders or forwarders, which drag or transport logs from the felling site in the woods to the log landing area for loading. They also operate grapple loaders, which lift and load logs into trucks. Some logging equipment operators, usually at a sawmill or a pulp-mill woodyard, use a tracked or wheeled machine similar to a forklift to unload logs and pulpwood off of trucks or gondola railroad cars. Some newer, more efficient logging equipment has state-of-the-art computer technology, requiring skilled operators with more training.

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 devices to enter data about individual trees; later, the data can be downloaded or sent from the scaling area to a central computer via modem.

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

Most crews work for self-employed logging contractors who have substantial logging experience, the capital to purchase equipment, and the skills needed to run a small business successfully. Many contractors work alongside their crews as supervisors and often operate one of the logging machines, such as the grapple loader or the tree harvester. Some 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 still are dangerous and very 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 to fell trees, and heavy equipment to skid and load logs onto trucks. To keep costs down, many timber-cutting and logging workers maintain and repair the equipment they use. A skillful, experienced logging worker is expected to handle a variety of logging operations.

Work environment. Forestry and logging jobs are physically demanding. 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 and has generally made tasks much safer. Workers in some sparsely populated western States, as well as northern Maine, commute long distances between their homes and logging sites. A few logging camps in Alaska and Maine house workers in bunkhouses. In the more densely populated eastern and southern States, commuting distances are shorter.

Most logging occupations involve lifting, climbing, and other strenuous activities, although machinery has eliminated some



Logging workers use increasingly productive machinery to harvest logs.

heavy labor. Loggers work under unusually hazardous conditions. Falling branches, vines, and rough terrain are constant hazards, as are the dangers associated with tree-felling and log-handling operations. Special care must be taken during strong winds, which can even halt logging operations. Slippery or muddy ground, 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, heat, humidity, and extreme cold are everyday occurrences where loggers work. The use of hearing protection devices is required on logging operations because the high noise level of felling and skidding operations over long periods may impair one's hearing. Workers must be careful and use proper safety measures and equipment such as hardhats, eye and ear protection, safety clothing, and boots to reduce the risk of injury.

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

Training, Other Qualifications, and Advancement

Most forest, conservation, and logging workers develop skills through on-the-job training, learning from experienced workers.

Education and training. Generally, a high school diploma is sufficient for most forest, conservation, and logging occupations. Many forest worker jobs offer only seasonal employment during warm-weather months, so many students are hired to perform short-term, labor-intensive tasks, such as planting tree seedlings or conducting precommercial tree thinning.

Through on-the-job training, logging workers become familiar with the character and dangers of the forest environment and the operation of logging machinery and equipment. Safety training is a vital and required part of the instruction of all logging workers. Many State forestry or logging associations provide training sessions for tree fallers, whose job duties require more skill and experience than do 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 and foresters are common in many States. These training programs also include sessions on encouraging the health and productivity of the Nation's forests through the forest product industry's Sustainable Forest Initiative program. Logger training programs vary by State but generally include classroom or field training in a number of areas, including best management practices, environmental compliance, wetlands, safety, endangered species, reforestation, and business management. Some programs lead to logger certification.

Logging companies and trade associations, such as the Northeastern Loggers Association, the American Loggers Council, and the Forest Resources Association, Inc. also offer training programs for workers who operate large, expensive machinery and equipment. Often, a representative of the equipment manufacturer spends several days in the field explaining and overseeing the operation of newly purchased machinery.

Some vocational and technical schools and community colleges offer courses leading to a 2-year technical degree in forestry, wildlife management, conservation, and forest harvesting, all of which are 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. Additionally, a few community colleges offer training for equipment operators.

Other qualifications. 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 when hazards arise. Mechanical aptitude and coordination are necessary for operators of machinery and equipment, who often are responsible for repair and maintenance. Self-employed loggers need initiative and managerial and business skills to be successful as logging contractors.

Advancement. Logging workers generally advance from tasks requiring a lot of manual labor to those involving the operation of expensive, sometimes complicated logging equipment. Inexperienced entrants usually begin as laborers, carrying tools and equipment, clearing brush, performing equipment maintenance, and loading and unloading 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.

Some experienced logging workers start their own logging contractor businesses, but to do so they also need some basic business skills, which are essential in today's tight business climate.

Employment

Forest, conservation, and logging workers held about 88,000 jobs in 2006 in the following occupations:

Logging equipment operators	40,000
Forest and conservation workers.....	20,000
Fallers.....	13,000
Log graders and scalers.....	7,100
Logging workers, all others	8,000

About 34 percent of all forest and conservation workers work for government, primarily at the State and local level. About 33 percent are employed by companies that operate timber tracts, tree farms, or forest nurseries, or for contractors that supply services to agriculture and forestry industries. Some of those employed in forestry services work on a contract basis for the U.S. Department of Agriculture's Forest Service. Self-employed forest and conservation workers make up nearly 15 percent of the occupation.

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. Seasonal demand for forest, conservation, and logging workers can vary by region and time of year. For northern States in particular, winter weather can interrupt forestry and logging operations, although some logging can be done in winter.

More than half of all logging workers work for the logging industry. Another 28 percent are self-employed, who mostly work under contract to landowners and the logging industry. About 10 percent work for sawmills and other businesses in the wood product manufacturing industry.

Job Outlook

Overall employment of forest, conservation, and logging workers is expected to experience little or no change through the year 2016. Most job openings will result from replacement needs because some forestry workers are young people who are not committed to the occupation on a long-term basis.

Employment change. Employment of forest, conservation, and logging workers overall is expected to decline slightly by 1 percent over the 2006-16 decade. Forest and conservation workers is the only occupation in this group that is expected to have job growth, increasing 6 percent over the 10 years. Demand for forest and conservation workers will increase as more land is set aside to protect natural resources or wildlife habitats. In addition, more jobs may be created by recent Federal legislation designed to prevent destructive wildfires by thinning the forests and setting controlled burns in dry regions susceptible to forest fires.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Forest, conservation, and logging workers	45-4000	88,000	87,000	-1,200	-1
Forest and conservation workers.....	45-4011	20,000	21,000	1,100	6
Logging workers	45-4020	69,000	66,000	-2,300	-3
Fallers.....	45-4021	13,000	12,000	-1,000	-7
Logging equipment operators	45-4022	40,000	40,000	-500	-1
Log graders and scalers.....	45-4023	7,100	6,700	-400	-5
Logging workers, all other.....	45-4029	7,900	7,500	-500	-6

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

Logging workers are expected to decline by 3 percent from 2006 to 2016. New policies allowing some access to Federal timberland may create some logging jobs, and job opportunities also will arise from timber sales of owners of privately owned forests and tree farms. Nevertheless, domestic timber producers continue to 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 continue to depress demand for many manual timber-cutting and logging workers. Employment of fallers, buckers, choke setters, and other workers whose jobs are labor intensive should decline as more labor-saving equipment is used. Employment of machinery and equipment operators, such as tree harvesting, skidding, and log-handling equipment operators, will be less adversely affected and should rise slightly as logging companies switch away from manual tree felling.

Job prospects. Despite the projection for little to no change in overall employment, prospects for forest and conservation workers should be good. Job openings will come from the large numbers of workers who leave these jobs on a seasonal basis and from an increase in retirements expected over the next decade. Also, many logging workers will transfer to other jobs that are less physically demanding, dangerous, and prone to layoffs.

But employment of forest, conservation, and logging workers can sometimes be unsteady. Weather can curtail the work of forest and conservation workers during the muddy spring season and the cold winter months, depending on the geographic region. Changes in the level of construction, particularly residential construction, also cause slowdowns in logging activities in the short term. In addition, logging operations must be relocated when timber in a particular area has been harvested. During prolonged periods of inactivity, some workers may stay on the job to maintain or repair logging machinery and equipment, but others are laid off or forced to find jobs in other occupations.

Earnings

Earnings vary with the particular forestry or logging occupation and with experience. Many beginning or inexperienced workers earn the Federal minimum wage of \$5.85 an hour, but

many States set minimum wages higher than the Federal minimum. Under Federal law, this wage will increase to \$6.55 in the summer of 2008 and to \$7.25 in the summer of 2009. Earnings range from the minimum wage in some beginning forestry and conservation positions to over \$26.00 an hour for the most experienced fallers.

Median hourly earnings in 2006 for forest, conservation, and logging occupations were as follows:

Logging equipment operators	\$14.28
Log graders and scalers.....	14.06
Fallers.....	13.80
Forest and conservation workers.....	10.01

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 ones. 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 or for large, private firms generally enjoy more generous benefits than do workers in smaller firms. Small logging contractor firms generally offer timber-cutting and logging workers few benefits beyond vacation days. 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 occupations and construction equipment operators.

Sources of Additional Information

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

► Forest Resources Association, Inc., 600 Jefferson Plaza, Suite 350, Rockville, MD 20852.

Internet: <http://www.forestresources.org>

► American Loggers Council. P.O. Box 966, Hemphill, TX 75948. Internet: <http://www.americanloggers.org>

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

► American Forest & Paper Association, 1111 19th St.NW., Suite 800, Washington, DC 20036.

Internet: <http://www.afandpa.org>

A list of State forestry associations and other forestry-related State associations is available at most public libraries. Schools of Forestry at State land-grant colleges or universities also can be useful sources of information.

Material Moving Occupations

(O*NET 53-1021.00, 53-7011.00, 53-7021.00, 53-7031.00, 53-7032.00, 53-7033.00, 53-7041.00, 53-7051.00, 53-7061.00, 53-7062.00, 53-7063.00, 53-7064.00, 53-7071.00, 53-7072.00, 53-7073.00, 53-7081.00, 53-7111.00, 53-7121.00, 53-7199.99)

Significant Points

- Despite little or no change in employment, job openings should be plentiful because these occupations are very large and numerous openings will be created to replace workers who leave them.
- Most jobs require little work experience or training.
- Pay is low, and the seasonal nature of the work may reduce earnings.

Nature of the Work

Material moving workers are categorized into two groups—operators and laborers. Operators use machinery to move construction materials, earth, petroleum products, and other heavy materials. Generally, they move materials over short distances—around construction sites, factories, or warehouses. Some move materials onto or off of trucks and ships. Operators control equipment by moving levers, wheels, and/or foot pedals;

operating switches; or turning dials. They also may set up and inspect equipment, make adjustments, and perform minor maintenance or repairs.

Laborers and hand material movers move freight, stock, or other materials by hand; clean vehicles, machinery, and other equipment; feed materials into or remove materials from machines or equipment; and pack or package products and materials.

Material moving occupations are classified by the type of equipment they operate or the goods they handle. Each piece of equipment requires different skills, as do different types of loads. (For information on operating engineers; paving, surfacing, and tamping equipment operators; and pile-driver operators, see the statement on construction equipment operators elsewhere in the *Handbook*.)

Industrial truck and tractor operators drive and control industrial trucks or tractors equipped to move materials around warehouses, storage yards, factories, construction sites, or other worksites. A typical industrial truck, often called a forklift or lift truck, has a hydraulic lifting mechanism and forks for moving heavy and large objects. Industrial truck and tractor operators also may operate tractors that pull trailers loaded with materials, goods, or equipment within factories and warehouses or around outdoor storage areas.

Excavating and loading machine and dragline operators tend or operate machinery equipped with scoops, shovels, or buckets to dig and load sand, gravel, earth, or similar materials

into trucks or onto conveyors. Construction and mining industries employ the majority of excavation and loading machine and dragline operators. *Dredge operators* excavate waterways, removing sand, gravel, rock, or other materials from harbors, lakes, rivers, and streams. Dredges are used primarily to maintain navigable channels but also are used to restore wetlands and other aquatic habitats; reclaim land; and create and maintain beaches. *Underground mining loading machine operators* use underground loading machines to load coal, ore, or rock into shuttles and mine cars or onto conveyors. Loading equipment may include power shovels, hoisting engines equipped with cable-drawn scrapers or scoops, and machines equipped with gathering arms and conveyors.

Crane and tower operators work mechanical boom and cable or tower and cable equipment to lift and move materials, machinery, and other heavy objects. Operators extend and retract horizontally mounted booms and lower and raise hooks attached to load lines. Most operators are guided by other workers using hand signals or a radio. Operators position loads from an on-board console or from a remote console at the site. While crane and tower operators are noticeable at office building and other construction sites, the biggest group works in primary metal, metal fabrication, and transportation equipment manufacturing industries that use heavy, bulky materials. Operators also work at major ports, loading and unloading large containers on and off ships. *Hoist and winch operators* control movement of cables, cages, and platforms to move workers and materials for manufacturing, logging, and other industrial operations. They work in positions such as derrick operators and hydraulic boom operators. Many hoist and winch operators are found in manufacturing or construction industries.

Pump operators tend, control, and operate pump and manifold systems that transfer gases, oil, or other materials to vessels or equipment. They maintain the equipment and regulate the flow of materials according to a schedule set up by petroleum engineers or production supervisors. *Gas compressor and gas pumping station operators* operate steam, gas, electric motor, or internal combustion engine-driven compressors. They transmit, compress, or recover gases, such as butane, nitrogen, hydrogen, and natural gas. *Wellhead pumpers* operate pumps and auxiliary equipment to produce flows of oil or gas from extraction sites.

Tank car, truck, and ship loaders operate ship-loading and -unloading equipment, conveyors, hoists, and other specialized material-handling equipment such as railroad tank car-unloading equipment. They may gauge or sample shipping tanks and test them for leaks. *Conveyor operators and tenders* control and tend conveyor systems that move materials to or from stockpiles, processing stations, departments, or vehicles. *Shuttle car operators* run diesel or electric-powered shuttle cars in underground mines, transporting materials from the working face to mine cars or conveyors.

Laborers and hand freight, stock, and material movers manually move materials and perform other unskilled, general labor. These workers move freight, stock, and other materials to and from storage and production areas, loading docks, delivery vehicles, ships, and containers. Their specific duties vary by industry and work setting. In factories, they may move raw

materials or finished goods between loading docks, storage areas, and work areas, as well as sort materials and supplies and prepare them according to their work orders. Specialized workers within this group include baggage and cargo handlers—who work in transportation industries—and truck loaders and unloaders.

Hand packers and packagers manually pack, package, or wrap a variety of materials. They may inspect items for defects, label cartons, stamp information on products, keep records of items packed, and stack packages on loading docks. This group also includes order fillers, who pack materials for shipment, as well as grocery store courtesy clerks. In grocery stores, they may bag groceries, carry packages to customers' cars, and return shopping carts to designated areas.

Machine feeders and offbearers feed materials into or remove materials from equipment or machines tended by other workers.

Cleaners of vehicles and equipment clean machinery, vehicles, storage tanks, pipelines, and similar equipment using water and cleaning agents, vacuums, hoses, brushes, cloths, or other cleaning equipment.

Refuse and recyclable material collectors gather refuse and recyclables from homes and businesses into their trucks for transport to a dump, landfill, or recycling center. They lift and empty garbage cans or recycling bins by hand or, using hydraulic lift trucks, pick up and empty dumpsters. They work along scheduled routes.

Work environment. Material moving work tends to be repetitive and physically demanding. Workers may lift and carry heavy objects and stoop, kneel, crouch, or crawl in awkward positions. Some work at great heights and some work outdoors—regardless of weather and climate. Some jobs expose workers to fumes, odors, loud noises, harmful materials and chemicals, or dangerous machinery. To protect their eyes, respiratory systems, and hearing, these workers wear safety clothing, such as gloves, hardhats, and other safety devices such as respirators. These jobs have become much less dangerous as safety equipment—such as overhead guards on lift trucks—has become common. Accidents usually can be avoided by observing proper operating procedures and safety practices.



Many job openings are expected in material moving occupations.

Material movers generally work 8-hour shifts—though longer shifts are not uncommon. In industries that work around the clock, material movers may work overnight shifts. Some do this because their employers do not want to disturb customers during normal business hours. Refuse and recyclable material collectors often work shifts starting at 5 or 6 a.m. Some material movers work only during certain seasons, such as when the weather permits construction activity.

Training, Other Qualifications, and Advancement

Many material moving occupations require little or no formal training. Most training for these occupations are done on the job. For those jobs requiring physical exertion, employers may require that applicants pass a physical exam. Some employers also require drug testing or background checks.

Education and training. Material movers generally learn skills informally, on the job, from more experienced workers or their supervisors. Some employers prefer applicants with a high school diploma, but most simply require workers to be at least 18 years old and physically able to perform the work.

Workers who handle toxic chemicals or use industrial trucks or other dangerous equipment must receive specialized training in safety awareness and procedures. Many of the training requirements are standardized through the U.S. Occupational Safety and Health Administration. This training is usually provided by the employer. Employers also must certify that each operator has received the training and evaluate each operator at least once every 3 years.

For other operators, such as crane operators and those working with specialized loads, there are some training and apprenticeship programs available, such as that offered by the International Union of Operating Engineers. Apprenticeships combine paid on-the-job training with classroom instruction.

Licensure. Fifteen States and 6 cities have laws requiring crane operators to be licensed. Licensing requirements typically include a written as well as a skills test to demonstrate that the licensee can operate a crane safely.

Certification and other qualifications. Some types of equipment operators can become certified by professional associations, such as the National Commission for the Certification of Crane Operators, and some employers may require operators to be certified.

Material moving equipment operators need a good sense of balance, the ability to judge distances, and eye-hand-foot coordination. For jobs that involve dealing with the public, such as grocery store courtesy clerks, workers should be pleasant and courteous. Most jobs require basic arithmetic skills and the ability to read procedural manuals, to understand orders, and other billing documents. Mechanical aptitude and training in automobile or diesel mechanics can be helpful because some operators may perform basic maintenance on their equipment. Experience operating mobile equipment—such as tractors on farms or heavy equipment in the Armed Forces—is an asset. As material moving equipment becomes more advanced, workers will need to be increasingly comfortable with technology.

Advancement. In many of these occupations, experience may allow workers to qualify or become trainees for jobs such as construction trades workers; assemblers or other production

workers; motor vehicle operators; or vehicle and mobile equipment mechanics, installers, and repairers. In many workplaces new employees gain experience in a material moving position before being promoted to a better paying and more highly skilled job. Some may eventually advance to become supervisors.

Employment

Material movers held 4.8 million jobs in 2006. They were distributed among the detailed occupations as follows:

Laborers and freight, stock, and material movers, hand	2,416,000
Packers and packagers, hand	834,000
Industrial truck and tractor operators	637,000
Cleaners of vehicles and equipment	368,000
Machine feeders and offbearers	148,000
Refuse and recyclable material collectors	136,000
Excavating and loading machine and dragline operators	80,000
Conveyor operators and tenders	50,000
Crane and tower operators	46,000
Tank car, truck, and ship loaders	16,000
Wellhead pumpers	14,000
Pump operators, except wellhead pumpers	11,000
Gas compressor and gas pumping station operators	4,200
Loading machine operators, underground mining	3,100
Hoist and winch operators	3,000
Shuttle car operators	2,900
Dredge operators	2,100
Material moving workers, all other	54,000

About 29 percent of all material movers worked in the wholesale trade or retail trade industries. Another 21 percent worked in manufacturing; 16 percent in transportation and warehousing; 4 percent in construction and mining; and 14 percent in the employment services industry, on a temporary or contract basis. For example, companies that need workers for only a few days, to move materials or to clean up a site, may contract with temporary help agencies specializing in providing suitable workers on a short-term basis. A small proportion of material movers were self-employed.

Material movers work in every part of the country. Some work in remote locations on large construction projects such as highways and dams, while others work in factories, warehouses, or mining operations.

Job Outlook

Job openings should be numerous because these occupations is very large and turnover is relatively high, even though little or no change in employment is expected because of automation.

Employment change. Employment in material moving occupations is projected to decline by 1 percent between 2006 and 2016, which is considered little or no change in employment. Improvements in equipment, such as automated storage and retrieval systems and conveyors, will continue to raise productivity and moderate the demand for material movers.

Job growth for material movers depends on the growth or decline of employing industries and the type of equipment the workers operate or the materials they handle. Employment will grow in the warehousing and storage industry as more firms contract out their warehousing functions to this industry. For

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Material moving occupations.....	53-7000	4,825,000	4,800,000	-25,000	-1
Conveyor operators and tenders.....	53-7011	50,000	46,000	-3,700	-7
Crane and tower operators.....	53-7021	46,000	48,000	1,300	3
Dredge, excavating, and loading machine operators.....	53-7030	85,000	92,000	6,900	8
Dredge operators.....	53-7031	2,100	2,300	100	7
Excavating and loading machine and dragline operators.....	53-7032	80,000	87,000	6,700	8
Loading machine operators, underground mining.....	53-7033	3,100	3,200	100	4
Hoist and winch operators.....	53-7041	3,000	3,000	0	-1
Industrial truck and tractor operators.....	53-7051	637,000	624,000	-13,000	-2
Laborers and material movers, hand.....	53-7060	3,766,000	3,741,000	-25,000	-1
Cleaners of vehicles and equipment.....	53-7061	368,000	420,000	52,000	14
Laborers and freight, stock, and material movers, hand.....	53-7062	2,416,000	2,466,000	50,000	2
Machine feeders and offbearers.....	53-7063	148,000	125,000	-22,000	-15
Packers and packagers, hand.....	53-7064	834,000	730,000	-104,000	-12
Pumping station operators.....	53-7070	29,000	25,000	-3,800	-13
Gas compressor and gas pumping station operators.....	53-7071	4,200	3,400	-700	-17
Pump operators, except wellhead pumpers.....	53-7072	11,000	9,200	-1,300	-13
Wellhead pumpers.....	53-7073	14,000	13,000	-1,700	-12
Refuse and recyclable material collectors.....	53-7081	136,000	146,000	10,000	7
Shuttle car operators.....	53-7111	2,900	2,600	-200	-8
Tank car, truck, and ship loaders.....	53-7121	16,000	18,000	1,500	9
Material moving workers, all other.....	53-7199	54,000	54,000	400	1

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

example, a frozen food manufacturer may reduce its costs by outsourcing these functions to a refrigerated warehousing firm, which can more efficiently deal with the specialized storage needs of frozen food. Jobs in mining are expected to decline due to continued productivity increases within that industry. Opportunities for material movers will also decline in manufacturing due to productivity improvements and outsourcing of warehousing and other activities that depend on material movers. Job growth generally will be slower in large establishments, which can afford to invest in automated systems for their material moving needs.

Construction is very sensitive to changes in economic conditions, so the number of job openings in this industry will fluctuate. Although increasing automation will eliminate some routine tasks, new jobs will be created by the need to operate and maintain new equipment. Additionally, firms are more likely initially to use workers when expanding their businesses as opposed to using automated systems due to the large fixed costs associated with such systems.

Job prospects. Despite the little or no employment growth expected, job openings should be plentiful due to the fact that these occupations are very large and there will be a relatively high number of openings created by the need replace workers who transfer to other occupations or who retire or leave the labor force for other reasons—characteristic of occupations requiring little prior or formal training.

Earnings

Median hourly earnings of material moving workers in May 2006 were relatively low, as indicated by the following tabulation:

Gas compressor and gas pumping station operators.....	\$21.83
Pump operators, except wellhead pumpers.....	19.13
Shuttle car operators.....	18.78
Crane and tower operators.....	18.77
Loading machine operators, underground mining.....	17.91
Wellhead pumpers.....	17.38
Dredge operators.....	16.26
Hoist and winch operators.....	16.16
Excavating and loading machine and dragline operators.....	15.83
Tank car, truck, and ship loaders.....	15.37
Refuse and recyclable material collectors.....	13.93
Industrial truck and tractor operators.....	13.11
Conveyor operators and tenders.....	13.09
Machine feeders and offbearers.....	10.88
Laborers and freight, stock, and material movers, hand.....	10.20
Cleaners of vehicles and equipment.....	8.68
Packers and packagers, hand.....	8.48
Material moving workers, all other.....	14.55

Wages vary according to experience and job responsibilities. Wages usually are higher in metropolitan areas. Seasonal peaks and lulls in workload can affect the number of hours scheduled which affects earnings. Some crane operators, such as those unloading containers from ships at major ports earn substantially more than their counterparts in other industries or establishments. Certified crane operators tend to have a slightly higher hourly rate than those who are not certified.

Related Occupations

Other workers who operate mechanical equipment include construction equipment operators; machine setters, operators, and tenders—metal and plastic; rail transportation workers;

and truck drivers and driver/sales workers. Other entry-level workers who perform mostly physical work include agricultural workers; building cleaning workers; construction laborers; forest, conservation, and logging workers; and grounds maintenance workers.

Sources of Additional Information

For information about job opportunities and training programs, contact local State employment service offices, building or construction contractors, manufacturers, and wholesale and retail establishments.

Information on safety and training requirements is available from:

► U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW., Washington, DC 20210. Internet: <http://www.osha.gov>

Information on training and apprenticeships for industrial truck operators is available from:

► International Union of Operating Engineers, 1125 17th St. NW., Washington, D.C. 20036. Internet: <http://www.iuoe.org>

Information on crane and derrick certification and licensure is available from:

► National Commission for the Certification of Crane Operators, 2750 Prosperity Ave., Suite 505, Fairfax, VA 22031. Internet: <http://www.nccco.org>

Rail Transportation Occupations

(O*NET 53-4011.00, 53-4012.00, 53-4013.00, 53-4021.00, 53-4031.00, 53-4041.00, 53-4099.99)

Significant Points

- Opportunities are expected to be good for qualified applicants since a large number of workers are expected to retire or leave these occupations in the next decade.
- Seventy-four percent of these workers are members of unions, and earnings are relatively high.

Nature of the Work

Rail transportation workers are employed by three different types of railroads: freight, passenger, and urban transit (subway and light-rail). Freight railroads transport billions of tons of goods to destinations within the U.S. and to ports to be shipped abroad. Passenger railroads deliver millions of passengers and long-distance commuters to destinations throughout the country. Subways and light-rail systems move passengers within metropolitan areas and their surrounding suburbs. All of these modes of rail transportation require employees to operate, oversee, and assist in rail operations. Rail transportation workers not only work on trains, but also can be found working in rail yards where railcars are inspected, repaired, coupled, and uncoupled as necessary.

Locomotive engineers operate large trains carrying cargo or passengers between stations. Most engineers run diesel-electric locomotives, although a few operate locomotives powered by battery or externally supplied electricity. Before each run, engineers check the mechanical condition of their locomotives, making any minor adjustments necessary and documenting issues that require more thorough inspection. While trains are in motion, engineers move controls such as throttles and airbrakes. They also monitor instruments that measure speed, amperage, battery charge, and air pressure, both in the brake lines and in the main reservoir. Engineers must have thorough knowledge of their routes and must be constantly aware of the condition

and makeup of their train, because trains react differently to the grade and condition of the rail, the number of cars, the ratio of empty cars to loaded cars, and the amount of slack in the train.

Railroad conductors coordinate all activities of freight or passenger train crews. Conductors assigned to freight trains review schedules, switching orders, waybills, and shipping records to obtain loading and unloading information regarding their cargo. In addition, they are responsible for the distribution of tonnage in the train and the operation of freight cars within rail yards and terminals that use remote control locomotive technology. Conductors assigned to passenger trains also ensure passenger safety and comfort as they go about collecting tickets and fares, making announcements for the benefit of passengers, and coordinating the activities of the crew.

Before trains leave a terminal, the conductor and the engineer discuss any concerns regarding the train's route, timetable, and cargo. During runs and in rail yards, engineers and conductors interface electronically with monitoring equipment, traffic control center personnel, dispatchers, and personnel on other trains to issue or receive information concerning stops, delays, and the locations of trains. While engineers interpret and comply with orders, signals, speed limits, and railroad rules and regulations, conductors use dispatch or electronic monitoring devices to relay information about equipment problems on the train or the rails. Conductors may arrange for the removal of defective cars from the train for repairs at the nearest station or stop, and discuss alternative routes with the engineer and dispatcher if there is a defect in, or obstruction on, the rails.

Railroad brake operators assist with the coupling and uncoupling of cars as well as operate some switches. In an effort to reduce costs, most railroads have phased out brake operators, and many trains use only an engineer and a conductor. *Signal operators* install, maintain, and repair the signals on tracks and in yards.

Yardmasters, where present, coordinate the activities of workers engaged in railroad yard operations. These activities, which are also performed by conductors, include making up or breaking up trains and switching inbound or outbound traffic to a specific section of the line. Some cars are sent to unload their cargo on special tracks, while others are moved to dif-

ferent tracks to await assembly into new trains, based on their destinations. Yardmasters tell yard engineers or other personnel where to move the cars to fit the planned train configuration. Switches—many of them operated remotely by computer—divert trains or railcars to the proper track for coupling and uncoupling.

Also included in rail transportation occupations are several smaller occupations. *Switch operators* control the track switches within a rail yard. In rail yards without remote control technology, *rail yard engineers* operate engines within the rail yard. Similarly, *hostlers* operate engines—without attached cars—within the yard, as well as driving them to and from maintenance shops.

In contrast to other rail transportation workers, subway and streetcar operators generally work for public transit authorities instead of railroads. *Subway operators* control trains that transport passengers through cities and their suburbs. The trains run in underground tunnels, on the surface, or on elevated tracks. Operators must stay alert to observe signals along the track that indicate when they must start, slow, or stop their train. They also make announcements to riders, may open and close the doors of the train, and ensure that passengers get on and off the subway safely. Increasingly, the train's speed and the amount of time spent at each station are controlled by computers and not by the operator. During breakdowns or emergencies, operators contact their dispatcher or supervisor and may have to evacuate cars.

Streetcar operators drive electric-powered streetcars, trolleys, or light-rail vehicles that transport passengers around metropolitan areas. Some tracks may be built directly into street pavement or have grade crossings, so operators must observe traffic signals and cope with car and truck traffic. Operators start, slow, and stop their cars so that passengers may get on and off easily. Operators may collect fares and issue change and transfers. They also interact with passengers who have questions about fares, schedules, and routes.

Work environment. Rail transportation employees work nights, weekends, and holidays to operate trains that run 24 hours a day, 7 days a week. Many work more than a 40-hour workweek, although minimum rest hours are mandated by Federal regulations. Engineers and conductors may be placed on an “extra board” on which workers receive assignments only when a railroad needs substitutes for workers who are absent because of vacation, illness, or other reasons. Seniority usually dictates who receives the more desirable shifts, as do union agreements at large unionized railroads. Working conditions vary by the mode of rail transport.

Freight trains generally are dispatched according to the needs of customers; as a result train crews may have irregular schedules. It is common for workers to place their name on a list and wait for their turn to work. Jobs usually are assigned on short notice and often at odd hours. Working weekends is common in freight train transportation. Those who work on trains operating between points hundreds of miles apart may spend consecutive nights away from home. Because of the distances involved on some routes, many railroad employees work without direct supervision.



Rail transportation workers may spend significant time on the road.

Workers on passenger trains ordinarily have regular and reliable shifts. Also, the appearance, temperature, and accommodations of passenger trains are more comfortable than those of freight trains.

Rail yard workers spend most of their time outdoors and work regardless of weather conditions. These workers climb up and down equipment, which can be strenuous and dangerous if safety rules are not followed. The work of conductors and engineers on local runs, on which trains frequently stop at stations or local rail yards to pick up and deliver cars, is physically demanding as well.

Training, Other Qualifications, and Advancement

Rail transportation workers start out in a variety of positions as they gain experience needed for more demanding assignments. Rail transportation workers generally start out training to become a conductor before they may be considered for an engineer position. Engineer positions require Federal licensure, and nearly all rail transportation workers complete formal classroom and hands-on training before beginning work. Most applicants must pass a drug screening, background check, and physical examination before being hired.

Education and training. Railroads require that applicants have a minimum of a high school diploma or its equivalent, and most training is done through a company's formal training program and on-the-job training. Entry-level jobs and rail yard jobs usually require the successful completion of a company training program before workers are allowed to begin. For brake and signal operator jobs, railroad firms will train applicants either in a company program or—especially with smaller railroads—at an outside training facility. Typical training programs combine classroom and on-site training lasting from a few weeks to a few months. Entry-level conductors are either trained by their employers or are required to complete a formal conductor training program through a community college.

Most transit systems that operate subways and streetcars also operate buses. In these systems, subway or streetcar operators usually gain experience by first driving buses. New operators then complete training programs that last from a few weeks to 6 months. At the end of the period of classroom and on-the-job training, operators usually must pass qualifying examinations

covering the operating system, troubleshooting, and evacuation and emergency procedures.

Licensure. Locomotive engineers are unique within rail transportation occupations in that they must be federally licensed to operate freight and passenger trains. Federal regulations require beginning engineers to complete a formal engineer training program, including classroom, simulator, and hands-on instruction in locomotive operation. The instruction usually is administered by the rail company in programs approved by the Federal Railroad Administration. At the end of the training period, candidates must pass a hearing and visual acuity test, a safety conduct background check, a railroad operation knowledge test, and a skills performance test before receiving an engineer’s license.

Engineers must periodically pass an operational rules efficiency test to maintain their licensure. The test is an unannounced event requiring engineers to take active or responsive action in certain situations, such as maintaining a particular speed through a curve or yard or complying with a signal.

For yard occupations, a commercial driver’s license may be required because these workers often operate trucks and other heavy vehicles.

Other qualifications. Rail transportation workers must have good hearing, eyesight, and color vision, as well as good hand-eye coordination, manual dexterity, and mechanical aptitude. Physical stamina is required for most rail transportation jobs. Applicants for locomotive engineer jobs and some conductor jobs must be at least 21 years old.

All applicants must be in good health, have good communication skills, and be able to make quick, responsible judgments. Employers require railroad transportation job applicants to pass a physical examination, drug and alcohol screening, and a criminal background check. Under Federal regulation, all persons licensed to operate engines are subject to random drug and alcohol testing while on duty, and engineers also undergo periodic physical examinations. In some cases, engineers who fail to meet these physical and conduct standards are restricted to yard service, trained to perform other work, or discharged.

Advancement. Most railroad transportation workers begin as a laborer, brake operator, or conductor after completing training on signals, timetables, operating rules, and related subjects. Although new employees may be hired as conductors, seniority determines whether an employee may hold a conductor position full-time. Employers almost always fill engineer positions with workers who have experience in other railroad-operating occupations. Subway and streetcar operators with sufficient se-

niority can advance to station manager or another supervisory position.

Employment

Rail transportation workers held 125,000 jobs in 2006, distributed among the detailed occupations as follows:

Locomotive engineers and operators	47,000
Railroad conductors and yardmasters	40,000
Railroad brake, signal, and switch operators	25,000
Subway and streetcar operators	6,900
Rail transportation workers, all other.....	6,800

Most rail transportation workers were employed in the rail transportation industry or support activities for the industry. Rail transportation and rail transportation support activities made up 109,000 jobs in 2006. The rest worked primarily for local governments as subway and streetcar operators, who held 11,000 jobs, while 1,700 workers were employed in mining and manufacturing establishments that operate their own locomotives to move railcars containing ore, coal, and other bulk materials.

Job Outlook

Although employment in most railroad transportation occupations is expected to change little through the year 2016, opportunities are expected to be good for qualified applicants, in large part due to the number of workers expected to retire or leave these occupations in the next decade.

Employment change. Employment is expected to increase by 1 percent, which is considered little or no change. This will occur despite expected increases in the amount of freight volume, which will be due to railroads’ advantages over other modes of shipping.

Demand for railroad freight service will grow as the economy and the intermodal transportation of goods continue to expand. Intermodal transportation involves loading cargo in large containers that can be moved by ship, rail, or truck. Improved delivery times and on time service along with reduced shipping rates will help railroads compete with other modes of transportation, such as trucks, ships, and aircraft. Railroads will also benefit from congested highways and relative savings on rising fuel costs. However, technology will allow railroads to improve productivity and consolidate duties, which will offset the need for new employees in occupations not essential for railroad operations. For example, the need for rail yard engineers who

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Rail transportation occupations.....	53-4000	125,000	127,000	1,800	1
Locomotive engineers and operators	53-4010	47,000	48,000	1,300	3
Railroad brake, signal, and switch operators	53-4021	25,000	22,000	-2,800	-11
Railroad conductors and yardmasters	53-4031	40,000	44,000	3,600	9
Subway and streetcar operators	53-4041	6,900	7,800	800	12
Rail transportation workers, all other.....	53-4099	6,800	5,500	-1,300	-19

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

operate trains inside rail yards will see a rapid decline as a result of remote control locomotive technology, while employment of locomotive engineers will grow as fast as the average because of the continued need for train operators on open rail. For similar reasons, railroad brake, signal, and switch operators and other rail transportation occupations will see a decline in employment, whereas railroad conductors will continue to be necessary for train operation for the foreseeable future and are expected to grow about as fast as average through 2016.

Passenger rail service is anticipated to increase volume on pace with the growing population, as are public transit authorities. Employment of subway and streetcar operators will see average growth due to increased demand for light-rail transportation systems around the country.

Job prospects. Opportunities for rail transportation workers will be favorable as a large number of older workers are expected to retire over the next decade. Other workers will leave the occupation for various personal and professional reasons, creating further opportunities. Prospects will be best for those positions that are also expected to see growth, for example locomotive engineers and conductors. There will also be job opportunities for those positions that are expected to decline, for example brake, signal, and switch operators. These openings will be the result of retirements and other separations. Entry-level occupations such as brake operator and conductor should be plentiful for applicants with clean drug and criminal records. Opportunities for long-distance train crews are also expected to be good as many of those working in the yards prefer not to travel long distances.

Earnings

Median hourly earnings of rail transportation occupations in May 2006 are indicated in the tabulation below. These earnings were relatively high, compared to \$12.17 per hour for all transportation occupations.

Locomotive engineers	\$27.88
Railroad conductors and yardmasters	26.70
Subway and streetcar operators	23.55
Railroad brake, signal, and switch operators	23.49

Most railroad transportation workers are paid according to miles traveled or hours worked, whichever leads to higher earnings. Factors such as seniority, job assignments, and location impact potential earnings.

Seventy-four percent of railroad transportation workers are members of unions compared to 12 percent for all occupations. Many different railroad unions represent various crafts on the railroads. Among the largest of the railroad employee unions are the United Transportation Union and the Brotherhood of Locomotive Engineers and Trainmen. Many subway operators are members of the Amalgamated Transit Union, while others belong to the Transport Workers Union of North America.

Related Occupations

Other related transportation workers include bus drivers, truck drivers and driver/sales workers, and those working in water transportation occupations. Employees who repair and maintain railroad rolling stock are included in heavy vehicle and

mobile equipment service technicians and mechanics. Rail transportation workers sometimes work closely with workers in material moving occupations to load and unload freight.

Sources of Additional Information

To obtain information on employment opportunities, contact either the employment offices of railroads and rail transit systems or State employment service offices.

General information about the rail transportation industry is available from:

➤ Association of American Railroads, 50 F St.N.W., Washington, DC 20001.

Internet: <http://www.aar.org>

General information about career opportunities in passenger transportation is available from:

➤ American Public Transportation Association, 1666 K Street N.W., Washington, DC 20006.

Internet: <http://www.apta.com>

➤ National Railroad Passenger Corporation, 60 Massachusetts Ave. N.E., 4th floor, Washington, DC 20002.

Internet: <http://www.amtrak.com>

General information on career opportunities as a locomotive engineer is available from:

➤ Brotherhood of Locomotive Engineers and Trainmen, 1370 Ontario St.MezzaniNE., Cleveland, OH 44113.

Internet: <http://www.ble.org>

General information on career opportunities as a conductor, yardmaster, or brake operator is available from:

➤ United Transportation Union, 14600 Detroit Ave., Cleveland, OH 44107.

Internet: <http://www.utu.org>

Taxi Drivers and Chauffeurs

(O*NET 53-3041.00)

Significant Points

- Taxi drivers and chauffeurs may work any schedule, including full-time, part-time, night, evening, weekend, and on a seasonal basis.
- Many taxi drivers like the independent, unsupervised work of driving their automobile.
- Local governments set license standards for driving experience and training; many taxi and limousine companies set higher standards.
- Job opportunities should be plentiful; applicants with good driving records, good customer service instincts, and the ability to work flexible schedules should have the best prospects.

Nature of the Work

Anyone who has been in a large city knows the importance of taxi and limousine services. *Taxi drivers* and *chauffeurs* take passengers to and from their homes, workplaces, and recreational pursuits, such as dining, entertainment, and shopping,

and to and from business-related events. These professional drivers also help out-of-town business people and tourists get around in unfamiliar surroundings. Some drivers offer sight-seeing services around their city.

Drivers must be alert to conditions on the road, especially in heavy and congested traffic or in bad weather. They must take precautions to prevent accidents and avoid sudden stops, turns, and other driving maneuvers that would jar passengers.

Taxi drivers. At the beginning of their driving shift, taxi drivers usually report to a taxicab service or garage where they are assigned a vehicle, most frequently a large, conventional automobile modified for commercial passenger transport. They record their name, the date, and the cab's identification number on a trip sheet. Drivers check the cab's fuel and oil levels and make sure that the lights, brakes, and windshield wipers are in good working order. Drivers adjust rear and side mirrors and their seat for comfort. Any equipment or part not in good working order is reported to the dispatcher or company mechanic.

Taxi drivers pick up passengers by "cruising" for fares, prearranging pickups, and picking up passengers from taxistands in high-traffic areas. In urban areas, many passengers flag down drivers cruising the streets. Customers also may prearrange a pickup by calling a cab company and giving a location, approximate pickup time, and destination. The cab company dispatcher then relays the information to a driver by two-way radio, cellular telephone, or onboard computer. Outside of urban areas, the majority of trips are dispatched in this manner. Drivers also pick up passengers waiting at cabstands or in taxi lines at airports, train stations, hotels, restaurants, and other places where people frequently seek taxis.

Some taxi commissions force cabs to specialize in either cruising or prearranged pickups. In other cases, not all drivers are allowed to pick up riders in certain parts of a city (a business district) or at certain landmarks (a convention center or airport). These restrictions aim to make taxis available to people in areas that drivers find less profitable.

Good drivers are familiar with streets in the areas they serve so they can choose the most efficient route to destinations. They know the locations of frequently requested destinations, such as airports, bus and railroad terminals, convention centers, hotels, and other points of interest. In case of emergency, drivers should know the location of fire and police stations as well as hospitals.

Upon reaching the destination, drivers determine the fare and announce it to their riders. Each jurisdiction determines the rate and structure of the fare system covering licensed taxis. In many cabs, a taximeter measures the fare based on the distance covered and the amount of time the trip took. Drivers turn on the meter when passengers enter the cab and turn it off when they reach the final destination. The fare also may include surcharges to help cover fuel costs as well as fees for additional passengers, tolls, handling luggage, and a drop charge—an additional flat fee added for use of the cab. In some cases, fares are determined by a system of zones through which the taxi passes during a trip.

Passengers usually add a tip or gratuity to the fare. The amount of the gratuity depends, in part, on the passengers' sat-

isfaction with the quality and efficiency of the ride and the courtesy of the driver.

Drivers issue receipts upon request by the passenger. They enter onto the trip sheet all information regarding the trip, including the place and time of pickup and drop off and the total fee; these logs help taxi company management check drivers' activity and efficiency. Drivers also must fill out accident reports when necessary.

Some drivers transport individuals with special needs, such as those with disabilities and the elderly. These drivers, known as *paratransit drivers*, operate specially equipped vehicles designed to accommodate a variety of needs in non-emergency situations. Although special certification is not necessary, some additional training on the equipment and passenger needs may be required.

Chauffeurs. Chauffeurs operate limousines, vans, and private cars for limousine companies, private businesses, government agencies, and wealthy individuals. Chauffeur service differs from taxi service in that all trips are prearranged. Many chauffeurs transport customers in large vans between hotels and airports, bus terminals, or train stations. Others drive luxury automobiles, such as limousines, to business events, entertainment venues, and social events. Still others provide full-time personal transportation for wealthy families and private companies.

At the beginning of the workday, chauffeurs prepare their automobiles or vans for use. They inspect the vehicle for cleanliness and, when needed, clean the interior and wash the exterior body, windows, and mirrors. They check fuel and oil levels and make sure the lights, tires, brakes, and windshield wipers work. Chauffeurs may perform routine maintenance and make minor repairs, such as changing tires or adding oil and other fluids. If a vehicle requires a more complicated repair, they take it to a professional mechanic.

Chauffeurs cater to passengers by providing attentive customer service and paying attention to detail. They help riders into the car by holding open doors, holding umbrellas when it is raining, and loading packages and luggage into the trunk of the car. Chauffeurs may perform errands for their employers such as delivering packages or picking up clients arriving at airports. To ensure a pleasurable ride in their limousines, many chauffeurs offer conveniences and luxuries such as newspapers,



Taxi drivers may work shifts at all times of the day and night.

magazines, music, drinks, televisions, and telephones. Increasingly, chauffeurs work as full-service executive assistants, simultaneously acting as driver, secretary, and itinerary planner.

Work environment. Taxi drivers and chauffeurs occasionally have to load and unload heavy luggage and packages. Driving for long periods can be tiring and uncomfortable, especially in densely populated urban areas. Taxi drivers risk robbery because they work alone and often carry large amounts of cash.

Design improvements in newer cars have reduced the stress and increased the comfort and efficiency of drivers. Many regulatory bodies overseeing taxi and chauffeur services require standard amenities such as air-conditioning and general upkeep of the vehicles. Some modern taxicabs also are equipped with sophisticated tracking devices, fare meters, and dispatching equipment. Satellites and tracking systems link many of these state-of-the-art vehicles with company headquarters. In a matter of seconds, dispatchers can deliver directions, traffic advisories, weather reports, and other important communications to drivers anywhere in the area. The satellite link also allows dispatchers to track vehicle location, fuel consumption, and engine performance. Automated dispatch systems help dispatchers locate the closest driver to a customer in order to minimize individual wait time and increase the quality of service. Drivers easily can communicate with dispatchers to discuss delivery schedules and courses of action if there are mechanical problems. When threatened with crime or violence, drivers may have special “trouble lights” to alert authorities of emergencies.

Work hours of taxi drivers and chauffeurs vary greatly. Some jobs offer full-time or part-time employment with work hours that can change from day to day or remain the same. It is often necessary for drivers to report to work on short notice. Chauffeurs who work for a single employer may be on call much of the time. Evening and weekend work is common for drivers and chauffeurs employed by limousine and taxicab services.

Whereas the needs of the client or employer dictate the work schedule for chauffeurs, the work of taxi drivers is much less structured. Working free of supervision, they may break for a meal or a rest whenever their vehicle is unoccupied. Many taxi drivers like the independent, unsupervised work of driving.

This occupation is attractive to individuals, such as college and postgraduate students, seeking flexible work schedules and to anyone seeking a second source of income. Other service workers, such as ambulance drivers and police officers, sometimes moonlight as taxi drivers or chauffeurs.

Full-time taxi drivers usually work one shift a day, which may last 8 to 12 hours. Part-time drivers may work half a shift each day, or work a full shift once or twice a week. Drivers may work shifts at all times of the day and night because most taxi companies offer services 24 hours a day. Early morning and late night shifts are not uncommon. Drivers work long hours during holidays, weekends, and other special times when demand for their services is heavier. Independent drivers set their own hours and schedules.

Training, Other Qualifications, and Advancement

Local governments set licensing standards and requirements for taxi drivers and chauffeurs, which may include minimum amounts of driving experience and training. Many taxi and lim-

ousine companies set higher standards than those required by law. It is common for companies to review an applicant’s medical, credit, criminal, and driving record. In addition, many companies require an applicant to be at least 21 years old, which is higher than the age typically required by law. Most companies also prefer that an applicant be a high school graduate.

Education and training. Little formal education is needed for taxi drivers or chauffeurs, but most have at least a high school diploma, GED, or its equivalent. Drivers need to be able to communicate effectively, use basic math, and often need knowledge of basic mechanics. Beyond having these skills, most drivers take a course offered by the government or their employer.

Some taxi and limousine companies give new drivers on-the-job training. This training typically is informal and often lasts only about a week. Companies show drivers how to operate the taximeter and communications equipment and how to complete paperwork. Other topics covered may include driver safety and the best routes to popular sightseeing and entertainment destinations. Many companies have contracts with social service agencies and transportation services to transport elderly and disabled citizens in non-emergency situations. To support these services, new drivers may get special training in how to handle wheelchair lifts and other mechanical devices.

Licensure. People interested in driving a taxicab or a limousine first must have a regular automobile driver’s license. Usually, applicants then must get a taxi driver or chauffeur’s license, commonly called a “hack” license. Some States require only a passenger endorsement, which allows the driver to carry passengers in the vehicle, on a regular driver’s license; some require only that drivers be certified by their employer; but the Federal Government requires a commercial driver’s license with a passenger endorsement for drivers transporting 16 or more passengers.

While States set licensing requirements, local regulatory bodies usually set other terms and conditions. These often include requirements for training, which can vary greatly. Some localities require new drivers to enroll in up to 80 hours of classroom instruction, to take an exam, or both before they are allowed to work. Applicants must know local geography, motor vehicle laws, safe driving practices, and relevant regulations. Often, they must also display some aptitude for customer service. Some localities require an English proficiency test, usually in the form of listening comprehension; applicants who do not pass the English exam must take an English course in addition to any formal driving programs.

Some classroom instruction includes route management, map reading, and service for passengers with disabilities. Many taxicab or limousine companies sponsor applicants, giving them a temporary permit that allows them to drive before they have finished the training program and passed the test. Some jurisdictions, such as New York City, have discontinued this practice and now require driver applicants to complete the licensing process before operating a taxi or limousine.

Other qualifications. Taxi drivers and chauffeurs work almost exclusively with the public, and should be able to get along with many different types of people. They must be patient when waiting for passengers and when dealing with rude

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Taxi drivers and chauffeurs	53-3041	229,000	258,000	30,000	13

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

customers. It also is helpful for drivers to be tolerant and level-headed when driving in heavy and congested traffic. Drivers should be dependable since passengers expect to be picked up at a prearranged time and taken to the correct destination. To be successful, drivers must be responsible and self-motivated because they work with little supervision. Increasingly, companies encourage drivers to develop their own loyal customer base, so as to improve their business.

Many municipalities and taxicab and chauffeur companies require drivers to have a neat appearance. Many chauffeurs wear formal attire, such as a tuxedo, a coat and tie, a dress, or a uniform and cap.

Advancement. Taxi drivers and chauffeurs have limited advancement opportunities. Experienced drivers may obtain preferred routes or shifts. Some advance to become lead drivers, who help to train new drivers. Others take dispatching and managerial positions. Many managers start their careers as drivers. Some people start their own limousine companies.

In small and medium-size communities, drivers sometimes are able to buy their own taxi, limousine, or other type of automobile and go into business for themselves. These independent owner-drivers require an additional permit allowing them to operate their vehicle as a company. Some big cities limit the number of operating permits. In these cities, drivers become owner-drivers by buying permits from owner-drivers who leave the business, or by purchasing or leasing them from the city. Although many owner-drivers are successful, some fail to cover expenses and eventually lose their permits and automobiles. Individuals starting their own taxi company face many obstacles because of the difficulty in running a small fleet. The lack of dispatch and maintenance facilities often is hard for an owner to overcome. Chauffeurs often have a good deal of success and many companies begin as an individually owned and operated business.

For both taxi and limousine service owners, good business sense and courses in accounting, business, and business arithmetic can help an owner-driver to be successful. Knowledge of mechanics enables owner-drivers to perform their own routine maintenance and minor repairs to cut expenses.

Employment

Taxi drivers and chauffeurs held about 229,000 jobs in 2006. About 30 percent of taxi drivers and chauffeurs were self-employed.

Job Outlook

Employment is expected to grow about as fast as average. Job opportunities should be plentiful because of the need to replace the many people who work in this occupation for short periods and then leave. Applicants with good driving records,

good customer service instincts, and the ability to work flexible schedules should have the best prospects.

Employment change. Employment of taxi drivers and chauffeurs is expected to grow 13 percent during the 2006-16 projection period—about as fast as the average for all occupations—as local and suburban travel increases. Job growth also will stem from Federal legislation requiring increased services for people with disabilities. Demand for paratransit drivers will grow in response to the increase in the number of elderly people, who often have difficulty driving and using public transportation.

Job prospects. People seeking jobs as taxi drivers and chauffeurs are expected to have plentiful opportunities because of the need to replace the many people who work in this occupation for short periods and then transfer to other occupations or leave the labor force. Earnings, work hours, and working conditions vary greatly, depending on economic and regulatory conditions. Applicants with good driving records, good customer service instincts, and the ability to work flexible schedules should have the best prospects.

The number of job opportunities can fluctuate with the overall movements of the economy because the demand for taxi and limousine transportation depends on travel and tourism. During economic slowdowns, drivers seldom are laid off, but they may have to increase their work hours, and earnings may decline. When the economy is strong, job prospects are numerous as many drivers transfer to other occupations. Extra drivers may be hired during holiday seasons as well as during peak travel and tourist times.

Rapidly growing metropolitan areas and cities experiencing economic growth should offer the best job opportunities.

Earnings

Earnings of taxi drivers and chauffeurs vary greatly, depending on factors such as the number of hours worked, regulatory conditions, customers' tips, and geographic location. Hybrid vehicles, which have improved gas mileage, offer taxi drivers better earnings because drivers pay for their gas out of pocket. Median hourly earnings of salaried taxi drivers and chauffeurs, including tips, were \$9.78 in May 2006. The middle 50 percent earned between \$8.00 and \$12.19 an hour. The lowest 10 percent earned less than \$6.85, and the highest 10 percent earned more than \$15.80 an hour. Median hourly earnings in the industries employing the largest numbers of taxi drivers and chauffeurs were:

Taxi and limousine service.....	\$10.62
Other transit and ground passenger transportation	9.32
Traveler accommodation.....	9.09
Individual and family services	8.94
Automobile dealers	8.86

Many taxi drivers and chauffeurs are *lease drivers*. These drivers pay a daily, weekly, or monthly fee to the company allowing them to lease their vehicles. In the case of limousines, leasing also permits the driver access to the company's dispatch system. The fee also may include charges for vehicle maintenance, insurance, and a deposit on the vehicle. Lease drivers may take their cars home with them when they are not on duty.

Most taxi drivers and chauffeurs do not receive benefits. This is unlikely to change because companies have little incentive to offer them. However, a few cities have made an attempt to provide health insurance for drivers.

Related Occupations

Other workers who have similar jobs include bus drivers and truck drivers and driver/sales workers.

Sources of Additional Information

Information on necessary permits and the registration of taxi drivers and chauffeurs is available from local government agencies that regulate taxicabs. Questions regarding licensing should be directed to your State motor vehicle administration. For information about work opportunities as a taxi driver or chauffeur, contact local taxi or limousine companies or State employment service offices in your area.

For general information about the work of taxi drivers, chauffeurs, and paratransit drivers, contact:

➤ Taxicab, Limousine and Paratransit Association, 3849 Farragut Ave., Kensington, MD 20895.

For general information about the work of limousine drivers, contact:

➤ National Limousine Association, 49 South Maple Ave., Marlton, NJ 08053. Internet: <http://www.limo.org>

Truck Drivers and Driver/ Sales Workers

(O*NET 53-3031.00, 53-3032.00, 53-3033.00)

Significant Points

- Overall job opportunities should be favorable.
- Competition is expected for jobs offering the highest earnings or most favorable work schedules.
- A commercial driver's license is required to operate large trucks.

Nature of the Work

Truck drivers are a constant presence on the Nation's highways and interstates. They deliver everything from automobiles to canned food. Firms of all kinds rely on trucks to pick up and deliver goods because no other form of transportation can deliver goods door-to-door. Even though many goods travel at least part of their journey by ship, train, or airplane, almost everything is carried by trucks at some point.

Before leaving the terminal or warehouse, truck drivers check the fuel level and oil in their trucks. They also inspect the trucks

to make sure that the brakes, windshield wipers, and lights are working and that a fire extinguisher, flares, and other safety equipment are aboard and in working order. Drivers make sure their cargo is secure and adjust the mirrors so that both sides of the truck are visible from the driver's seat. Drivers report equipment that is inoperable, missing, or loaded improperly to the dispatcher.

Drivers keep a log of their activities, as required by the U.S. Department of Transportation, to the condition of the truck, and the circumstances of any accidents.

Heavy truck and tractor-trailer drivers operate trucks or vans with a capacity of at least 26,000 pounds Gross Vehicle Weight (GVW). They transport goods including cars, livestock, and other materials in liquid, loose, or packaged form. Many routes are from city to city and cover long distances. Some companies use two drivers on very long runs—one drives while the other sleeps in a berth behind the cab. These "sleeper" runs can last for days, or even weeks. Trucks on sleeper runs typically stop only for fuel, food, loading, and unloading.

Some heavy truck and tractor-trailer drivers who have regular runs transport freight to the same city on a regular basis. Other drivers perform ad hoc runs because shippers request varying service to different cities every day.

Long-distance heavy truck and tractor-trailer drivers spend most of their working time behind the wheel but also may have to load or unload their cargo. This is especially common when drivers haul specialty cargo because they may be the only ones at the destination familiar with procedures or certified to handle the materials. Auto-transport drivers, for example, position cars on the trailers at the manufacturing plant and remove them at the dealerships. When picking up or delivering furniture, drivers of long-distance moving vans hire local workers to help them load or unload.

Light or delivery services truck drivers operate vans and trucks weighing less than 26,000 pounds GVW. They pick up or deliver merchandise and packages within a specific area. This may include short "turnarounds" to deliver a shipment to a nearby city, pick up another loaded truck or van, and drive it back to their home base the same day. These services may require use of electronic delivery tracking systems to track the whereabouts of the merchandise or packages. Light or delivery services truck drivers usually load or unload the merchandise at the customer's place of business. They may have helpers if there are many deliveries to make during the day or if the load requires heavy moving. Typically, before the driver arrives for work, material handlers load the trucks and arrange items for ease of delivery. Customers must sign receipts for goods and pay drivers the balance due on the merchandise if there is a cash-on-delivery arrangement. At the end of the day, drivers turn in receipts, payments, records of deliveries made, and any reports on mechanical problems with their trucks.

A driver's responsibilities and assignments change according to the type of loads transported and their vehicle's size. The duration of runs depends on the types of cargo and the destinations. Local drivers may provide daily service for a specific route or region, while other drivers make longer, intercity and interstate deliveries. Interstate and intercity cargo tends to vary from job to job more than local cargo does.

Some local truck drivers have sales and customer service responsibilities. The primary responsibility of *driver/sales workers*, or *route drivers*, is to deliver and sell their firms' products over established routes or within an established territory. They sell goods such as food products, including restaurant takeout items, or pick up and deliver items such as laundry. Their response to customer complaints and requests can make the difference between a large order and a lost customer. Route drivers may also take orders and collect payments.

The duties of driver/sales workers vary according to their industry, the policies of their employer, and the emphasis placed on their sales responsibility. Most have wholesale routes that deliver to businesses and stores, rather than to homes. For example, wholesale bakery driver/sales workers deliver and arrange bread, cakes, rolls, and other baked goods on display racks in grocery stores. They estimate how many of each item to stock by paying close attention to what is selling. They may recommend changes in a store's order or encourage the manager to stock new bakery products. Laundries that rent linens, towels, work clothes, and other items employ driver/sales workers to visit businesses regularly to replace soiled laundry. Their duties also may include soliciting new customers along their sales route.

After completing their route, driver/sales workers place orders for their next deliveries based on product sales and customer requests.

Satellites and the Global Positioning System link many trucks with their company's headquarters. Troubleshooting information, directions, weather reports, and other important communications can be instantly relayed to the truck. Drivers can easily communicate with the dispatcher to discuss delivery schedules and what to do in the event of mechanical problems. The satellite link also allows the dispatcher to track the truck's location, fuel consumption, and engine performance. Some drivers also work with computerized inventory tracking equipment. It is im-



Overall job opportunities for truck drivers should be favorable.

portant for the producer, warehouse, and customer to know their products' location at all times so they can maintain a high quality of service.

Work environment. Truck driving has become less physically demanding because most trucks now have more comfortable seats, better ventilation, and improved, ergonomically designed cabs. Although these changes make the work environment less taxing, driving for many hours at a stretch, loading and unloading cargo, and making many deliveries can be tiring. Local truck drivers, unlike long-distance drivers, usually return home in the evening. Some self-employed long-distance truck drivers who own and operate their trucks spend most of the year away from home.

The U.S. Department of Transportation governs work hours and other working conditions of truck drivers engaged in interstate commerce. A long-distance driver may drive for 11 hours and work for up to 14 hours—including driving and non-driving duties—after having 10 hours off-duty. A driver may not drive after having worked for 60 hours in the past 7 days or 70 hours in the past 8 days unless they have taken at least 34 consecutive hours off. Most drivers are required to document their time in a logbook. Many drivers, particularly on long runs, work close to the maximum time permitted because they typically are compensated according to the number of miles or hours they drive. Drivers on long runs face boredom, loneliness, and fatigue. Drivers often travel nights, holidays, and weekends to avoid traffic delays.

Local truck drivers frequently work 50 or more hours a week. Drivers who handle food for chain grocery stores, produce markets, or bakeries typically work long hours—starting late at night or early in the morning. Although most drivers have regular routes, some have different routes each day. Many local truck drivers, particularly driver/sales workers, load and unload their own trucks. This requires considerable lifting, carrying, and walking each day.

Training, Other Qualifications, and Advancement

A commercial driver's license (CDL) is required to drive large trucks and a regular driver's license is required to drive all other trucks. Training for the CDL is offered by many private and public vocational-technical schools. Many jobs driving smaller trucks require only brief on-the-job training.

Education and training. Taking driver-training courses is a good way to prepare for truck driving jobs and to obtain a commercial drivers license (CDL). High school courses in driver training and automotive mechanics also may be helpful. Many private and public vocational-technical schools offer tractor-trailer driver training programs. Students learn to maneuver large vehicles on crowded streets and in highway traffic. They also learn to inspect trucks and freight for compliance with regulations. Some States require prospective drivers to complete a training course in basic truck driving before getting their CDL.

Completion of a program does not guarantee a job. Some programs provide only a limited amount of actual driving experience. People interested in attending a driving school should check with local trucking companies to make sure the school's training is acceptable. The Professional Truck Driver Institute (PTDI), a nonprofit organization established by the trucking in-

dustry, manufacturers, and others, certifies driver-training courses at truck driver training schools that meet industry standards and Federal Highway Administration guidelines for training tractor-trailer drivers.

Training given to new drivers by employers is usually informal and may consist of only a few hours of instruction from an experienced driver, sometimes on the new employee's own time. New drivers may also ride with and observe experienced drivers before getting their own assignments. Drivers receive additional training to drive special types of trucks or handle hazardous materials. Some companies give 1 to 2 days of classroom instruction covering general duties, the operation and loading of a truck, company policies, and the preparation of delivery forms and company records. Driver/sales workers also receive training on the various types of products their company carries so that they can effectively answer questions about the products and more easily market them to their customers.

New drivers sometimes start on panel trucks or other small straight trucks. As they gain experience and show competent driving skills, new drivers may advance to larger, heavier trucks and finally to tractor-trailers.

Licensure. State and Federal regulations govern the qualifications and standards for truck drivers. All drivers must comply with Federal regulations and any State regulations that are in excess of those Federal requirements. Truck drivers must have a driver's license issued by the State in which they live, and most employers require a clean driving record. Drivers of trucks designed to carry 26,000 pounds or more—including most tractor-trailers, as well as bigger straight trucks—must obtain a commercial driver's license. All truck drivers who operate trucks transporting hazardous materials must obtain a CDL, regardless of truck size. In order to receive the hazardous materials endorsement, a driver must be fingerprinted and submit to a criminal background check by the Transportation Security Administration. In many States, a regular driver's license is sufficient for driving light trucks and vans.

To qualify for a CDL, an applicant must have a clean driving record, pass a written test on rules and regulations, and demonstrate that they can operate a commercial truck safely. A national database permanently records all driving violations committed by those with a CDL. A State will check these records and deny a CDL to those who already have a license suspended or revoked in another State. Licensed drivers must accompany trainees until they get their own CDL. A person may not hold more than one license at a time and must surrender any other licenses when a CDL is issued. Information on how to apply for a CDL may be obtained from State motor vehicle administrations.

Many States allow those who are as young as 18 years old to drive trucks within their borders. To drive a commercial vehicle between States one must be at least 21 years of age, according to the Federal Motor Carrier Safety Regulations published by the U.S. Department of Transportation (U. S. DOT). Regulations also require drivers to pass a physical examination once every 2 years. Physical qualifications include good hearing, at least 20/40 vision with glasses or corrective lenses, and a 70-degree field of vision in each eye. Drivers may not be colorblind. Drivers must also be able to hear a forced whisper in one ear at not less than 5 feet, with a hearing aid if needed. Drivers must have

normal use of arms and legs and normal blood pressure. People with epilepsy or diabetes controlled by insulin are not permitted to be interstate truck drivers.

Federal regulations also require employers to test their drivers for alcohol and drug use as a condition of employment and require periodic random tests of the drivers while they are on duty. Drivers may not use any controlled substances, unless prescribed by a licensed physician. A driver must not have been convicted of a felony involving the use of a motor vehicle or a crime involving drugs, driving under the influence of drugs or alcohol, refusing to submit to an alcohol test required by a State or its implied consent laws or regulations, leaving the scene of a crime, or causing a fatality through negligent operation of a motor vehicle. All drivers must be able to read and speak English well enough to read road signs, prepare reports, and communicate with law enforcement officers and the public.

Other qualifications. Many trucking companies have higher standards than those described here. Many firms require that drivers be at least 22 years old, be able to lift heavy objects, and have driven trucks for 3 to 5 years. Many prefer to hire high school graduates and require annual physical examinations. Companies have an economic incentive to hire less risky drivers, as good drivers use less fuel and cost less to insure.

Drivers must get along well with people because they often deal directly with customers. Employers seek driver/sales workers who speak well and have self-confidence, initiative, tact, and a neat appearance. Employers also look for responsible, self-motivated individuals who are able to work well with little supervision.

Advancement. Although most new truck drivers are assigned to regular driving jobs immediately, some start as extra drivers—substituting for regular drivers who are ill or on vacation. Extra drivers receive a regular assignment when an opening occurs.

Truck drivers can advance to driving runs that provide higher earnings, preferred schedules, or better working conditions. Local truck drivers may advance to driving heavy or specialized trucks or transfer to long-distance truck driving. Working for companies that also employ long-distance drivers is the best way to advance to these positions. Few truck drivers become dispatchers or managers.

Many long-distance truck drivers purchase trucks and go into business for themselves. Although some of these owner-operators are successful, others fail to cover expenses and go out of business. Owner-operators should have good business sense as well as truck driving experience. Courses in accounting, business, and business mathematics are helpful. Knowledge of truck mechanics can enable owner-operators to perform their own routine maintenance and minor repairs.

Employment

Truck drivers and driver/sales workers held about 3.4 million jobs in 2006. Of these workers, 445,000 were driver/sales workers and 2.9 million were truck drivers. Most truck drivers find employment in large metropolitan areas or along major interstate roadways where trucking, retail, and wholesale companies tend to have their distribution outlets. Some drivers work in rural areas, providing specialized services such as delivering newspapers to customers.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Driver/sales workers and truck drivers.....	53-3030	3,356,000	3,614,000	258,000	8
Driver/sales workers.....	53-3031	445,000	421,000	-24,000	-5
Truck drivers, heavy and tractor-trailer.....	53-3032	1,860,000	2,053,000	193,000	10
Truck drivers, light or delivery services.....	53-3033	1,051,000	1,140,000	89,000	8

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

The truck transportation industry employed 26 percent of all truck drivers and driver/sales workers in the United States. Another 25 percent worked for companies engaged in wholesale or retail trade. The remaining truck drivers and driver/sales workers were distributed across many industries, including construction and manufacturing.

Around 9 percent of all truck drivers and driver/sales workers were self-employed. Of these, a significant number were owner-operators who either served a variety of businesses independently or leased their services and trucks to a trucking company.

Job Outlook

Overall job opportunities should be favorable for truck drivers, although opportunities may vary greatly in terms of earnings, weekly work hours, number of nights spent on the road, and quality of equipment. Competition is expected for jobs offering the highest earnings or most favorable work schedules. Average growth is expected.

Employment change. Overall employment of truck drivers and driver/sales workers is expected to increase by 8 percent over the 2006-16 decade, which is about as fast as the average for all occupations, due to growth in the economy and in the amount of freight carried by truck. Because it is such a large occupation, truck drivers will have a very large number of new jobs arise, over 258,000 over the 2006-16 period. Competing forms of freight transportation—rail, air, and ship transportation—require trucks to move the goods between ports, depots, airports, warehouses, retailers, and final consumers who are not connected to these other modes of transportation. Demand for long-distance drivers will remain strong because they can transport perishable and time-sensitive goods more effectively than alternate modes of transportation.

Job prospects. Job opportunities should be favorable for truck drivers. In addition to growth in demand for truck drivers, numerous job openings will occur as experienced drivers leave this large occupation to transfer to other fields of work, retire, or leave the labor force for other reasons. Jobs vary greatly in terms of earnings, weekly work hours, the number of nights spent on the road, and quality of equipment. There may be competition for the jobs with the highest earnings and most favorable work schedules. There will be more competition for jobs with local carriers than for those with long-distance carriers because of the more desirable working conditions of local carriers.

Job opportunities may vary from year to year since the output of the economy dictates the amount of freight to be moved. Companies tend to hire more drivers when the economy is strong and their services are in high demand. When the economy slows, employers hire fewer drivers or may lay off some drivers. In-

dependent owner-operators are particularly vulnerable to slow-downs. Industries least likely to be affected by economic fluctuation, such as grocery stores, tend to be the most stable employers of truck drivers and driver/sales workers.

Earnings

Median hourly earnings of heavy truck and tractor-trailer drivers were \$16.85 in May 2006. The middle 50 percent earned between \$13.33 and \$21.04 an hour. The lowest 10 percent earned less than \$10.80, and the highest 10 percent earned more than \$25.39 an hour. Median hourly earnings in the industries employing the largest numbers of heavy truck and tractor-trailer drivers in May 2006 were:

General freight trucking.....	\$18.38
Grocery and related product wholesalers.....	18.01
Specialized freight trucking.....	16.40
Cement and concrete product manufacturing.....	15.26
Other specialty trade contractors.....	14.94

Median hourly earnings of light or delivery services truck drivers were \$12.17 in May 2006. The middle 50 percent earned between \$9.31 and \$16.16 an hour. The lowest 10 percent earned less than \$7.47, and the highest 10 percent earned more than \$21.23 an hour. Median hourly earnings in the industries employing the largest numbers of light or delivery services truck drivers in May 2006 were:

Couriers.....	\$17.80
General freight trucking.....	15.33
Grocery and related product wholesalers.....	12.84
Building material and supplies dealers.....	11.54
Automotive parts, accessories, and tire stores.....	8.38

Median hourly earnings of driver/sales workers, including commissions, were \$9.99 in May 2006. The middle 50 percent earned between \$7.12 and \$15.00 an hour. The lowest 10 percent earned less than \$6.19, and the highest 10 percent earned more than \$20.30 an hour. Median hourly earnings in the industries employing the largest numbers of driver/sales workers in May 2006 were:

Drycleaning and laundry services.....	\$14.81
Direct selling establishments.....	13.72
Grocery and related product wholesalers.....	12.37
Full-service restaurants.....	7.11
Limited-service eating places.....	7.02

Local truck drivers tend to be paid by the hour, with extra pay for working overtime. Employers pay long-distance drivers primarily by the mile. The per-mile rate can vary greatly from employer to employer and may even depend on the type of cargo being hauled. Some long-distance drivers are paid a percent of each load's revenue. Typically, earnings increase with mileage driven, seniority, and the size and type of truck driven. Most driver/sales workers receive commissions based on their sales in addition to their hourly wages.

Most self-employed truck drivers are primarily engaged in long-distance hauling. Many truck drivers are members of the International Brotherhood of Teamsters. Some truck drivers employed by companies outside the trucking industry are members of unions representing the plant workers of the companies for which they work.

Related Occupations

Other driving occupations include ambulance drivers and attendants, except emergency medical technicians; bus drivers; and taxi drivers and chauffeurs. Another occupation involving sales duties is sales representatives, wholesale and manufacturing.

Sources of Additional Information

Information on truck driver employment opportunities is available from local trucking companies and local offices of the State employment service.

Information on career opportunities in truck driving may be obtained from:

➤ American Trucking Associations, Inc., 950 North Glebe Road., Suite 210, Arlington, VA 22203.

Internet: <http://www.trucking.org>

A list of certified tractor-trailer driver training courses may be obtained from:

➤ Professional Truck Driver Institute, 2200 Mill Rd., Alexandria, VA 22314. Internet: <http://www.ptdi.org>

Information on union truck driving can be obtained from:

➤ The International Brotherhood of Teamsters, 25 Louisiana Ave. NW., Washington, DC 20001.

Information on becoming a truck driver may be obtained from: <http://www.gettrucking.com>

Water Transportation Occupations

(O*NET 53-5011.00, 53-5021.00, 53-5021.01, 53-5021.02, 53-5021.03, 53-5022.00, 53-5031.00)

Significant Points

- Merchant mariners spend extended periods at sea.
- Entry, training, and educational requirements for many water transportation occupations are established and regulated by the U.S. Coast Guard.
- Faster-than-average growth and good job opportunities are expected.

Nature of the Work

The movement of huge amounts of cargo, as well as passengers, between nations and within our Nation depends on workers in water transportation occupations, also known on commercial ships as merchant mariners. They operate and maintain deep-sea merchant ships, tugboats, towboats, ferries, dredges, offshore supply vessels, excursion vessels, and other waterborne craft on the oceans, the Great Lakes, rivers, canals, and other waterways, as well as in harbors. (Workers who operate watercraft used in commercial fishing are described in the section on fishers and fishing vessel operators elsewhere in the *Handbook*.)

Captains, mates, and pilots of water vessels command or supervise the operations of ships and water vessels, both within domestic waterways and on the deep sea. *Captains* or *masters* are in overall command of the operation of a vessel, and they supervise the work of all other officers and crew. Together with their department heads, captains ensure that proper pro-

cedures and safety practices are followed, check to make sure that machinery and equipment are in good working order, and oversee the loading and discharging of cargo or passengers. They also maintain logs and other records tracking the ships' movements, efforts at controlling pollution, and cargo and passengers carried.

Deck officers or *mates* direct the routine operation of the vessel for the captain during the shifts when they are on watch. On smaller vessels, there may be only one mate (called a *pilot* on some inland towing vessels), who alternates watches with the captain. The mate would assume command of the ship if the captain became incapacitated. When more than one mate is necessary aboard a ship, they typically are designated chief mate or first mate, second mate, third mate, etc. Mates also supervise and coordinate activities of the crew aboard the ship. Captains and mates determine the course and speed of the vessel, maneuvering to avoid hazards and continuously monitoring the vessel's position with charts and navigational aides. Captains and mates oversee crew members who steer the vessel, determine its location, operate engines, communicate with other vessels, perform maintenance, handle lines, and operate equipment on the vessel. They inspect the cargo holds during loading to ensure that the load is stowed according to specifications and regulations. Captains and mates also supervise crew members engaged in maintenance and the primary upkeep of the vessel.

Pilots guide ships in and out of harbors, through straits, and on rivers and other confined waterways where a familiarity with local water depths, winds, tides, currents, and hazards such as reefs and shoals are of prime importance. Pilots on river and canal vessels usually are regular crew members, like mates. Harbor pilots are generally independent contractors

who accompany vessels while they enter or leave port. Harbor pilots may pilot many ships in a single day.

Ship engineers operate, maintain, and repair propulsion engines, boilers, generators, pumps, and other machinery. Merchant marine vessels usually have four engineering officers: A chief engineer and a first, second, and third assistant engineer. Assistant engineers stand periodic watches, overseeing the safe operation of engines and machinery.

Marine oilers and more experienced *qualified members of the engine department*, or QMEDs, assist the engineers to maintain the vessel in proper running order in the engine spaces below decks. These workers lubricate gears, shafts, bearings, and other moving parts of engines and motors; read pressure and temperature gauges; record data; and sometimes assist with repairs and adjust machinery.

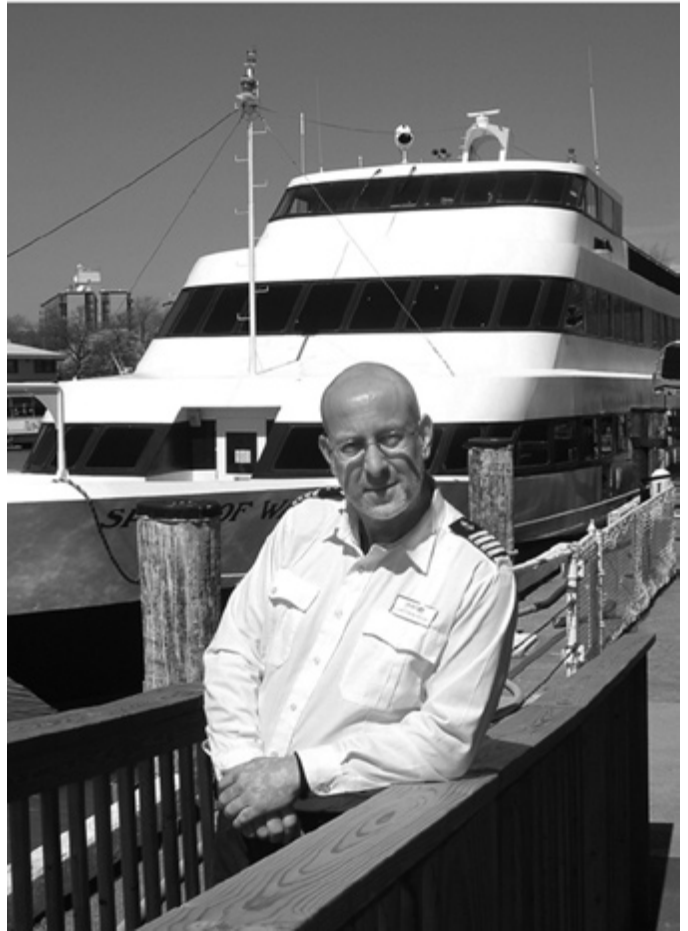
Sailors or *deckhands* operate the vessel and its deck equipment under the direction of the ship's officers and keep the nonengineering areas in good condition. They stand watch, looking out for other vessels and obstructions in the ship's path, as well as for navigational aids such as buoys and lighthouses. They also steer the ship, measure water depth in shallow water, and maintain and operate deck equipment such as lifeboats, anchors, and cargo-handling gear. On vessels handling liquid cargo, mariners designated as *pumpmen* hook up hoses, operate pumps, and clean tanks; on tugboats or tow vessels, they tie barges together into tow units, inspect them periodically, and disconnect them when the destination is reached. When docking or departing, they handle lines. They also perform routine maintenance chores, such as repairing lines, chipping rust, and painting and cleaning decks or other areas. Experienced sailors are designated *able seamen* on oceangoing vessels, but may be called simply deckhands on inland waters; larger vessels usually have a *boatswain*, or *head seaman*.

A typical deep-sea merchant ship has a captain, three deck officers or mates, a chief engineer and three assistant engineers, plus six or more seamen, such as able seamen, oilers, QMEDs, and a cook. The size and service of the ship determine the number of crewmembers for a particular voyage. Small vessels operating in harbors, on rivers, or along the coast may have a crew comprising only a captain and one deckhand. On smaller vessels the cooking responsibilities usually fall under the deckhands' duties.

On larger coastal ships, the crew may include a captain, a mate or pilot, an engineer, and seven or eight seamen. Some ships may have special unlicensed positions for entry level apprentice trainees. Unlicensed positions on a large ship may include a full-time cook, an electrician, and machinery mechanics.

Motorboat operators operate small, motor-driven boats that carry six or fewer passengers on fishing charters. They also take depth soundings in turning basins and serve as liaisons between ships, between ship and shore, between harbors and beaches, or on area patrol.

Work environment. Water transportation workers' schedules vary based upon the type of ship and length of voyage. While on the water, crews are normally on duty for half of the day, 7 days a week.



Captains direct all operations on their vessels.

Merchant mariners on survey and long distance cargo vessels can spend extended periods at sea. Most deep-sea mariners are hired for one or more voyages that last for several months; there is no job security after that. The length of time between voyages varies depending on job availability and personal preference.

Workers on supply vessels transport workers, supplies (water, drilling mud, fuel, and food), and equipment to oil and gas drilling platforms mostly in the Gulf of Mexico. Their voyages can last a few hours to a couple of weeks. As oil and gas exploration pushes into deeper waters, these trips take more time.

Workers on tugs and barges operate on the rivers, lakes, inland waterways, and along the coast. Most tugs have two crews and operate constantly. The crews will alternate, each working for 2-3 weeks and then taking 2-3 weeks off.

Many of those employed on Great Lakes ships work 60 days and have 30 days off, but do not work in the winter when the lakes are frozen. Others work steadily for a week or a month and then have an extended period off. Those on smaller vessels, such as tugs, supply boats and Great Lakes ships, are normally assigned to one vessel and have steady employment.

Workers on ferries transporting commuters work on weekdays in the morning and evening. Other ferries make frequent trips lasting a few hours. Ferries servicing vacation destinations often operate on seasonal schedules. Workers in harbors

generally have year-round work. Work in harbors and on ferries is sought after because workers return home every day.

People holding water transportation jobs work in all kinds of weather, except when frozen waters make travel impossible. Although merchant mariners try to avoid severe storms while at sea, working in damp and cold conditions often is inevitable. While it is uncommon for vessels to suffer disasters such as fire, explosion, or a sinking, workers face the possibility that they may have to abandon their craft on short notice if it collides with other vessels or runs aground. They also risk injury or death from falling overboard and hazards associated with working with machinery, heavy loads, and dangerous cargo. However, modern safety management procedures, advanced emergency communications, and effective international rescue systems have greatly improved mariner safety.

Many companies are working to improve the living conditions on vessels to reduce employee turnover. Most of the Nation's newest vessels are air conditioned, soundproofed to reduce machinery noise, and equipped with comfortable living quarters. Some companies have added improved entertainment systems and hired full-time cooks. These amenities lessen the difficulty of spending long periods away from home. Advances in communications, particularly e-mail, better link mariners to their families. Nevertheless, some mariners dislike the long periods away from home and the confinement aboard ship and consequently leave the occupation.

Training, Other Qualifications, and Advancement

Entry, training, and educational requirements for many water transportation occupations are established and regulated by the U.S. Coast Guard. Most officers and operators of commercially operated vessels must be licensed by the Coast Guard, which offers various kinds of licenses, depending on the position, body of water, and type of vessel. Individuals must be relicensed when they change the type of ship or the body of water they are on.

Education and training. Entry-level workers are classified as ordinary seamen or deckhands. Workers take some basic training, lasting a few days, in areas such as first aid and fire-fighting.

There are two paths of education and training for a deck officer or an engineer: applicants must either accumulate thousands of hours of experience while working as a deckhand, or graduate from the U.S. Merchant Marine Academy or another maritime academy. In both cases, applicants must pass a written examination. It is difficult to pass the examination without substantial formal schooling or independent study. The academies offer a 4-year academic program leading to a bachelor-of-science degree, a license (issued only by the Coast Guard) as a third mate (deck officer) or third assistant engineer (engineering officer), and, if the person chooses, a commission as ensign in the U.S. Naval Reserve, Merchant Marine Reserve, or Coast Guard Reserve. With experience and additional training, third officers may qualify for higher rank. Generally officers on deep water vessels are academy graduates and those in supply boats, inland waterways, and rivers rose to their positions through years of experience.

Harbor pilot training usually consists of an extended apprenticeship with a towing company or a harbor pilots' association. Entrants may be able seamen or licensed officers.

Licensure. Coast Guard licensing requirements vary by occupational specialty, type of vessel, and by body of water (river, inland waterway, Great Lakes, and oceans.) The requirements increase as the skill level of the occupational specialty increases and the size of the vessel increases.

Entry level seamen or deckhands on vessels operating in harbors or on rivers or other waterways do not need a license. All others working on larger, ocean-going vessels do need a license. To get the basic entry level license, workers must pass a drug screen, take a medical exam, and be U.S. citizens.

Workers on ocean-going or Great Lakes vessels need specialty licenses to work as engineering officers, or deck officers. On rivers or inland waterways, only the captain or anyone who steers the boat needs a license. For more information on licensing requirements see the Coast Guard's Web site listed in the sources of additional information. Radio operators are licensed by the Federal Communications Commission.

Other qualifications. Most positions require excellent health, good vision, and color perception. Good general physical condition is needed because many jobs require the ability to lift heavy objects, withstand heat and cold, stand or stoop for long periods of time, dexterity to maneuver through tight spaces, and good balance on uneven and wet surfaces and in rough water.

Advancement. Experience and passing exams are required to advance. Deckhands who wish to advance must decide whether they want to work in the wheelhouse or the engine room. They will then assist the engineers or deck officers. With experience, assistant engineers and deck offices can advance to become chief engineers or captains. On smaller boats, such as tugs, a captain may choose to become self-employed by buying a boat and working as an owner-operator.

Employment

Water transportation workers held more than 84,000 jobs in 2006. The total number who worked at some point in the year was significantly larger because many merchant marine officers and seamen worked only part of the year. The following tabulation shows employment in the occupations that make up this group:

Captains, mates, and pilots of water vessels	34,000
Sailors and marine oilers.....	33,000
Ship engineers.....	15,000
Motorboat operators.....	3,000

About 40 percent of all workers were employed in water transportation services. About 17 percent worked in inland water transportation—primarily the Mississippi River system—while the other 23 percent were employed in water transportation on the deep seas, along the coasts, and on the Great Lakes. Another 24 percent worked in establishments related to port and harbor operations, marine cargo handling, or navigational services to shipping. Governments employed 9 percent of all water transportation workers, many of whom worked on supply

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Water transportation occupations.....	53-5000	84,000	98,000	14,000	16
Sailors and marine oilers.....	53-5011	33,000	38,000	5,200	16
Ship and boat captains and operators.....	53-5020	37,000	43,000	6,300	17
Captains, mates, and pilots of water vessels.....	53-5021	34,000	40,000	6,000	18
Motorboat operators.....	53-5022	3,000	3,300	300	11
Ship engineers.....	53-5031	15,000	17,000	2,100	14

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

ships and are civilian mariners of the Navy Department's Military Sealift Command.

Job Outlook

Employment in water transportation occupations is projected to grow faster than average. Good job opportunities are expected.

Employment change. Employment in water transportation occupations is projected to grow 16 percent over the 2006-2016 period, faster than the average for all occupations. Job growth will stem from increasing tourism and growth in offshore oil and gas production. Employment will also increase in and around major port cities due to rapidly increasing international trade.

Employment in deep-sea shipping for American mariners is expected to remain stable. A fleet of deep-sea U.S.-flagged ships is considered vital to the Nation's defense, so some receive Federal support through a maritime security subsidy and other provisions in laws that limit certain Federal cargoes to ships that fly the U.S. flag.

Employment growth also is expected in passenger cruise ships within U.S. waters. Vessels that operate between U.S. ports are required by law to be U.S.-flagged vessels. The staffing needs for several new U.S. flagged cruise ships that will travel to the Hawaiian Islands will create new opportunities for employment. In addition, increasing use of ferries to handle commuter traffic around major metropolitan areas should increase employment.

Some growth in water transportation occupations is projected in vessels operating in the Great Lakes and inland waterways. Growth will be driven by increasing demand for bulk products, such as coal, iron ore, petroleum, sand and gravel, grain, and chemicals. Since current pipelines cannot transport ethanol, some growth will come from shipping ethanol. Problems with congestion in the rail transportation system will increase demand for inland water transportation.

Job prospects. Good job opportunities will result from growth and the need to replace those leaving the occupation. Most water transportation occupations require workers to be away from home for extended periods of time, causing some to leave these jobs.

Maritime academy graduates who have not found licensed shipboard jobs in the U.S. merchant marine find jobs in related industries. Many academy graduates are ensigns in the Naval or Coast Guard Reserve; some are selected or apply for active duty in those branches of the Service. Some find jobs as seamen on U.S.-flagged or foreign-flagged vessels, tugboats, and

other watercraft or enter civilian jobs with the U.S. Navy or Coast Guard. Some take land-based jobs with shipping companies, marine insurance companies, manufacturers of boilers or related machinery, or other related jobs.

Earnings

Earnings vary widely with the particular water transportation position and the worker's experience. Earnings are higher than most other occupations with similar educational requirements for entry-level positions. While wages are lower for sailors than for mates and engineers, sailors' on-board experience is important for advancing into those higher paying positions. Workers are normally paid by the day. Since companies provide food and housing at sea and it is difficult to spend money while working, sailors are able to save a large portion of their pay.

Median annual wage-and-salary earnings of sailors and marine oilers were \$30,630 in May 2006. The middle 50 percent earned between \$23,790 and \$39,830. The lowest 10 percent had earnings of less than \$19,220, while the top 10 percent earned over \$49,650.

Median annual wage-and-salary earnings of captains, mates, and pilots of water vessels were \$53,430 in May 2006. The middle 50 percent earned between \$38,880 and \$69,570. The lowest 10 percent had earnings of less than \$29,360, while the top 10 percent earned over \$89,230. Annual pay for captains of larger vessels, such as container ships, oil tankers, or passenger ships may exceed \$100,000, but only after many years of experience. Similarly, earnings of captains of tugboats are dependent on the port and the nature of the cargo.

Median annual wage-and-salary earnings of ship engineers were \$54,820 in May 2006. The middle 50 percent earned between \$41,190 and \$74,360. The lowest 10 percent had earnings of less than \$34,140, while the top 10 percent earned over \$92,860.

Median annual wage-and-salary earnings of motorboat operators were \$32,350 in May 2006. The middle 50 percent earned between \$23,340 and \$45,850. The lowest 10 percent had earnings of less than \$17,270, while the top 10 percent earned over \$55,170.

The rate of unionization for these workers is about 16 percent, higher than the average for all occupations. Unionization rates vary by region. In unionized areas, merchant marine officers and seamen, both veterans and beginners, are hired for voyages through union hiring halls or directly by shipping companies. Hiring halls rank the candidates by the length of time the per-

son has been out of work and fill open slots accordingly. Most major seaports have hiring halls.

Related Occupations

Workers in other occupations who make their living on the seas and coastal waters include fishers and fishing vessel operators and members of the Navy and the Coast Guard. Heavy vehicle and mobile equipment service technicians and mechanics perform work similar to shipboard engineers.

Sources of Additional Information

Information on a program called “Careers Afloat”, which includes a substantial listing of training and employment information and contacts in the U.S., may be obtained through:

➤ Maritime Administration, U.S. Department of Transportation, 400 7th St.SW., Room 7302, Washington, DC 20590.

Internet: **<http://www.marad.dot.gov/acareerafloat>**

Information on merchant marine careers, training, and licensing requirements is available from:

➤ U.S. Coast Guard National Maritime Center, 4200 Wilson Blvd., Suite 630, Arlington, VA 22203-1804.

Internet: **<http://www.uscg.mil/stcw/index.htm>**

Information on careers with the Military Sealift Command can be found at:

➤ Military Sealift Command, CIVMAR Support Center, 6353 Center Drive, Building 8, Suite 202, Norfolk, VA 23502.

Internet: **<http://www.sealiftcommand.com>**