

Agriculture, Forestry, and Fishing

(NAICS 11)

SIGNIFICANT POINTS

- Small family farms constitute 91 percent of all farms and own about two-thirds of all farmland, but large family and commercial farms account for over half of the total value of agricultural production.
- Self-employed workers—mostly farmers and fishers—account for half of the industry’s workforce.
- Employment in agriculture, forestry, and fishing is projected to decline, especially among self-employed farmers and ranchers.

Nature of the Industry

The agriculture, forestry, and fishing industry plays a vital role in our economy and our lives. It supplies us and many other countries with a wide variety of food products and non-food products such as fibers, lumber, and nursery items. It contributes positively to our foreign trade balance and it remains one of the Nation’s top industries in terms of total employment. However, technology continues to enable us to produce more of these products with fewer workers, even in the face of stagnant prices for output, resulting in fewer farms and farmworkers.

Establishments in this industry include farms, ranches, dairies, greenhouses, nurseries, orchards, and hatcheries. But production also takes place in the country’s natural habitats and on government-owned lands and waterways, as in the case of logging and fishing. The vast majority of farms, ranches, and fishing companies are small enterprises, owned and operated by families as their primary or secondary source of income. Although large family farms (those generating more than \$250,000 per year in gross annual sales) and corporate farms comprise less than 10 percent of the establishments in the industry, they produce over half of all agricultural output. Increasingly, these large farms are being operated for the benefit of large agribusiness firms, which buy most of the product.

The agriculture sector of this industry is divided into two major segments, *animal production* and *crop production*. Animal production includes establishments that raise livestock, such as beef cattle, sheep, and hogs; dairy farms; poultry and egg farms; and animal specialty farms, such as apiaries (bee farms) and aquaculture (fish farms). Crop production includes the growing of grains, such as wheat, corn, and barley; field crops, such as cotton and tobacco; vegetables and melons; fruits and nuts; and horticultural specialties, such as flowers and ornamental plants. Of course, many farms have both crops and livestock, such as those that grow their own animal feed, or have diverse enterprises.

Production of some types of crops and livestock tends to be concentrated in particular regions of the country, on the basis of growing conditions and topography. For example, the warm climates of Florida, California, and Arizona are well suited for citrus fruit production. The Southern States are the major growers of tobacco, cotton, rice, and peanuts, while the Northeast, from

Maine to New Jersey, produces blueberries, maple syrup, and apples. Cranberry bogs are found mainly in Wisconsin, Massachusetts, and New Jersey. Hogs, grains, potatoes, and range-fed cattle are major products in the Plains States, where cattle feedlots also are numerous. In the Southwest and West, ranchers raise beef cattle. In Washington State, apples are an important crop. In California, most vegetables and fruits are prominent, as well as grapes for wine. Poultry and dairy farms tend to be found in most areas of the country.

The nature of agricultural work varies, depending on the crop grown, animals being raised and the size of the farm. Although much of the work is now highly mechanized, large numbers of people still are needed to plant and harvest some crops on the larger farms. During the planting, growing, and harvesting seasons, farmers and employed workers are busy for long hours, plowing, disking, harrowing, seeding, fertilizing, and harvesting. Vegetables generally are still harvested manually by groups of migrant farmworkers, although new machines have been developed to replace manual labor for some fruit crops. Vegetable growers on large farms of approximately 100 acres or more usually practice “monoculture,” large-scale cultivation of one crop on each division of land. Fieldwork on large grain farms—consisting of hundreds, sometimes thousands, of acres—often is done using massive, climate-controlled tractors and other modern agricultural equipment. In some cases, teams of operators with tractors, combines, or other agricultural equipment travel from one farm to another during harvest time in a practice known as “custom harvesting.”

Workers on farms that raise other products, particularly those raising animals, have work that must be done all year long. On dairy farms, for example, the cows must be milked and fed every day and their stalls cleaned. Cows may then be taken outside for exercise and grazing. Dairy workers also may plant, harvest, and store crops such as corn or hay to feed the cattle through the cold of winter or the drought of summer.

Though the nature of the work on large livestock ranches in the West and Southwest still entails the kind of activities—such as branding and herding—often seen in western movies, the use of modern equipment and technology has changed the way the work is done. Branding and vaccinating of herds, for example, are largely mechanized; and the use of trucks, portable communi-

cations gear, and geopositioning equipment now is common and saves valuable time for ranchers. The work on such establishments still tends to be seasonal and to take place largely outdoors. Common activities include raising feed crops, rotating cattle from one pasture to another, and keeping fences in good repair.

Most poultry and egg farms are large operations resembling production lines. Although free-range farms allow fowl some time outside during the day for exercise and sunlight, most poultry production involves mainly indoor work, with workers repeatedly performing a limited number of specific tasks. Because of increased mechanization, poultry growers can raise chickens by the thousands—sometimes by the hundreds of thousands—under one roof. Eggs still are collected manually in some small-scale hatcheries, but, in larger hatcheries, eggs tumble down onto conveyor belts. Machines then wash, sort, and pack the eggs into individual cartons. Workers place the cartons into boxes and stack the boxes onto pallets for shipment.

Aquaculture farmers raise fish and shellfish in salt, brackish, or fresh water—depending on the requirements of the particular species. Farms usually use ponds, floating net pens, raceways, or recirculating systems, but larger fish farms are actually in the sea, relatively close to shore. Workers on aquaculture farms stock, feed, protect, and otherwise manage aquatic life to be sold for consumption or used for recreational fishing.

Horticulture farms raise ornamental plants, bulbs, shrubbery, sod, and flowers. Although much of the work takes place outdoors, in climates with cold seasons, substantial production also takes place in greenhouses or hothouses. On such farms, the work can be year-round.

Although most agricultural establishments sell their products to food processing, textile, and food retailing companies, some cater directly to the public. For example, some fruit and vegetable growers use the marketing strategy of “pick-your-own” produce, set up roadside stands, or sell at farmers’ markets. Nurseries and greenhouses, which grow everything from flowers to tree seedlings, provide products to lawn and garden centers as well as to retail establishments, landscaping contractors, and other businesses; some also sell directly to individual consumers.

Workers employed in the forestry and logging sector grow and harvest timber on a long production cycle of 10 years or more, and specialize in different stages of the production cycle. Those engaged in reforestation produce seedlings in specialized nurseries. Workers in timber production remove diseased or damaged trees from timber land, as well brush and debris that could pose a fire hazard. Besides commercial timber land, they may also work in natural forests or other suitable areas of land that remain available for production over a long duration. Logging workers harvest the timber in order for it to become lumber for construction, wood products, or paper products. They cut down the trees, remove their tops and branches, and cut their trunks into logs of specified length. They usually use a variety of specialized machinery to move the logs to loading areas and load them on trucks for transport to papermills and sawmills.

People employed in fishing harvest fish and shellfish from their natural habitat in fresh water and in tidal areas and the ocean, and depend for their livelihood on a naturally replenishing sup-

ply of fish, lobster, shellfish, or other edible marine life. Some full-time and many part-time fishers work on small boats in relatively shallow waters, often in sight of land. Crews are small—usually only one or two people collaborate on all aspects of the fishing operation. Others fish hundreds of miles offshore on large commercial fishing vessels. Navigation and communication are essential for safety of all of those who work on the water, but particularly for those who work far from shore. Large boats, capable of hauling a catch of tens of thousands of pounds of fish, require 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 to operate the fishing gear, sort and load the catch when it is brought to the deck, and aid in the general operation of the vessel.

Working Conditions

Agriculture, forestry, and fishing attract people who enjoy working with animals, living an independent lifestyle, or working outdoors on the land. For many, the wide-open physical expanse, the variability of day-to-day work, and the rural setting provide benefits that offset the sometimes hard labor, the danger and the risks associated with unseasonable or extreme weather or unfavorable commodity prices.

Although the working conditions vary by occupation and setting, there are some characteristics common to most agriculture, forestry and fishing jobs. Work hours generally vary and the jobs often require longer than an 8-hour day and a 5-day, 40-hour week; work cannot be delayed when crops must be planted and harvested, or when animals must be sheltered and fed. Weekend work is common, and farmers, agricultural managers, crew leaders, farm-equipment operators, and agricultural workers may work a 6- or 7-day week during planting and harvesting seasons. Graders and sorters may work evenings or weekends because of the perishable nature of the products. Almost 1 out of 4 employees in this industry work variable schedules, compared with fewer than 1 in 10 workers in all industries combined. Because much of the work is seasonal in nature, many farmworkers must cope with periods of unemployment or obtain short-term jobs in other industries when the farms have no work. Migrant farmworkers, who move from location to location to harvest crops as they ripen, live an unsettled lifestyle, which can be stressful.

Much of the work on farms and ranches takes place outdoors, in all kinds of weather, and is physical in nature. Harvesting some types of vegetables, for example, requires manual labor and workers do a lot of bending, stooping, and lifting. Living conditions are often modest, although there are regulations to assure minimum standards. The year-round nature of much livestock production work means that ranch workers must be out in the heat of summer, as well as the cold of winter. Those who work directly with animals risk being bitten or kicked.

Farmers, farm managers, and agricultural workers in crop production risk exposure to pesticides and other potentially hazardous chemicals that are sprayed on crops or plants. Those who work on mechanized farms must take precautions when working with tools and heavy equipment in order to avoid injury.

Forestry and logging jobs are physically demanding and often dangerous, although machinery has eliminated some of the heavy labor. Most logging occupations involve lifting, climb-

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

Logging sites are often far from population centers and require long commutes. Some lumber companies set up bunkhouses or camps for employees to stay in overnight.

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 the work of fishing vessels. People employed in fishing work under conditions that can quickly turn from pleasant to wet and hazardous, and help is often not readily available. Work must be performed on decks that are wet and slippery as the result of fish processing operations or ice formation in the winter. Workers must be constantly on guard against entanglement in fishing nets and gear, sudden breakage or malfunction of fishing gear, or being swept overboard. Malfunctioning navigation or communication equipment may lead to collisions with underwater hazards or other vessels and even shipwrecks. Also, when injuries occur, medical treatment beyond simple first aid usually is not available until the vessel can reach port.

Most workers employed in fishing return to their homes every evening. However, workers on vessels that range far from port may be at sea for days or even weeks. While newer vessels of this type have improved living quarters and amenities, such as television and shower stalls, crews still experience the aggravations of confined conditions, continuous close personal contact, and the absence of family.

Some component industries making up agriculture, forestry, and fishing have some of the highest incidences of illnesses and injuries of any industry. In 2002, the overall industry had 6.4 injuries and illnesses per 100 full-time workers, compared with an average of 5.3 throughout private industry. Those working with livestock had significantly higher incidences of work-related illness and injury than those working with crops.

Employment

In 2002, agriculture, forestry, and fishing employed a total of about 2.2 million workers including self-employed and unpaid family workers, making it one of the largest industries in the Nation. This industry is unusual in that self-employed and unpaid family workers account for almost 46 percent of its workforce. The vast majority of these workers—about 2 million—were employed in the agricultural products subsector of this industry. Among all workers in agriculture, forestry and fish-

ing industry, more than 1.2 million were wage and salary workers (See table 1), while slightly more than 1 million were self-employed and unpaid family workers.

Table 1. Distribution of wage and salary employment in agriculture, forestry, and fishing by detailed industry, 2002
(Employment in thousands)

Industry	Employment	Percent
Total, all industries	1,216	100.0
Crop production	570	46.9
Animal production	440	36.2
Logging	69	5.7
Fishing, hunting and trapping	30	2.5
Forestry	10	0.8
Support activities for agriculture and forestry	97	8.0

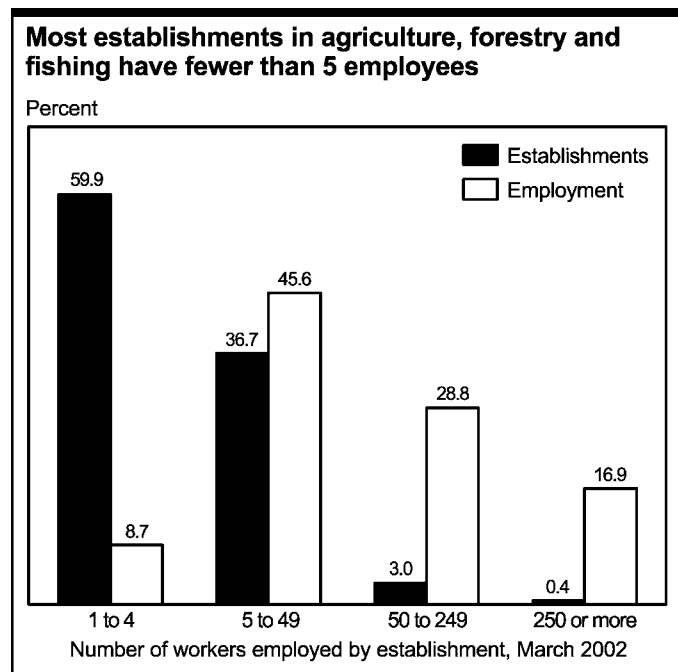
Agriculture, forestry, and fishing is one of the few remaining areas of the economy in which unpaid family workers remain a significant part of the workforce. Most unpaid family workers assist with the farmwork or fishing, but a small number do book-keeping, purchase supplies, or arrange the sale of crops, livestock, or the daily catch.

Most individual agricultural-production establishments employ fewer than 5 workers (chart).

Workers in agriculture, forestry, and fishing tend to be older than workers in other industries. In 2002, 50 percent of workers were aged 45 or older, compared with about 38 percent of all workers in all industries.

Occupations in the Industry

Agriculture, forestry, and fishing employs many occupational specialties—from bookkeepers, accountants, and auditors to mechanics and repairers (table 2). Among the industry's wage and salary workers, the single most common occupation was that of



farmworkers, who made up nearly 43 percent of the overall workforce. The majority of self-employed workers were farmers and ranchers, but many also worked as fishers. Along with farm managers, farmworkers, farmers, and ranchers comprise the overwhelming majority of workers.

Farmers and ranchers are the self-employed owner-operators of establishments that produce agricultural output. Their work encompasses numerous tasks, both production-related and management-related. Along with planting, cultivating, harvesting their crops and feeding and raising their livestock, farmers and ranchers must perform numerous bookkeeping activities. They keep records of their animals' health, crop rotation, operating expenses, major purchases, bills paid, and income due, as well as pay bills and file taxes. If the farm or ranch has paid employees, its owner or operator may keep in order all of the paperwork needed to satisfy legal requirements, including payroll records and State and Federal tax records. Computer literacy has become as necessary for farmers as it has for many other occupations. Farmers also hire, train, and manage the schedules and supervise the work of farmworkers or farm labor contractors. They assign, monitor, and assess individuals' work day in and day out.

Farmers and ranchers must have additional skills to keep a farm or ranch operating. Basic understanding and working knowledge of mechanics, carpentry, plumbing, and electricity are helpful, if not essential, for running an agricultural establishment. Increasingly, farmers are becoming more involved in marketing, too, especially in "direct marketing" where they sell their products directly to the consumer.

Farmers who work large farms make decisions as much as a year in advance about which crop to grow. Therefore, a farmer must be aware of commodity prices in national and international markets to use for guidance, while tracking the costs associated with each particular crop. When dealing in hundreds or thousands of acres of one crop, even small errors in judgment are magnified, so the impact can be substantial. Thus, large-scale farmers strive to keep costs to a minimum in every phase of the operation. Furthermore, risk management of portfolios—the practice of juggling stocks, buying and selling futures, and engaging in other paper deals such as bond trading—is now becoming more important for owner-operators of large commercial farms.

Farm, ranch, and other agricultural managers operate farms, ranches, nurseries, timber tracts, and aquaculture operations on a daily basis for the owners. Agricultural managers perform many of the same tasks as do farmers and ranchers. Large commercial farms may have a manager for different operations within the establishment. On smaller farms, one manager may oversee all operations. Managers are responsible for purchasing machinery, seed, fertilizers, herbicides and pesticides, fuel, and labor. They must be aware of any laws that govern the use of such inputs in the farm's locality. Agricultural managers must be knowledgeable about crop rotation, soil testing, and various types of capital improvements necessary to maximize crop yields.

Agricultural workers include occupations that perform a whole spectrum of daily chores involved in crop and livestock production. *Graders and sorters* ensure the quality of the agricultural commodities that reach the market. They grade, sort, or

classify unprocessed food and other agricultural products by size, weight, color, or condition. *Farmworkers and laborers, crop, nursery, and greenhouse* manually plant, maintain, and harvest food crops; apply pesticides, herbicides, and fertilizer to crops; and cultivate plants used to beautify landscapes. They prepare nursery acreage or greenhouse beds for planting; water, weed, and spray trees, shrubs, and plants; cut, roll, and stack sod; stake trees; tie, wrap, and pack flowers, plants, shrubs, and trees to fill orders; and dig up or move field-grown and containerized shrubs and trees. Additional duties include planting seedlings, transplanting saplings, and watering and trimming plants.

Farmworkers, farm and ranch animals care for farm, ranch, or aquaculture animals that may include cattle, sheep, swine, goats, horses, poultry, finfish, shellfish, and bees. They also tend to animals raised for animal products, such as meat, fur, skins, feathers, eggs, milk, and honey. Duties may include feeding, watering, herding, grazing, castrating, branding, debeaking, weighing, catching, and loading animals. These farmworkers also may maintain records on animals, examine animals to detect diseases and injuries, and assist in birth deliveries and administer medications, vaccinations, or insecticides, as appropriate. Daily duties include cleaning and maintaining animal housing areas. These workers also may repair farm buildings and fences and haul livestock products to market. On dairy farms, they may operate milking machines and other dairy-processing equipment.

Forest and conservation workers perform a variety of tasks to reforest and conserve timber lands and maintain forest facilities, such as roads and campsites. They may plant tree seedlings to reforest timber land areas, remove diseased or undesirable trees, and spray trees with insecticides. They also may clear away brush and debris from trails, roadsides, and camping areas. Other forest and conservation workers work in forest nurseries, sorting out tree seedlings and discarding those that do not meet prescribed standards of root formation, stem development, and foliage condition.

Foresters manage forested lands for economic, recreational, and conservation purposes. They inventory the type, amount, and location of standing timber, determine the timber's worth, negotiate with purchasers for the timber, and draw up contracts for tree removal and procurement. Foresters determine how to conserve wildlife habitats, creekbeds, water quality, and soil stability, and how best to comply with environmental regulations. They also devise plans for planting and growing trees, monitor the trees' growth, and determine the best time for harvesting.

Forest and conservation technicians, under the direction of foresters, compile data on the size, content, and condition of forest land tracts. These workers travel through sections of forest to gather basic information, such as species and population of trees, disease and insect damage, tree seedling mortality, and conditions that may cause fire danger. Forest and conservation technicians also train and lead forest and conservation workers in seasonal activities, such as planting tree seedlings, putting out forest fires, and maintaining recreational facilities.

Fishers and related fishing workers use nets, fishing rods, or other equipment to catch and trap various types of marine life for human consumption, animal feed, bait, and other uses. Fishing boat captains plan and oversee fishing operations—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. *First mates*—captains’ assistants, who must be familiar with navigation requirements and the operation of the vessel and all of its electronic equipment—assume control of the vessel when the captain is off duty. *Boatswains*, highly experienced deckhands with supervisory responsibilities, direct the *deckhands* as they carry out the sailing and fishing operations.

Training and Advancement

The agriculture, forestry, and fishing industry is characterized by a large number of workers with relatively low levels of educational attainment. Almost 30 percent of this industry’s workforce does not have a high school diploma, compared with only 12 percent of all workers in all industries combined. The proportion of workers without a high school diploma is particularly high in the crop-producing agricultural sector, where there are more labor-intensive establishments employing migrant farmworkers.

Training and education requirements for general farmworkers are few. Some experience in farmwork or ranchwork is beneficial, but most tasks require manual labor and are learned fairly quickly on the job. Advancement for farmworkers is somewhat limited. Motivated and experienced farmworkers may become crew leaders or farm-labor contractors. Because firsthand knowledge of farm produce is good preparation for grading, sorting, and inspecting, some farmworkers may become agricultural graders and sorters or inspectors. Farmworkers who wish to become independent farmers or ranchers first must buy or rent a plot of land, which can be a substantial financial commitment if one buys instead of rents.

Becoming a farmer generally does not require formal training or credentials. However, knowledge of and expertise in agricultural production are essential to success for prospective farmers. The traditional method for acquiring such knowledge is through growing up on a farm, but this background is becoming less and less common as the percentage of the U.S. population raised on farms continues to dwindle. But even with a farming background, a person considering farming would benefit from the formal postsecondary agricultural education offered by land-grant universities in many of the States. Programs usually incorporate hands-on training into the curriculums to complement the academic subjects. Typical coursework covers the agricultural sciences (crop, dairy, and animal) and business subjects such as accounting and marketing. Also, there are some private organizations that help people gain farming skills, particularly if they are interested in more “alternative” types of farming.

Experience and some formal education are necessary for agricultural managers. A bachelor’s degree in business with a concentration in agriculture provides a good background. Work experience in the various aspects of farm or ranch operations enhances knowledge and develops decision-making skills, which further qualifies prospective agricultural managers. The experience of having performed tasks on other farming establishments as a farmworker may save managers valuable time in forming daily or monthly work plans and help them to avoid pitfalls that could result in financial burdens for the farm.

Whether it is gained through experience or formal education, both farmers and agricultural managers need enough technical

knowledge of crops, growing conditions, and plant diseases to make sound scientific and business decisions. A rudimentary knowledge of veterinary science, as well as animal husbandry, is important for dairy and livestock farmers, ranchers, and agricultural managers.

Table 2. Employment of wage and salary workers in agriculture, forestry, and fishing by occupation, 2002 and projected change, 2002-2012
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-2012
	Number	Percent	
All occupations	1,216	100.0	-1.9
Management, business, and financial occupations	231	19.0	2.5
Top executives	9	0.7	-18.6
Farm, ranch, and other agricultural managers	193	15.9	6.4
Farmers and ranchers	6	0.5	-22.4
Accountants and auditors	6	0.5	-20.8
Professional and related occupations	25	2.1	-9.1
Biological scientists	4	0.3	-10.3
Conservation scientists and foresters ...	3	0.3	2.4
Agricultural and food science technicians	4	0.3	-2.0
Service occupations	42	3.4	-16.0
Landscaping and groundskeeping workers	11	0.9	-14.4
Animal care and service workers	11	0.9	-8.7
Office and administrative support occupations	62	5.1	-30.9
Bookkeeping, accounting, and auditing clerks	18	1.5	-31.1
Secretaries and administrative assistants	16	1.3	-32.4
Farming, fishing, and forestry occupations	743	61.1	2.4
Supervisors, farming, fishing, and forestry workers	30	2.5	10.4
Animal breeders	4	0.3	11.3
Graders and sorters, agricultural products	14	1.1	9.7
Agricultural equipment operators	48	4.0	8.7
Farmworkers and laborers, crop, nursery, and greenhouse	498	41.0	2.5
Farmworkers, farm and ranch animals	25	2.0	4.1
Fishers and related fishing workers	16	1.3	-30.2
Fallers	9	0.7	-4.6
Logging equipment operators	24	1.9	-3.9
All other farming, fishing, and forestry workers	70	5.8	2.3
Installation, maintenance, and repair occupations	18	1.5	-10.8
Production occupations	19	1.5	-15.4
Transportation and material moving occupations	60	4.9	-17.3
Driver sales workers	5	0.4	-28.9
Truck drivers, heavy and tractor-trailer	28	2.3	-11.2
Laborers and material movers, hand	15	1.3	-26.1

NOTE: May not add to totals due to omission of occupations with small employment.

It also is crucial for farmers, ranchers, and agricultural managers to stay abreast of the latest developments in agricultural production. They may do this by reviewing agricultural journals that publish information about new cost-cutting procedures, new forms of marketing, or improved production using new techniques. County cooperative extension agencies serve as a link between university and government research programs on the one hand, and farmers and farm managers on the other, providing the latest information on numerous agriculture-related subjects. County cooperative extension agents may demonstrate new animal-breeding techniques, or more environmentally safe methods of fertilizing, for example. Other organizations provide information—through journals, newsletters, and the Internet—on agricultural research and the results of implementing innovative methods and ideas.

Some private organizations are helping to make farmland available and affordable for new farmers through a variety of institutional innovations. Land Link programs, coordinated by the National Farm Transition Network, operate in over 20 states. They help match up young farmers with farmers approaching retirement so that arrangements can be made to pass along their land to young farmers wishing to keep the land under cultivation. Often a beginning farmer will rent some or all of his or her farmland. Sometimes, a new farmer will work on a farm for a few years, while the farm owner gradually transfers ownership to the new farmer.

Most forest, conservation, and logging workers develop skills and learn to operate the complex machinery through on-the-job training with instruction coming primarily from experienced workers and the logging companies themselves. Some trade associations also offer special training programs. Safety training is a vital part of instruction for all logging workers.

Many State forestry and logging associations provide training sessions for fallers, whose jobs require more skill and experience than other positions on the logging team. Sessions may take place in the field, where trainees, under the supervision of an experienced logger, have the opportunity to practice various felling techniques. Fallers learn how to manually cut down extremely large or expensive trees safely and with minimal damage to the felled or surrounding trees. They also may receive training in best management practices, safety, endangered species preservation, reforestation, and business management. Some programs lead to logger certification.

Workers in the fishing industry usually acquire occupational skills on the job, many as members of families involved in fishing activities. No formal academic requirements exist. 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.

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. 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 their vessel is 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 possess the business skills needed to run business operations.

On fishing vessels, most workers begin as deckhands. Deckhands who acquire experience and whose interests are in ship engineering—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. Experienced, reliable deckhands who display supervisory qualities may become boatswains. Boatswains may, in turn, become second mates, first mates, and, finally, captains. Almost all captains become self-employed, and the overwhelming majority eventually own, or have an interest in, one or more fishing vessels. Some may choose to run a sport or recreational fishing operation. When their seagoing days are over, experienced individuals may work in or, with the necessary capital, own stores selling fishing and marine equipment and supplies.

Earnings

In 2002, median earnings for workers in the agriculture, forestry, and fishing industry were \$376 a week, with a wide range from less than \$226 a week for the lowest 10 percent to more than \$822 a week for the highest 10 percent. Lower than average earnings are due in part to the low level of skill required for many of the jobs in the industry and to the seasonal nature of the work.

Farm income can vary substantially depending on a number of factors, including: The type of crop or livestock being raised, price fluctuations for various agricultural products, and weather conditions that affect yield. In some cases, government subsidies may supplement a farmer's income. For a growing number of farmers and ranchers, particularly those working on farms for residential and lifestyle reasons, crop or livestock production is not their major occupation or source of income.

Outlook

Employment in the agriculture, forestry, and fishing industry is projected to decline 15 percent over the 2002-2012 period. Low agricultural prices and increasing imports of lumber and fish will cause many workers to leave this industry. In addition, fishers face growing restrictions on where they can fish and how much they can harvest because many fisheries (fish habitats) have been depleted due to years of overfishing.

Numerous farms are expected to go out of business over the next decade because prices for many agricultural goods are low, a situation that has many causes. First of all, U.S. farms continue to produce more than is needed to meet domestic and ex-

port requirements. Increasing productivity means that it takes less farm labor to produce crops and livestock than in the past. In addition, market pressures on the family farm will continue to drive consolidation in the industry, as farms become bigger and more likely to be controlled by large corporations. The decline in employment will be fastest, at 31 percent, among self-employed and unpaid family workers, most of whom are farmers and their families. Employment of wage and salary workers is expected to decline by 2 percent compared with 16 percent growth for all industries combined.

Employment on many farms will most likely continue to be characterized by low wages and lack of benefits. Employment of farmers and ranchers is projected to decrease. Employment of agricultural managers, farmworkers, and graders and sorters is projected to rise, but more slowly than the average for all occupations. Prospects should be best for agricultural workers employed by nurseries and greenhouses.

Employment declines, however are being moderated by other changes taking place in agriculture. Employment in aquaculture, for example, has been growing steadily over the past 10 years in response to growth in the demand for fish. Because of low prices for some agricultural commodities, more farmers—including some in the Midwest—are switching to specialty crops or aquaculture production. New developments in the marketing of milk and other agricultural produce through farmer-owned and -operated cooperatives hold promise for some dairy and other farms. Furthermore, demand for organic farm produce—grown mostly on small to medium-sized farms—is growing. Consumers are becoming more wary of the possible effects the pesticides and fertilizers used in conventional agriculture. The production of crops without the use of these chemicals is allowing farms of small acreage—which only 12 years ago appeared to have almost no future as working farms—to remain economically viable.

Also, some Federal, State, and local government programs provide assistance targeted at small farms. For example, some programs allow farmers to sell the development rights to their property to nonprofit organizations pledged to preserving green space. This immediately lowers the market value of the land—and the property taxes levied on it—making farming more affordable.

Prospects for employment in forestry will be below average as the sector moves towards greater mechanization, replacing many lower skilled workers with more machinery tended by a few technicians. In addition, rising imports of wood and wood products are expected to continue. Other countries, particularly Canada, have invested more heavily in their lumber and paper mills than has the United States, and that has enabled them to keep prices low. The best job opportunities will be for those forestry workers with more skills, such as technicians and foresters.

In the fishing sector, increases in imports and efforts to revive fisheries by limiting fishing activity in them will continue to lead to employment declines. Although certain areas of the country, such as Alaska, will continue to harvest massive amounts of fish, and remain relatively prosperous, the Nation's fisheries are a delicate resource. To the extent that they are damaged by such factors as coastal pollution or overfishing, there will be fewer jobs for fishers.

Sources of Additional Information

For general information about farming and agricultural occupations, contact:

- Small Farm Program, U.S. Department of Agriculture, Cooperative State, Research, Education, and Extension Service, Stop 2215, Washington, DC 20250-2215. Internet: <http://www.ree.usda.gov/smallfarm>
- Growing New Farmers Consortium, c/o New England Small Farm Institute, P.O. Box 608, Belchertown, MA 01007. Internet: <http://www.northeastnewfarmers.org>

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

- Appropriate Technology Transfer for Rural Areas, P.O. Box 3657, Fayetteville, AR 72702. Internet: <http://attra.ncat.org>

For information on a wide range of topics in agriculture, contact:

- The National Agricultural Library, 10301 Baltimore Ave., Room 132, Beltsville, MD 20705-2351. Internet: <http://www.nal.usda.gov/>

For information on a career as a farm manager, contact:

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

For information on Land Link Programs, contact:

- The National Farm Transition Network, ISU Extension Outreach Center, 2020 DMACC Boulevard, Ankeny, IA 50021. Internet: <http://www.extension.iastate.edu/nftn/netwpart.html>

For information about State agencies involved in the purchases of development rights of farmland, contact:

- American Farmland Trust, 1200 18th St., NW, Washington, DC 20036. Internet: <http://www.farmland.org>

For information about careers and education resources in agriculture, contact:

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

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

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

Information on the following occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Farmers, ranchers, and agricultural managers
- Agricultural workers
- Forest, conservation, and logging workers
- Fishers and fishing vessel operators
- Grounds-maintenance workers
- Bookkeeping, accounting, and auditing clerks