

# Labor Market Analysis of Skills Related to Environmental Science & Sustainability in Massachusetts

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## Overview and Key Findings

### Programs

Five Chapter 74 programs of study are currently offered within the Agriculture and Natural Resources Cluster:

* Veterinary Science
* Agricultural Mechanics
* Animal Science
* Environmental Science & Technology
* Horticulture

Each of these programs maps to at least one target occupation, and each occupation is employed by multiple industries. This analysis uses labor market data from the Massachusetts Department of Economic Research to provide perspective on both the industries (the employers) and the career paths that are available to our graduates.

### Industries

In public labor market data systems, industries are types of employers defined by their primary output. There is not a direct relationship between industries and occupations, although the United States Bureau of Labor Statistics publishes an employment matrix that estimates the share of a given industry’s workforce that consists of each occupational category.

Industries are organized in general categories under a two-digit code, and the industry category is then subdivided into three-digit codes, then four-digit codes and so on down to six digits. Three distinct industries are profiled in this analysis:

* Veterinary Services (NAICS 54194)
* Animal Production and Aquaculture (NAICS 112)
* Crop Production (NAICS 111)

There are some inherent challenges in using public labor market data sources to profile these industries. The Agriculture industry makes use of a large number of self-employed workers and workers whose compensation is paid in cash and not included in public employment and wage data. Also, Agricultural Mechanics is not classified as an industry in these systems. To provide perspective on the importance and the career potential of these fields, we also use analysis of target occupations for these programs.

Veterinary Services is a component of the two-digit level industry Professional, Scientific, and Technical Services. Animal Production and Crop Production are components of the Agriculture, Forestry, Fishing, and Hunting industry.

#### Veterinary Services Industry (NAICS 54194)

Establishments of licensed veterinary practitioners primarily engaged in the practice of veterinary medicine, dentistry, or surgery for animals; and establishments primarily engaged in providing testing services for licensed veterinary practitioners.

Illustrative Examples:

* Animal hospitals
* Veterinary clinics
* Veterinarians' offices
* Veterinary testing laboratories

##### Animal Production and Aquaculture (NAICS 112)

Industries in the Animal Production and Aquaculture subsector raise or fatten animals for the sale of animals or animal products and/or raise aquatic plants and animals in controlled or selected aquatic environments for the sale of aquatic plants, animals, or their products. The subsector includes establishments, such as ranches, farms, and feedlots, primarily engaged in keeping, grazing, breeding, or feeding animals. These animals are kept for the products they produce or for eventual sale. The animals are generally raised in various environments, from total confinement or captivity to feeding on an open range pasture.

The industries in this subsector are grouped by important factors, such as suitable grazing or pasture land, specialized buildings, type of equipment, and the amount and types of labor required. Establishments are classified in the Animal Production and Aquaculture subsector when animal production (i.e., value of animals for market) accounts for one-half or more of the establishment's total agricultural production.

##### Crop Production (NAICS 111)

Industries in the Crop Production subsector grow crops mainly for food and fiber. The subsector comprises establishments, such as farms, orchards, groves, greenhouses, and nurseries, primarily engaged in growing crops, plants, vines, or trees and their seeds.

The industries in this subsector are grouped by similarity of production activity, including biological and physiological characteristics and economic requirements, the length of growing season, degree of crop rotation, extent of input specialization, labor requirements, and capital demands. The production process is typically completed when the raw product or commodity grown reaches the "farm gate" for market, that is, at the point of first sale or price determination.

Establishments are classified in the Crop Production subsector when crop production (i.e., value of crops for market) accounts for one-half or more of the establishment's total agricultural production.

### Occupations

In public data systems, occupations are sets of tasks regularly performed by one individual on an employer’s payroll. In this analysis, occupations related to these programsare profiled in a career pathway framework as we seek to provide strategic value in the development and administration of Agriculture curriculum and the construction of compelling and instructive narrative that will introduce students to the rapidly evolving world of Agriculture in the 21st Century.

Each program maps to at least one particular occupation and at least one industry-recognized credential. The table that follows identifies each target occupation and the occupation family (from the United States Bureau of Labor Statistics) in which that occupation is found. Also included is the career cluster (from Advance CTE and used as the taxonomy for CTE programs). Within every cluster are from one to eight pathways, and those are included for each occupation, as well.

##### Agriculture and Natural Resources Cluster Programs and Related Occupations and Credentials Veterinary Science

* Target Occupation: Veterinary Assistant
* Occupation Family: Healthcare Practitioners & Technical
* Career Cluster: Health Sciences
* Career Pathway: Diagnostic Services
* Industry-Recognized Credential: Certified Veterinary Technician

##### Agricultural Mechanics

* Target Occupation: Agricultural Equipment Operators
* Occupation Family: Farming, Fishing and Forestry
* Career Cluster: Agriculture, Food and Natural Resources
* Career Pathway: Power, Structural and Technical Systems
* Industry-Recognized Credential: Valid Driver’s License

##### Animal Science

* Target Occupations
  + Farmworkers and Laborers, Crop, Nursery and Greenhouse
  + Farmworkers, Farm, Ranch and Aquacultural Animals
  + Farmers, Ranchers and Other Agricultural Managers
* Occupation Family: Farming, Fishing and Forestry
* Career Cluster: Agriculture, Food and Natural Resources
* Career Pathway: Agribusiness Systems
* Industry-Recognized Credential: Valid Driver’s License

##### Environmental Science & Technology

* Target Occupation: Biological Technician
* Occupation Family: Life, Physical and Social Science
* Career Cluster: Agriculture, Food and Natural Resources
* Career Pathway: Plant Systems
* Industry-Recognized Credential: Technologist In Molecular Biology (MB-ASCP)

##### Horticulture

##### Target Occupation; Agricultural Technician

* Occupation Family: Life, Physical and Social Science
* Career Cluster: Agriculture, Food and Natural Resources
* Career Pathway: Food Products and Processing Systems
* Industry-Recognized Credential: Pesticide Applicator

### Key Findings

A detailed analysis of the Programs of study, related industries, and related occupations led to several key conclusions:

1. **The importance of the** **Agriculture, Forestry, Fishing, and Hunting industry to the Massachusetts economy**

In labor market data systems, the Agriculture, Forestry, Fishing, and Huntingindustry is further divided into five subcategories, of which four are significant components of the Commonwealth’s economy and labor market. More than 23,000 people are employed by organizations in this industry.

1. **Career Outlooks for the target occupations**

More than 14,000 people in Massachusetts are employed in Agriculture, Fishing, and Forestry occupations. That number is projected to grow by more than 300 in the coming decade.

1. **Trends in the profiled industries**

Both the Agriculture, Forestry, Fishing, and Hunting and the Veterinary Services industries have avoided the employment declines that characterized the regional economy in the aftermath of the COVID-19 pandemic, and Veterinary Services has experienced notable growth.

1. **The importance of a driver’s license**

A valid driver's license is by far the most mentioned qualification for careers in this field, making it not only a value to the individual on a personal level, but also as a career-related asset.

## The Agriculture, Forestry, Fishing, and Hunting Industry in Massachusetts

### The Agriculture, Forestry, Fishing, and Hunting Industry in Labor Market Data Systems

In public labor market data systems, the Agriculture, Forestry, Fishing, and Hunting Industry (NAICS 11) comprises five more detailed industry categories, including Crop Production, Animal Production, and Support Activities for Crop Production. It comprises employers primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.

The establishments in this sector are often described as farms, ranches, dairies, greenhouses, nurseries, orchards, or hatcheries. A farm may consist of a single tract of land or a number of separate tracts which may be held under different tenures. For example, one tract may be owned by the farm operator and another rented. It may be operated by the operator alone or with the assistance of members of the household or hired employees, or it may be operated by a partnership, corporation, or other type of organization. When a landowner has one or more tenants, renters, croppers, or managers, the land operated is considered a farm.

The sector distinguishes two basic activities: agricultural production and agricultural support activities. Agricultural production includes establishments performing the complete farm or ranch operation, such as farm owner-operators and tenant farm operators. Agricultural support activities include establishments that perform one or more activities associated with farm operation, such as soil preparation, planting, harvesting, and management, on a contract or fee basis.

The category is then further parsed into four-, five-, and ultimately six-digit level categories, and the Massachusetts Department of Economic Research produces employment and wage estimates for each.

#### Other Industry Categories

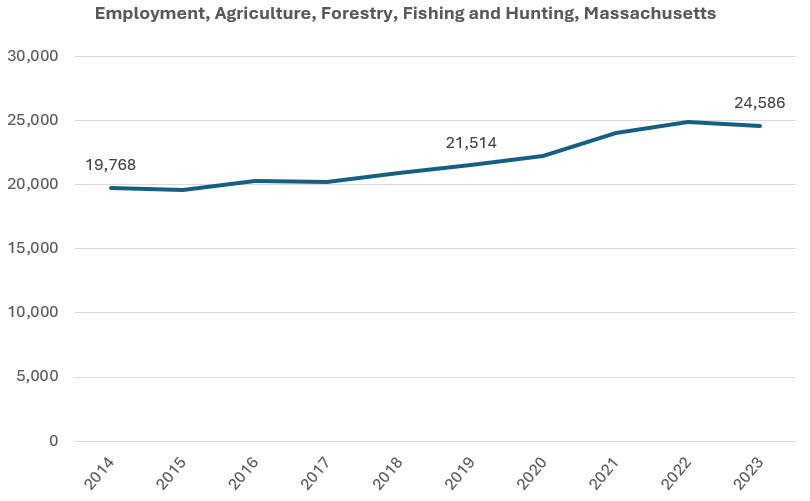
* 11 Agriculture, Forestry, Fishing and Hunting
  + 111 Crop Production
  + 112 Animal Production and Aquaculture
  + 113 Forestry and Logging
    - 1131 Timber Tract Operations
    - 1132 Forest Nurseries and Gathering of Forest Products
    - 1133 Logging
  + 114 Fishing, Hunting and Trapping
  + 115 Support Activities for Agriculture and Forestry
    - 1151 Support Activities for Crop Production
      * 115111 Cotton Ginning
      * 115112 Soil Preparation, Planting, and Cultivating
      * 115113 Crop Harvesting, Primarily by Machine
      * 115114 Postharvest Crop Activities (except Cotton Ginning)
      * 115115 Farm Labor Contractors and Crew Leaders
      * 115116 Farm Management Services
    - 1152 Support Activities for Animal Production
    - 1153 Support Activities for Forestry

### Employment Trends

More than 24,000 people are employed at 999 payrolled locations in the Agriculture, Forestry, Fishing, and Hunting Industry (NAICS 11) in Massachusetts. Employment in this sector has declined slightly over the last ten years.

#### Table 1: Average Annual Employment, Auto Repair and Maintenance Industries, 2014-2023

|  |  |
| --- | --- |
| **Year** | **Jobs** |
| 2014 | 19,768 |
| 2015 | 19,552 |
| 2016 | 20,301 |
| 2017 | 20,192 |
| 2018 | 20,869 |
| 2019 | 21,514 |
| 2020 | 22,203 |
| 2021 | 24,036 |
| 2022 | 24,838 |
| 2023 | 24,586 |



When we break down the Commonwealth’s employment within the Agriculture, Forestry, Fishing, and Hunting industry, we find that the largest number of jobs are in the Animal Production and Crop Production industries. Employment in each has been generally consistent over the last decade, with only Animal Production experiencing a measurable decrease (1,668 jobs).

#### Tables 2 and 3: Employment Change, Agriculture, Forestry, Fishing and Hunting, Massachusetts, 2014-2023

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Industry | 2014 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| Animal Production | 3,245 | 3,422 | 3,517 | 3,343 | 3,454 | 3,464 | 3,321 |
| Crop Production | 8,561 | 8,482 | 8,710 | 8,958 | 9,226 | 10,064 | 11,001 |
| Support Activities for Crop Production | 846 | 723 | 701 | 685 | 761 | 648 | 739 |
| Support Activities for Animal Production | 1,043 | 1,012 | 1,090 | 1,172 | 1,236 | 1,137 | 1,211 |

|  |  |  |
| --- | --- | --- |
| Industry | 2014-2023 Change | 2014-2023 % Change |
| Animal Production | 196 | 6.0% |
| Crop Production | 5,050 | 59.0% |
| Support Activities for Crop Production | 150 | 17.7% |
| Support Activities for Animal Production | 285 | 27.3% |

## The Pathways

### Priority Occupations and Pathways

This section looks at the target occupation categories. It will also consider advancement opportunities in related careers that are not directly related to the program of study, but that illustrate opportunities that may be available to workers in these occupations with additional education and experience.

#### Table 7: Target Occupations, Massachusetts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Occupation | 2023 Jobs | Turnover Rate | 2014 - 2023 Change | 2014 - 2023 % Change | Median Annual Earnings |
| Farmworkers and Laborers, Crop, Nursery, and Greenhouse | 4,846 | 94.9% | 1,469 | 43.5% | $33,231 |
| Farmworkers, Farm, Ranch, and Aquacultural Animals | 2,039 | 76.3% | 940 | 85.5% | $34,073 |
| Farmers, Ranchers, and Other Agricultural Managers | 7,884 | 19.8% | 521 | 7.1% | $32,144 |
| Agricultural Equipment Operators | 680 | 91.7% | 371 | 120.2% | $38,839 |
| Agricultural Technician | 407 | 55.2% | 258 | 173.2% | $79,100 |
| Biological Technician | 6,927 | 64.2% | 1,409 | 25.5% | $61,693 |
| Veterinary Assistant | 1,831 | 88.9% | 338 | 22.7% | $44,456 |

While careers in these two occupations are certainly viable in their own rights, they also can serve as entry points to progressively more sophisticated and better-paying roles.

#### Table 8: Related Career Pathways

##### Job Zone Two Occupations

|  |  |  |  |
| --- | --- | --- | --- |
| Occupation | 2023 Jobs | Typical Education Requirement | Median Annual Earnings |
| Forest and Conservation Workers | 251 | High school | $38,164 |
| [Animal Breeders](https://www.onetonline.org/link/summary/45-2021.00) | 37 | High school | $40,619 |
| Animal Trainers | 2,793 | High school | $33,906 |
| [Agricultural Inspectors](https://www.onetonline.org/link/summary/45-2011.00) | 215 | Bachelor's | $51,214 |
| Veterinary Assistants and Laboratory Animal Caretakers | 1,831 | High school | $44,456 |
| Biological Technicians | 6,927 | Bachelor's | $61,693 |

##### Job Zone Three Occupations

|  |  |  |  |
| --- | --- | --- | --- |
| Occupation | 2023 Jobs | Typical Education Requirement | Median Annual Earnings |
| First-Line Supervisors of Farming, Fishing, and Forestry Workers | 734 | High school | $47,218 |

## Occupation Profiles and Job Postings

### O\*Net Occupation Profile-Agricultural Technician

The United States Department of Labor, Employment, and Training Administration created and regularly updates more than 800 occupational profiles with characteristics like skills, educational requirements, and daily tasks, based on the inputs of industry experts and people who are employed in the occupations.

#### Description

Work with agricultural scientists in plant, fiber, and animal research, or assist with animal breeding and nutrition. Set up or maintain laboratory equipment and collect samples from crops or animals. Prepare specimens or record data to assist scientists in biology or related life science experiments. Conduct tests and experiments to improve yield and quality of crops or to increase the resistance of plants and animals to disease or insects.

#### Top Skills

* Understanding written sentences and paragraphs in work-related documents.
* Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
* Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
* Understanding the implications of new information for both current and future problem-solving and decision-making.
* Considering the relative costs and benefits of potential actions to choose the most appropriate one.
* Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
* Communicating effectively in writing as appropriate for the needs of the audience.
* Adjusting actions in relation to others' actions.
* Teaching others how to do something.
* Watching gauges, dials, or other indicators to make sure a machine is working properly.
* Talking to others to convey information effectively.
* Managing one's own time and the time of others.
* Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

#### Top Daily Tasks

* Cultivate land.
* Operate farming equipment.
* Record research or operational data.
* Maintain laboratory or technical equipment.
* Research sustainable agricultural processes or practices.
* Prepare biological samples for testing or analysis.
* Measure ingredients.
* Test quality of materials or finished products.
* Prepare scientific or technical reports or presentations.
* Collect biological specimens.
* Operate laboratory or field equipment.
* Examine characteristics or behavior of living organisms.
* Manage agricultural or forestry operations.
* Set up laboratory or field equipment.
* Supervise scientific or technical personnel.
* Train personnel in technical or scientific procedures.
* Develop sustainable industrial or development methods.
* Research diseases or parasites.
* Care for plants or animals.
* Research crop management methods.
* Prepare compounds or solutions for products or testing.
* Provide technical information or assistance to public.

#### Additional Information

##### National Associations

* Agronomic Science Foundation
* American Dairy Science Association
* American Society for Clinical Pathology
* American Society of Agronomy
* American Society of Animal Science

##### Accreditation, Certification, & Unions

* American Registry of Professional Animal Scientists
* Society of Commercial Seed Technologists

#### Job Postings - Agricultural Technician

P2C uses a third-party system that aggregates data from job postings to provide perspective on the skills and qualifications employers are prioritizing in their advertisements for these occupations.

* After controlling for multiple postings that likely referenced the same single opening, over the last year, we identified 221 unique job postings for Agricultural Technicians.
* We identified 104 unique employers who posted openings online.

##### Top Employers Advertising:

* Blount Fine Foods
* Plantwerks
* Express Employment Professionals
* The Judge Group
* The Home Depot
* Cumberland Farms
* Actalent
* Ezhire Cannabis
* Acosta
* Hexcel
* Walmart
* Kura Sushi USA
* Monroe Tractor & Implement Co.
* Westaff
* The Coating House
* Tougas Family Farm
* Cms Landscaping
* Natural Resources Conservation Service
* Little Leaf Farms

##### Top Job Titles:

* FSQ Technicians
* Horticulture Technicians
* Food Service Technicians
* Agriculture Extension Agents
* Food Equipment Service Technicians
* Quality Managers
* Landscaping Assistants
* Safety Technicians
* Appliance Repair Technicians
* Sensory Technicians
* Soil Conservationists
* Agronomists
* SQF Practitioners
* Agricultural Specialists
* Facilities Services Technicians
* Farm Workers

##### Top Qualifications:

* Valid Driver's License
* 30-Hour OSHA General Industry Card
* Pesticide Applicator License
* Food Protection Manager Certification
* SQF (Safe Quality Food) Practitioner
* EPA 608 Technician Certification
* Hazard Analysis and Critical Control Point (HACCP) Certification

### O\*Net Occupation Profile-Biological Technician

The United States Department of Labor, Employment, and Training Administration created and regularly updates more than 800 occupational profiles with characteristics like skills, educational requirements, and daily tasks, based on the inputs of industry experts and people who are employed in the occupations.

#### Description

Assist biological and medical scientists. Set up, operate, and maintain laboratory instruments and equipment, monitor experiments, collect data and samples, make observations, and calculate and record results. May analyze organic substances, such as blood, food, and drugs.

#### Top Skills

* Understanding written sentences and paragraphs in work-related documents.
* Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
* Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
* Using scientific rules and methods to solve problems.
* Understanding the implications of new information for both current and future problem-solving and decision-making.
* Communicating effectively in writing as appropriate for the needs of the audience.
* Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
* Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
* Talking to others to convey information effectively.
* Considering the relative costs and benefits of potential actions to choose the most appropriate one.
* Using mathematics to solve problems.
* Watching gauges, dials, or other indicators to make sure a machine is working properly.
* Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.

#### Top Daily Tasks

* Collect biological specimens.
* Monitor operational procedures in technical environments to ensure conformance to standards.
* Interpret research or operational data.
* Research microbiological or chemical processes or structures.
* Record research or operational data.
* Prepare biological samples for testing or analysis.
* Set up laboratory or field equipment.
* Clean objects.
* Care for plants or animals.
* Analyze chemical compounds or substances.
* Examine characteristics or behavior of living organisms.
* Order materials, supplies, or equipment.

#### Additional Information

##### National Associations

* American Academy of Forensic Sciences
* American Association for Laboratory Animal Science
* American Chemical Society
* American Fisheries Society
* American Institute of Biological Sciences

### Job Postings - Biological Technician

P2C uses a third-party system that aggregates data from job postings to provide perspective on the skills and qualifications employers are prioritizing in their advertisements for these occupations.

* After controlling for multiple postings that likely referenced the same single opening, over the last year, we identified 531 unique job postings for Biological Technicians.
* We identified 223 unique employers who posted openings online.

#### Top Employers Advertising:

* Bristol-Myers Squibb
* Actalent
* Disability Solutions
* Mass General Brigham
* Sullivan Tire and Auto Service
* AbbVie
* Takeda Pharmaceutical Company
* Foundation Medicine
* Vertex Pharmaceuticals
* Moderna Therapeutics
* Massachusetts General Hospital
* Eclaro
* Massbioed Foundation
* Columbia Consulting Group
* Eli Lilly
* Baystate Health
* Randstad
* Eurofins
* Waltham Public Schools
* Rangam Infotech
* GlaxoSmithKline
* System One
* Pfizer
* Rangam International
* CSL
* Thermo Fisher Scientific
* Outlier

#### Top Job Titles:

* Bioprocess Associates
* Molecular Technologists
* Manufacturing Technicians
* Extraction Technicians
* Process Associates
* General Service Technicians
* Microbiology Technicians
* Neuroscience Specialists
* Scientific Associates
* Bioprocess Technicians
* Molecular Biology Interns
* Biometrics Technicians
* Prep Technicians
* Biological Science Technicians
* Cell Culture Technicians
* Scientists
* Directors of Analytical Development
* Quality Control Microbiology Analysts
* Associate Scientists
* Research Technologists
* Cleanroom Technicians
* Rehabilitation Registered Nurses
* Manufacturing Bioprocess Technicians
* Laboratory Assistants

#### Top Qualifications:

* Technologist In Molecular Biology (MB-ASCP)
* Valid Driver's License
* American Society for Clinical Pathology (ASCP) Certification
* Certified First Responder (CFR)
* Certified Risk Adjustment Coder (CRC)
* American Medical Technologists (AMT) Certification
* American Association for Laboratory Animal Science (AALAS) Certification