

VERMONT

Forest Economy

Career Guide

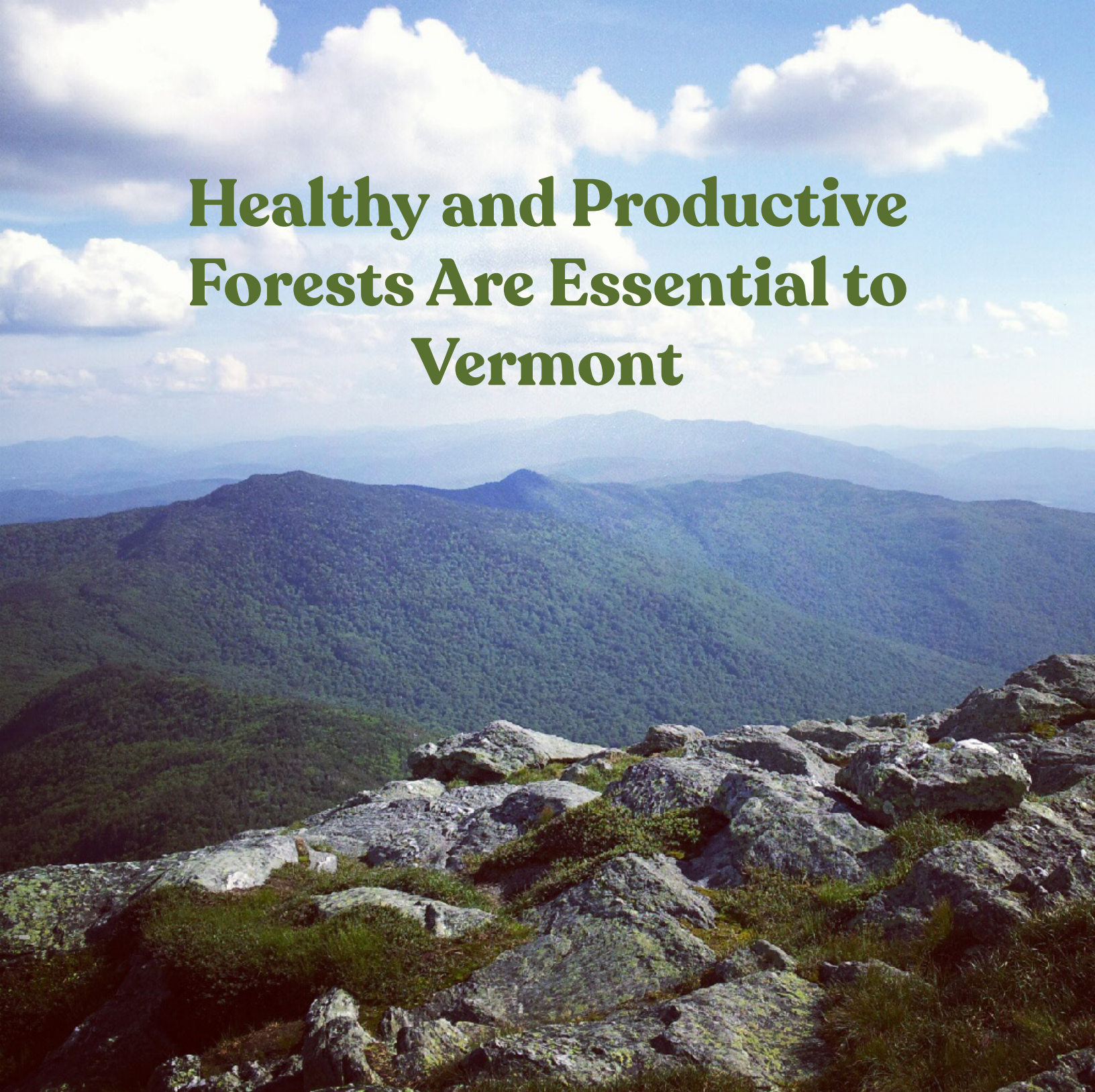




ACKNOWLEDGMENTS

Special thanks to Lia Ivanick, Emily Bradbury, Ricky McLain, Peggy Farabaugh, Colleen Goodridge, Mike Rainville, Charlie Hancock, Tony D'Amato, Danielle Fitzko, Emma Hanson, Dave Hubbard, Catherine Emil, Jamey Fidel, and Ken Gagnon for all their generous help in providing information for this Guide, and to Paul Frederick, Robbo Holleran, Molly Willard, Ann Nygard and Samuel Nijensohn, who reviewed the Guide for accuracy.

Photography by Erica Housekeeper



Healthy and Productive Forests Are Essential to Vermont

Forest economy jobs in Vermont range from logging to furniture-making, from using drones that map the forest to manufacturing wood pellets for heat. A diverse and dynamic field, Vermont's forest and wood products industry attracts people who enjoy being in the woods, working with their hands, using technology to solve environmental problems, operating large machines, and running their own business.

Part of Vermont's history and heritage, forest-related businesses play an important role in preserving the health and productivity of Vermont's forests, which are critical to our economy, the working landscape, tourism and recreation, and the environment.

Vermont's forest products industry supports 9,100 direct and indirect jobs in forestry, logging, processing, specialty woodworking, construction, and wood biproducts, generating an annual economic output of \$1.3 billion. Forest-based recreation doubles that impact with activities such as hiking, mountain biking, fishing, bird watching, and skiing on Vermont's forested land adding \$1.9 billion to the economy and supporting another 10,000 jobs. And maple production adds another 2,600 jobs, and \$53.5 million in economic output from Vermont's forests.

Protecting and conserving Vermont's forests depends on a healthy forest and wood products industry. The next generation of forest industry professionals will steward Vermont's most valued natural resource for both economic and environmental benefit. As the current workforce ages and approaches retirement and new technologies and markets appear, there are opportunities for both employment and advancement in all areas of the industry.

Understanding Vermont's Forest Economy

Vermont's forests were almost completely cleared in the 1800s for agriculture, leaving only 20 to 30 percent of forested land intact. Through the 1900's, most of the mountain pastures were abandoned for natural regrowth, with forested land currently covering about 76 percent of the state, or 4.5 million acres. These post-pasture forests offer particular challenges and opportunities. How we choose to protect and steward our forested land for the next one hundred years will depend on the next generation of forest industry professionals.

PRIMARY FOREST ECONOMY CAREERS

Stewardship of our forested land begins with the "primary" side of the industry, which includes the foresters, loggers, and log haulers and sawmills. Professional foresters and loggers choose which trees to cut and how to balance the many objectives of public and private landowners, including wildlife habitat, income from timber, recreation, and clean water. Log haulers move forest products on to sawmills and pulp mills where they are processed for a variety of uses. Other forest-related careers include real estate surveying, wetlands, watershed and wildlife management, arborists, nursery work, pest control, and forest-related recreation.

"We want our community to understand that you can have a wild, remote experience in a working landscape. Wild does not necessarily mean pristine or untouched. Vermont is a small place; we get a lot from our landscape."

Mike DeBonis
Executive Director
Green Mountain Club



SECONDARY FOREST ECONOMY CAREERS

The “secondary” side of the industry utilizes processed wood for construction, flooring, furniture, woodware, pellets, paper, plywood, and prefabricated wood, among many other items. Careers in this field range from high-end woodworking—including everything from making electric guitars and hand-crafted bowls—to manufacturing veneers for cabinets and wood pellets for heat. New and innovative ways to use wood are emerging every day, with exciting new products such as mass timber, biofuel, and products that may someday replace plastic!

RELATED FOREST ECONOMY CAREERS

A third category of jobs surrounds and supports the forest economy, and includes bookkeepers, sales managers, retail salespeople, educators, and attorneys.

In addition to the forest economy career options highlighted here, our forests are utilized for two other significant sectors in Vermont: maple production and recreation. This guide focuses on timber harvesting and utilization for wood-based products, but forest-related career seekers should know that many wonderful careers can also be found in maple production and forest-based recreation, and much of the education and training for forestry is applicable in those sectors as well.

Useful Connections

Throughout the Vermont Forest Economy Career Guide, we refer to educational opportunities that are conveniently available to every Vermonter at [Career and Technical Centers](#) (see map, page 5). We also highlight [CareerOneStop](#), a website clearinghouse of the U.S. Department of Labor that identifies data and trends for different occupations, as well as training options.

“Forests that are untouched will change anyway, and not necessarily in the way you want them to. We can manage the forest to provide the products and the environment we want”

Johannes von Trapp
Forest Ecologist and
President
Trapp Family Lodge



The forest economy provides a wide range of jobs, many of which do not require a four-year post-secondary degree. Whether you are interested in woodworking, owning your own business, machinery, science, or simply being in the forest every day, there may be a job in the forest economy for you!



Vermont's Career and Technical Centers



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FORESTRY



FORESTERS

Responsible for the overall health of a forest, foresters manage public forest land (i.e., US Forest Service, Vermont County Forester, State Land Stewardship Forester) and/or provide private consultation to landowners. Foresters may also perform the duties of auditing a landowner's land so ensure it meets the requirements of a third-party certification organization (see "Forest Third Party Certifications").

FOREST & CONSERVATION TECHNICIANS

Technicians carry out the skilled, technical work of a forest management plan including mapping, inventory, marking, tree thinning, and reforestation.

URBAN & LANDSCAPE FORESTRY

Arborists, tree trimmers, and pruners preserve the health, value, and appearance of individual trees and shrubs.

Work Context

Public and private forests are managed for many objectives such as timber harvesting, wildlife habitat, recreation, and carbon sequestration, among others. Foresters are responsible for understanding the makeup of the forest as well as developing, implementing, and managing a plan to achieve the landowner's objectives and support the long-term overall health of the forest. Work in the field of forestry may include identifying trees for removal and areas for planting; mapping and inventorying a forested area using GIS; monitoring and mitigating invasive species; preparing reports; or overseeing a timber sale. Foresters are often self-employed, or they work for private consulting firms or for the government.

Work Values & Skills

Forestry work is good for people who like to spend time working outdoors in all seasons. The schedule can be irregular and physically demanding, with work sites often in remote locations. **Foresters** have the highest level of education in this sector and must have a strong background in science, biology, and mathematics, as well as an understanding of relevant laws and regulations to ensure compliance. Data collection and analysis are important skills in the field, as are good communication skills. Foresters write forest management plans and supervise the work of technicians and other contractors.

Forestry and Conservation Technicians carry out the technical execution of a forester's plan, while arborists are skilled in maintaining and improving the health of individual trees and shrubs, typically in urban or suburban settings. Both can expect to utilize various tools and machines.

Tree Trimmers and Pruners are expected to be able to use arborist supplies like clippers, harnesses, ropes, shears, shredding and chipping equipment, various pruners and saws, and operate machinery like trucks, loaders, tractors, material lifting clamps, and other climbing and lifting equipment.

Education

Entry-level positions typically require a high school diploma. Some employers offer apprenticeships that combine paid, on-the-job training with skill development. Forest and conservation technician jobs generally require one to two years of post-secondary education. Professional foresters have at

“Some of the best parts of my job are when I can see that light go off in a client’s eyes, where they get it, and they understand it.

Part of that is fostering that commitment to steward that resource or protect that resource through a conservation easement or some other mechanism. Because people only love what they know, and they only protect what they love.

So part of our job is to get them to know and understand what they got.”

Charlie Hancock
Consulting Forester
North Woods Resource
Group

least two to four years of post-secondary education, most commonly a Bachelor of Science degree, and some go on to pursue advanced degrees.

Vermont offers a unique educational pathway through a partnership between Vermont Technical College (VTC) and the University of Vermont (UVM). Students can gain an associate's degree at VTC and transfer those credits toward a bachelor's degree at UVM.

- 79% of Foresters have a Bachelor of Science degree; 12% have an associate degree (or some level of college and no degree); 3% have a master's degree.
- 50% of Forestry and Conservation Technicians have an associate degree (or some level of college with no degree); 35% have a high school diploma; 14% have a bachelor's degree.
- 94% of Arborists have high school diploma or less.

Wage and Employment Data

FORESTERS



2021 Median
Hourly Wage

\$30.65

2021 Median
Annual Wage

\$63,750

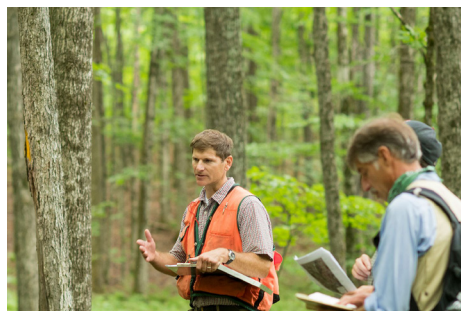
Annual Projected
VT Job Openings

9

U.S. Trend: Approx. 15,900 job openings nationally for Foresters and Conservation Scientists due to a retiring and decreasing workforce.

Local info: [Vermont Department of Labor](#) National info: [U.S. Bureau of Labor Statistics](#)

FOREST AND CONSERVATION TECHNICIANS



2021 Median
Hourly Wage

\$20.96

2021 Median
Annual Wage

\$43,600

Annual Projected
VT Job Openings

9

U.S. Trend: The need for workers to control wildfires, along with increased demand for timber and wood pellets, is projected to account for employment increases.

Local info: [Vermont Department of Labor](#) National info: [U.S. Bureau of Labor Statistics](#)

TREE TRIMMERS AND PRUNERS



2021 Median
Hourly Wage

\$18.64

2021 Median
Annual Wage

\$38,770

Annual Projected
VT Job Openings

89

U.S. Trend: Job opportunities are expected to see growth.

Local info: [Vermont Department of Labor](#)

National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
University of Vermont Burlington, Vermont	B.S. in Forestry
Vermont Technical College Randolph, Vermont	Associate of Applied Science in Forestry <i>Education articulation agreement with UVM to seamlessly enter as a junior to pursue a BS in Forestry</i> Arboriculture Certificate Program <i>Requires an associates degree; designed for professionals wishing to become certified and gain continuing education credits</i>
Paul Smith's College Paul Smiths, New York	B.S. in Forestry in three concentrations: Ecological Forest Management Forest Operations Forest Biology
SUNY College of Environmental Science and Forestry Syracuse, New York	B.S. in Forest Ecosystem Science B.S. in Forest Health B.S. in Forest Resources Management
The Ranger School, SUNY ESF Wanakena, New York	Associate in Applied Science in Forest Technology
University of Massachusetts Amherst, MA	Urban Forestry & Arboriculture Concentration
University of New Hampshire Durham, New Hampshire	B.S. in Forestry

Vermont Career and Technical Centers

Career and Technical Center	Program
Green Mountain Technology and Career Center Hyde Park	Forestry and Land Management
Stafford Technical Center Rutland	Natural Resources and Forestry
Southwest Vermont Career Development Center Bennington	Forestry & Heavy Equipment
Canaan Career Center Canaan	Diversified Agriculture & Natural Resources
North Country Career Center Newport	Natural Resources Heavy Equipment Operation and Maintenance
St. Johnsbury Academy St. Johnsbury	Forestry Resources and Land Management
Patricia A. Hannaford Career Center Middlebury	Natural Resource Management
Central Vermont Career Center Barre	Natural Resources and Sustainability
River Bend Career and Technical Center Bradford	Diversified Agriculture and Natural Resources
Randolph Technical Career Center Randolph	Environmental Resource Management
Windham Regional Career Center Brattleboro	Forestry & Natural Resources
Cold Hollow Career Center Enosburg Falls	Forestry & Natural Resources

Other Training Opportunities

School/Organization	Program
The Mountain School of Milton Academy Vershire, Vermont	Wood Crew & Forestry <i>Semester program for high school juniors who come to live and work together on the school's farm</i>
Vermont Youth Conservation Corps	Vermont Forestry Work Crew <i>This grant-funded program focuses on workforce development, training students in a variety of forest-related skills including trail work, maintenance, construction, carpentry, and forestry.</i>
A collaboration between: Vermont Youth Conservation Corps Vermont Technical College Vermont Career & Technical Education Centers University of Vermont University of New Hampshire	<i>This program is for students ranging from high school to college, to lifelong learners working on Timber Stand Improvement (TSI) crews in the field with the Vermont Youth Conservation Corps.</i> <i>Among other skills, these TSI crews learn how to use chainsaws, gain knowledge about wood implementation, tree species and quality identification</i> <i>Could potentially be eligible to students for academic credit</i>

Related Licenses and Certifications

Certification/License	Where to Get It
Forest License	Vermont Secretary of State, Office of Professional Regulation – Forester Licensing
Certified Forester	Society of American Foresters
Certified Arborist	International Society of Arboriculture – Specialty
Certified Tree Care Safety Specialist	Tree Care Industry Association

FOREST FIRE PREVENTION



FOREST FIREFIGHTERS

Forest firefighters do the brunt of the physical work required for fighting fires and rescuing people in forested or vacant public lands. They operate the firefighting and rescue vehicles, administer first aid, and rescue civilians. They also patrol natural areas in order to prevent future fires by enforcing regulations.

FOREST FIRE PREVENTION

Prevention inspectors and specialists enforce fire regulations, inspect fire hazards, recommend prevention and control measures, report forest fire and weather conditions, patrol areas for hazardous conditions, and compile and report meteorological data. Supervisory level jobs oversee teams that control fires and train workers. Public education may also be a part of the job.

Work Context

While forest fires are uncommon in Vermont, they are increasingly common in other parts of the United States and the world.

Work Values and Skills

Leadership, communication skills, good decision-making, and the ability to function well under stress are essential to this profession. The work of forest firefighters is extremely physical and dangerous, involving hazardous situations. Workers are expected to drive all-terrain vehicles for fire and rescue purposes and use basic fire suppression equipment like extinguishers, fire pump sets, shovels, axes, and power saws. It is essential to have knowledge about emergency first aid, with paramedic training often preferred.

Education

Entry-level positions typically require a high school diploma or equivalent and some post-secondary education. One to twelve months of on-the-job training is required to achieve competency, while supervisory positions often require five years of experience. First aid, CPR, and/or paramedic training are important to firefighting jobs.

- 61% of forest firefighters have a high school diploma or equivalent; 19% have additional degree or certificate.
- 24% of fire prevention inspectors and specialists have a bachelor's degree, while more than 50% of supervisors have an associate, bachelor's, or master's degree.

Wage and Employment Data

FOREST FIREFIGHTING PREVENTION SUPERVISORS



2020 Median
Hourly Wage

\$31.62

2020 Median
Annual Wage

\$65,770

Annual Projected
VT Job Openings

5

U.S. Trend: From 2019 to 2029, jobs in this field are projected to grow much faster than average across the country due to increased forest fires across the West.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

FOREST FIRE INSPECTORS AND PREVENTION SPECIALISTS



2020 Median
Hourly Wage (US)

\$20.26

2020 Median
Annual Wage (US)

\$42,150

Annual Projected
VT Job Openings

No data

U.S. Trend: From 2019 to 2029, jobs in this field are projected to grow much faster than average across the country due to increased forest fires across the West.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

FOREST FIREFIGHTERS



2020 Median
Annual Wage (US)

\$25.24

2020 Median
Annual Wage (US)

\$52,500

Annual Projected
VT Job Openings

10

U.S. Trend: From 2019 to 2029, jobs in this field are projected to grow much faster than average across the country due to increased forest fires across the West.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
Vermont Fire Academy Pittsford, Vermont	Firefighter I and Firefighter II, Fire Instructor, Fire Inspector
St. Michael's College Colchester, Vermont	Certificate in Emergency Management
Paul Smith's College Paul Smiths, NY	Wildland Firefighting Minor

Vermont Career and Technical Centers

Career and Technical Center	Program
North Country Career Center Newport	Natural Resources Heavy Equipment Operation and Maintenance
Northwest Technical Center St. Albans	Public Safety and Fire Services
River Bend Career and Technical Center Bradford	Emergency Services and Fire Management
Southwest Vermont Career Development Center Bennington	Forestry & Heavy Equipment
Windham Regional Technical Center Brattleboro	Protective Services

Other Resources

School/Organization	Program
National Wildfire Coordinating Group	Offers online, hybrid and in-person courses in basic wildland firefighting as well as advanced courses



GEOPHYSICAL SURVEYING AND MAPPING

CARTOGRAPHERS AND PHOTOGRAMMETRISTS

Cartographers draw and create maps, while photogrammetrists use satellite and aerial images to build models of the earth's surface. Both compile data points from multiple sources—such as land records, GIS data, photography, and field surveys—and use digital design tools. These maps and models are used by foresters, landowners, and government for a variety of purposes.

GEOGRAPHIC INFORMATION SYSTEMS (GIS) TECHNICIANS

GIS is used commonly in the forest industry to capture and map spatial and geologic data. Computer-based applications often allow the user to create interactive queries to assist foresters in decision-making and planning. Remote GIS sensors can be used on airplanes and drones to capture data from above.

Work Context

Increasingly, forestry organizations are seeking out individuals with dedicated surveying and mapping skills. Workers in this field gather and interpret datapoints to map the physical properties of the land. The work is very visually oriented and requires a high-level of attention to detail. Most of the work is indoors, though sometimes fieldwork is necessary.

Work Values and Skills

A background or interest in geography, mathematics, design, engineering, and technology are all useful in this field. Employers look for innovation, detail-orientation, creativity, accuracy and precision, an analytical mind, an investigative personality, and an ability to visualize information/artistic inclinations. Workers use map creation software, computer aided design (CAD), database under interface and query software, graphics and photoimaging, web platform development software, and development environmental software.

Education

Most workers in this field have a bachelor's degree or higher in cartography, geography, geomatics, or surveying. Many have a forestry degree. Some entry-level jobs may be available with a certificate or associate degree.

- 57% of Cartographers and Photogrammetrists have a certificate or associate degree; 30% have a bachelor's degree; and 12% have a master's degree.
- 99% of GIS Scientists and Technicians have a bachelor's degree or higher.

Wage and Employment Data

CARTOGRAPHERS AND PHOTOGRAMMETRISTS



2021 Median
Hourly Wage

\$36.63

2021 Median
Annual Wage

\$76,190

Annual Projected
VT Job Openings

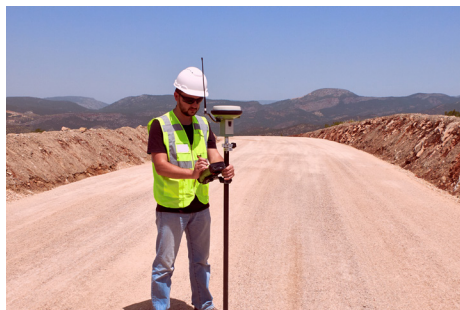
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U.S. Trend: Projected rapid growth of job opportunities due to increased use of maps in government planning.

Local info: [Vermont Department of Labor](#)

National info: [U.S. Bureau of Labor Statistics](#)

GIS TECHNICIANS



2020 Median
Hourly Wage (US)

\$33.41

2020 Median
Annual Wage (US)

\$69,490

Annual Projected
VT Job Openings

47

U.S. Trend: Projected rapid growth of job opportunities due to increased use of maps in government planning.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

GEOSPATIAL INFORMATION SCIENTISTS AND TECHNOLOGISTS



2020 Median
Annual Wage

\$33.41

2020 Median
Annual Wage

\$69,490

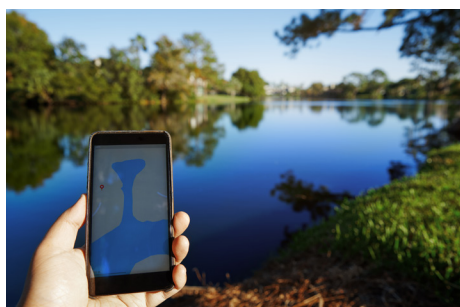
Annual Projected
VT Job Openings

47

U.S. Trend: Projected rapid growth of job opportunities due to increased use of maps in government planning.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

REMOTE SENSING SCIENTISTS AND TECHNOLOGISTS



2020 Median
Annual Wage (US)

\$51.55

2020 Median
Annual Wage (US)

\$107,210

Annual Projected
VT Job Openings

No data

U.S. Trend: No data available.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
University of Vermont Burlington, Vermont	BA in Geography BS in Forestry BS in Geology/Earth Science BS in Computer Science Mathematics and Statistics
Vermont Technical College Randolph, Vermont	ArcGIS Pro (Online)
University of Maine Orono, Maine	Survey Engineering
University of Southern Maine Portland, Maine	Certificate in Applied Geographic Information Systems BA in Geography-Anthropology, Specialization in Applied Geographic Information Systems
Unity College Unity, Maine	Certificate in Environmental Geographic Information Systems

Related Licenses and Certifications

Certification/License	Where to Get It
Certified GIS/LIS Technologist	American Society for Photogrammetry and Remote Sensing
Certified Mapping Scientist, GIS/LIS	American Society for Photogrammetry and Remote Sensing
GEOINT Professional Certification Cartography	National Geospatial Intelligence Agency
Certified Photogrammetrist	American Society for Photogrammetry and Remote Sensing
Engineer	Vermont Secretary of State Office of Professional Regulation - Board of Professional Engineering



LOGGING

LOGGERS

Loggers and fellers are responsible for cutting trees and directing the fall in a safe way while sustaining the least damage to the tree. They are able to determine which trees to cut, trim tops before a cut, appraise trees for certain characteristics (twist, rot), and determine what cuts should be made with which tools. Loggers often use heavy equipment, with specialized training in operating skidders, loaders, slashers and excavation equipment.

TRUCK AND TRACTOR OPERATORS

Operators drive trucks, tractors, skidders and other equipment at a logging site, within a warehouse, log yard, or construction site.

Work Context

Logging forms a link between landowners and foresters, carrying out responsible timber harvesting practices and implementing management goals. The work includes operating large equipment, building log roads, felling trees, and manufacturing logs based on measurements and imperfections. Most often, logs are delivered to mills for processing. Logging companies can act as reliable wood chip dealers to biomass users if they have the machinery and consistency to make good quality chips. Loggers often are self-employed or work as partners.

Work Values and Skills

Logging is a physical job that requires stamina, skill, and the ability to work outdoors in all kinds of weather (logging is often done in the winter when the ground is frozen). Employers will look for workers who are able to use tools and heavy machinery such as axes, chainsaws, harvesters, bulldozers, excavators, skidders, forwarders, feller-bunchers and de-limbers. Loggers are responsible for manufacturing logs to mill specifications. A high regard for safety protocols is important. Mechanical aptitude and/or experience is also desirable.

Education

Typical entry-level jobs require a high school diploma or equivalent. On-the-job training is moderate (one to twelve months) and specific vocational training for loggers ranges from short demonstrations to one year or longer.

- 44% of loggers have a high school diploma or equivalent; 64% large equipment operators have a high school diploma or equivalent.
- 23% of workers have a certificate or some college, and 2% have an associate degree.

“Timber harvests are the key to keeping the entire system sustainable. It’s the economics of the timber industry that keep Vermont’s forests as forests.”

Ken Gagnon
Owner
Gagnon Lumber



Wage and Employment Data

LOGGERS/FALLERS



2021 Median
Hourly Wage

\$22.03

U.S. Trend: Job opportunities are projected to flatten.

2021 Median
Annual Wage

\$45,810

Annual Projected
VT Job Openings

No data

National info:
[CareerOneStop](#)

Local info: [Vermont Department of Labor](#)

LOGGING EQUIPMENT OPERATORS



2021 Median
Annual Wage

\$18.34

U.S. Trend: Job opportunities are projected to decrease.

2021 Median
Annual Wage

\$38,150

Annual Projected
VT Job Openings

15

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

INDUSTRIAL TRUCK AND TRACTOR OPERATORS



2021 Median
Annual Wage

\$18.74

U.S. Trend: Job opportunities are projected to flatten.

2021 Median
Annual Wage

\$38,980

Annual Projected
VT Job Openings

89

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
Vermont Technical College Randolph, Vermont	Forestry <i>Students interested in forestry/logging can take classes in diesel mechanics, hydraulics, welding, and other technologies. VTC offers intern opportunities with select log contracting firms. VTC offers Game of Logging classes</i>
SUNY College of Environmental Sciences and Forestry Syracuse, New York	A.A.S. Degree in Forest Technology
Paul Smith's College Paul Smiths, New York	A.A.S Degree in Forestry Technology School of Logging – summer program
University of Maine at Fort Kent Fort Kent, Maine	A.A.S. Degree in Forest Technology
University of New Hampshire Durham, New Hampshire	Certificate in Environmental Geographic Information Systems

Vermont Career and Technical Centers

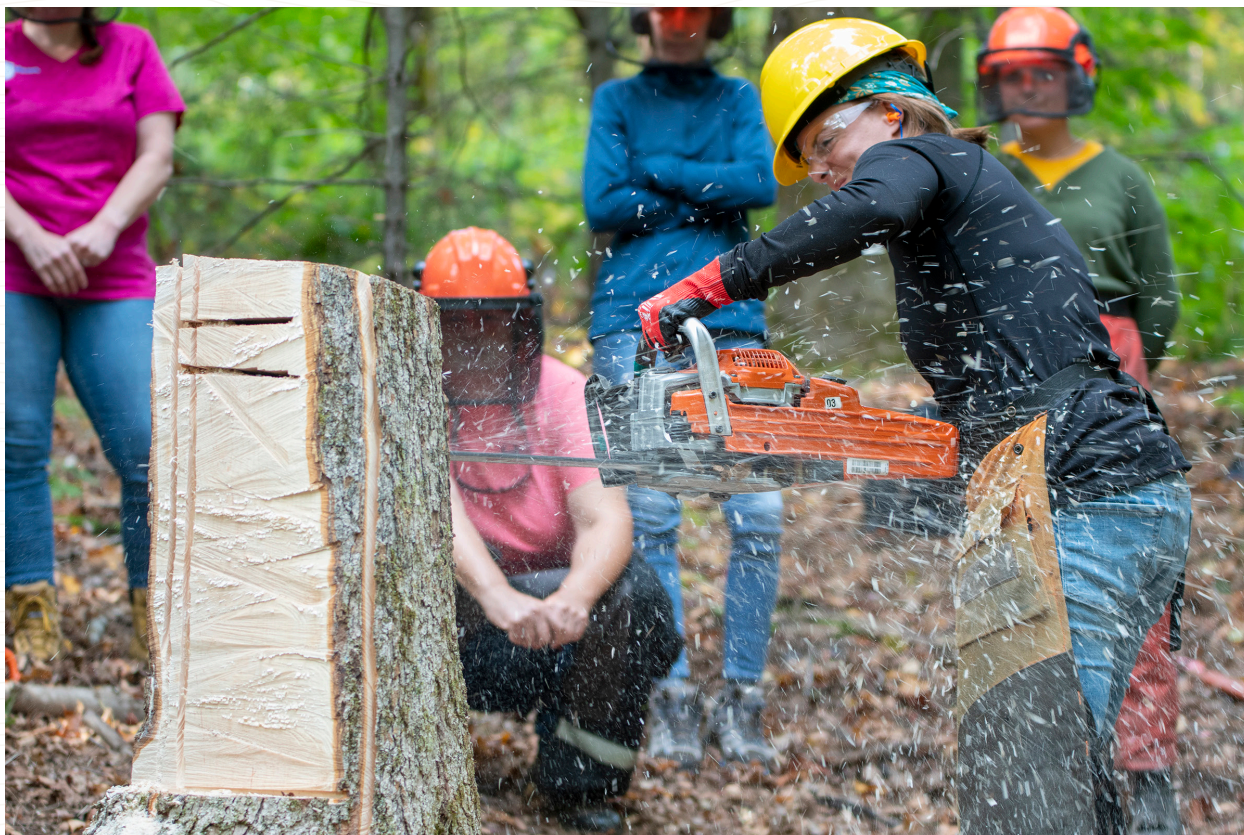
Career and Technical Center	Program
Canaan Career Center Canaan	Diversified Agriculture and Natural Resources
Center for Technology Essex	Automotive Technology
Green Mountain Technology and Career Center Hyde Park	Forestry and Land Management
North Country Career Center Newport	Natural Resources Heavy Equipment Operation and Maintenance
Northwest Technical Center St. Albans	Automotive Technology Outdoor Technology
Patricia A. Hannaford Career Center	Automotive Technology Diesel Power Technology Natural Resource Management
Randolph Technical Career Center Randolph	Automotive Technology Diesel Technology

Vermont Career and Technical Centers

River Bend Career and Technical Center Bradford	Diversified Agriculture and Natural Resources Heavy Equipment
River Valley Technical Center Springfield	Horticulture and Natural Resources
Southwest Vermont Career Development Center Bennington	Forestry & Heavy Equipment

Related Licenses and Certifications

Certification/License	Where to Get It
Provisional LEAP Certification Full LEAP Certification	Vermont Logger Education to Advance Professionalism (LEAP) Program
Game of Logging Chainsaw Training and Events Logging and forest management has typically been seen as a male-dominated field, but increasingly there are initiatives in Vermont to get women more involved with this field, such as the Women's Game of Logging training at Merck Forest .	Green Mountain Technology and Career Center Merck Forest and Farmland Visitor Center Northeast Woodland Training (NEWT) Our Vermont Woods Paul Smith College River Valley Technical Center Stafford Technical Center Vermont Family Forests Vermont Local Roads Program Vermont Technical College Vermont Urban and Community Forestry Windham County Natural Resources Conservation District Windham Regional Woodlands Association
Safety Certified Mechanized Logger Safety Certified Non-Mechanized Logger <i>Qualifies workers for a 15% discount on their worker's compensation insurance premiums</i>	Vermont Agency of Natural Resources, Department of Forests, Parks, and Recreation
Master Logger Certification	Northeast Master Logger Certification



“Learning to use a chainsaw was the most empowering thing I have ever done. It amazed me how I could fell a tree in such a precise location.”

Caitlin Gosciminski, a Natural Resources major at the University of Vermont and participant in the Women’s Game of Logging





TRUCKING AND TRANSPORTATION

TRACTOR TRAILER DRIVER

Truck drivers transport logs, lumber, and other items from origin to destination. The haul can be local or long-distance, and usually has a same-day return. Tractor trailer drivers sometimes operate forklifts at the mill to load and unload the logs.

Work Context

The movement and transportation of logs, lumber, machinery, and other heavy items requires skilled truck and tractor operators who can move items both within a worksite and across state lines.

Work Values and Skills

This is a profession that is very much in need of skilled workers. Public safety is paramount to this profession. Tractor trailers have the capacity to haul anywhere from 26,000 – 99,000 pounds of freight on public roads, so attention to detail, dependability, and the utmost concern for safety protocols are critical to work in this area. Workers typically spend time outdoors in all kinds of weather and are responsible for the operation, inspection, and maintenance of their vehicle. Time management and the ability to meet firm deadlines is important.

Education

No formal education is required; however, most workers have a high school diploma or equivalent. Jobs in trucking require a commercial driver's license. On the job training is typically less than one month, while vocational training may be three to twelve months.

- 83% of Operators and 56% of Truck Drivers have a high school diploma or equivalent.
- Fewer than 20% of workers have a certificate or some college.

Wage and Employment Data

HEAVY AND TRACTOR-TRAILER TRUCK DRIVERS



2021 Median
Hourly Wage

\$23.52

2021 Median
Annual Wage

\$48,920

Annual Projected
VT Job Openings

439

U.S. Trend: Projected growth of job opportunities are expected to grow.

National info:
[CareerOneStop](#)

Local info: [Vermont Department of Labor](#)

Educational Opportunities

College / University	Degree Program
Vermont Technical College Randolph, Vermont	Diesel Technology

Vermont Career and Technical Centers

Career and Technical Center	Program
Burlington Technical Center Burlington	Automotive Science and Technology
Center for Technology Essex	Automotive Technology
Central Vermont Career Center Barre	Automotive Technology
Green Mountain Technology and Career Center Hyde Park	Automotive Technology
Hartford Area Career and Technology Center Hartford	Automotive Technology
North Country Career Center Newport	Heavy Equipment Operation and Maintenance
Northwest Technical Center St. Albans	Automotive Technology Industrial Maintenance and Repair
Patricia A. Hannaford Career Center Middlebury	Automotive Technology Diesel Power Technology
Randolph Technical Career Center Randolph	Automotive Technology Diesel Technology
River Bend Career and Technical Center Bradford	Automotive Technology Heavy Equipment
Stafford Technical Center Rutland	Automotive Technology

Related Licenses and Certifications

Certification/License	Where to Get It
Commercial Driver's License (CDL): Class A	Vermont Agency of Transportation, Department of Motor Vehicles Federal Motor Carrier Safety Administration
Master Truck Equipment Specialist	National Institute for Automotive Service Excellence



PRIMARY PROCESSING: SAWMILLS

Primary sawmills take the logs that have been felled in timber tracts, grade them, and saw them into boards, beams, poles, shingles, siding, and wood chips. Secondary manufacturing mills add value to the wood and prepare it for construction/manufacturing by further crafting the wood into materials like door and window units and frames, sash, molding, trim, flooring, wall paneling, and crown molding. Softwood mills produce more construction materials while hardwood mills more often produce raw material for secondary manufacturers to turn into finished products.

LOG BUYERS

Log buyers are the sawmill's representatives who go out into the field to buy logs. Typically, these workers start out with the skills of scaling and grading logs (and an understanding of forestry), and then go out to meet the producers in the field to explain their specifications. Generally speaking this is carried out by the mill owner in smaller companies, and also has a lot of crossover with other jobs. People skills and communication are required for this job, which tends to come with a certain amount of learned experience.

LOG GRADER AND SCALER

Scaling and grading a log means measuring it to determine the amount of lumber that can be sawn from it and assigning it a specific market-value grade based on overall quality. Graders and scalers should have the mathematical and analytical skills to know what parts of the log to cut off in order to increase its value. Many of the skills needed are picked up through on-the-job training.

Log graders and scalers inspect the logs as they arrive and enter their findings into hand-held data collectors that are then downloaded onto an office computer for other workers to access. Sometimes this role is performed by the mill owners themselves.

DRY KILN OPERATOR

In some mills, freshly sawn “green” lumber is dried on site in a lumber kiln to dry it to a desired moisture content to ensure stability in the final product. The idea is to reduce the moisture content of the lumber to a point at which seasonal changes will not change its dimensions, or create stains and decay. Drying may take place in various locations, be it with the processor, producer, primary or secondary mills.

FORKLIFT OPERATOR/LOADER

Loaders operate large forklift equipment to load and move the logs and lumber as needed around the yard and the mill. The operator often works in conjunction with the scaler and sometimes has a part in handling the forklift too.

SAWYER

Sawyer is one of the most skilled positions in the sawmill. Sawyers must possess a thorough knowledge of log defects and lumber grades in order to maximize the value of a log. Sawyers operate most of the machinery that cuts the logs into lumber to meet specifications. Their work may entail machine maintenance, adjusting blades, troubleshooting different parts of the process, and inspecting the completed product. On a surface level the actual activities are not very complicated and can be mastered with on-site and classroom training. But this work requires an understanding of how various machinery operates and knowledge of electrical, hydraulic, and air operation principles.

OFFICE AREA MANAGEMENT

In the office, workers manage information from the mill. They may track the logs through the mill as they become lumber, integrating that data into information useful for sales, like knowing the range of price values for the lumber. For this reason many workers in management started out grading and scaling logs. Managers interface the most with those in charge of lumber sales, and in smaller mills the owners may carry out sales transactions with buyers.

LUMBER INSPECTOR/GRADER/TALLIER

Lumber inspectors are the second data entry point on the outgoing end of lumber production. In a lot of ways their job is similar to those of the log grader and scaler, inspecting the finished product and recording grade and volume data. More than log inspectors, lumber inspectors are representing the buyer’s needs. Lumber inspectors work in a fast paced environment and are one of the highest paid positions at the mill. Like log grading and scaling, lumber inspection requires a high degree of attention to detail and the ability to do mathematical calculations quickly and accurately.

SORTING AND STACKING

This is an entry-level position requiring minimal technical skill. Once the lumber finishes going through the mill and is graded, it needs to be sorted by grade and size as part of the inspection process, before it ships out to the buyers.

SALES

Some larger mills have salespeople, many of whom are familiar with lumber trading and may have started out as lumber inspectors or graders. In smaller mills, the mill owner is in charge of most sales and is in contact with the wholesale buyer. Developing relationships with people who share common goals is a huge part of this job. Every relationship is a new opportunity.

Work Context

Many small, family-owned businesses exist in Vermont, making not only the technical and operational skills important but knowledge about running a business essential as well. There are numerous jobs within a sawmill, from production to management to sales, and these positions both overlap and interface with one another. Some workers at a sawmill may never have to saw a log, but all sawmill workers learn to know the lumber well and play a key role in its movement through the mill. Today's modern saw booth is computerized, so computer skills are desired for these positions. Much of the work of a sawmill is done outdoors, in the open air.

Work Values and Skills

Safety gear, such as protective eye wear, is common for most workers. Employers look for precision, attention to detail, stress tolerance, familiarity with hand tools, and mechanical knowledge. For this profession, proficiency in automated inventory software and use of tools like calipers and other measuring equipment is very useful. In larger mills, computers are used to run machinery, so technical skills are important. In secondary manufacturing mills Computer Numerical Control (CNC) software is used to perform shaping and machining operations. Knowledge of mechanics, production and processing, and public safety and security is important in daily operations. Strong interpersonal skills are important for most workers as well, as inspectors and managers interface with buyers and the retail sector. All workers are in communication with each other to coordinate the movement of the lumber and to collaborate on the floor.

Education

Most jobs require a high school diploma or equivalent and one to twelve months of on-the-job training. Most lumber inspectors are taught within the mill, learning that mill's specific techniques and proprietary grades, though hardwood lumber inspectors may also attend an intensive in-person school run by the [National Hardwood Lumber Association](#). Specific vocational training requires three to twelve months.

- 59% have a high school diploma or equivalent.
- 22% have less than a high school diploma.
- 19% have a certificate or some college experience.

Wage and Employment Data

SAWYERS



2021 Median
Hourly Wage

\$17.85

2021 Median
Annual Wage

\$37,120

Annual Projected
VT Job Openings

13

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

LOG GRADERS AND SCALERS



2021 Median
Annual Wage

\$18.04

2021 Median
Annual Wage

\$37,520

Annual Projected
VT Job Openings

10

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
Vermont Technical College Randolph, Vermont	Forestry <i>VTC offers sawyer training programs through its Continuing Education Program.</i>
Paul Smith's College Paul Smiths, New York	Forestry Program <i>Forestry students manage the college-owned land and transform the timber into finished boards at Paul Smith's sawmill.</i>
University of New Hampshire Durham, New Hampshire	A.A.S. in Forest Technology – Thompson School of Applied Science <i>UNH has a sawmill connected to their campus that students in this program use as a part of their hands-on curriculum.</i>

Vermont Career and Technical Centers

Career and Technical Center	Program
Central Vermont Career Center Barre	Electrical Technology
Green Mountain Technology and Career Center Hyde Park	Electrical Technology
Hartford Area Career and Technology Center Hartford	Industrial Mechanics and Welding
North Country Career Center Newport	Heavy Equipment Operation and Maintenance
Northwest Technical Center St. Albans	Industrial Maintenance and Repair
Patricia A. Hannaford Career Center Middlebury	Mechanical Science Construction Technology Industrial Design and Fabrication
River Valley Technical Center Springfield	Industrial Trades
Southwest Vermont Career Development Center Bennington	Building Trades Manufacturing Technology
Stafford Technical Center Rutland	Electrical and Plumbing Welding

Related Licenses and Certifications

Certification/License	Where to Get It
National Hardwood Lumber Association	<p>Offers educational programs for the hardwood industry. Sometimes they can be contacted by a sawmill to teach a short course.</p> <p>Inspector Training School Webinars Online Training Programs Short Courses & Workshops</p> <p>Good for both primary and secondary mill education</p>
Individual Forklift Certification	Forklift Academy
Machining Level I - CNC Milling : Programming Setup and Operations	National Institute for Metalworking Skills



BIOMASS AND WOOD ENERGY

According to the Vermont Department of Forests, Parks, and Recreation, 78 cents of every dollar spent on fossil fuels leaves the state. Vermont is one of the most forested states in the country (74% forested land), and also the state with one of the most ambitious renewable energy goals: our 2030 goal is to have 35% of thermal energy sourced from wood-fuel. Currently wood fuel contributes 21% of Vermont's thermal energy needs, 33% of Vermont homes are heated partially or in full by wood, and 1/3 of Vermont students attend a school heated by wood. It is estimated that if Vermont's renewable energy goals are met, ~40 million gallons of fossil fuels will be displaced per year, saving Vermonters \$120,000,000 annually and keeping jobs within the state. This creates a huge opportunity on the job market for those potentially interested in entering the industry.

BIOMASS – WOOD PELLET MILL MANUFACTURING

Wood pellets and briquettes are made from fluffy, low density wood (mostly sawdust or wood shavings), that has been compressed into shapes by machinery. Pellets and briquettes are denser than a log and they lack water content, which makes the process of burning them for energy much more efficient and clean. Wood pellets are most often burned in boilers, furnaces, or small household heating stoves – basically acting as improved firewood. There are both smaller pellet mills and larger pellet plants. Wood pellet heating can be used in homes and businesses to displace traditional fossil fuels. For more information: [Wood Biofuels: Past, Present and Future](#).

PELLET MILL OPERATOR

Generally, workers in a pellet mill directly operate wood pellet and hydraulic briquetting presses to compress the woody residue into high density products. Machinery may include a wood chipper that reduces the raw wood materials to the appropriate size, drum/flatbed dryers that achieve the desired moisture content in the wood, hammer mills that grind the wood to further reduce its size, and of course pellet mills that “pelletize” the materials into the final correct shape and size. The pellets that come out of the die holes of pellet mills are hot and soft and must be taken to cool and release any moisture content. Sometimes workers are responsible for operating forklifts and loaders to move materials around and bagging and shrink wrap equipment to package the final pellet product. Throughout the entire process, workers are performing quality control measures, recording valuable information, and minding safety and manufacturing regulations.

HEAVY EQUIPMENT OPERATOR

One of the most skilled jobs at the mill are heavy equipment operators, with previous training required more often than not. Heavy equipment includes most of the machinery meant for moving the materials around the warehouse and production areas of the plant. Various loaders are used for unloading woody debris from trucks, and cranes and forklifts are used for moving and stacking woody materials and pallets. Workers must additionally weigh and scale the materials or compliance with specifications.

PACKAGING OPERATOR

Sometimes mills also have a position responsible for operating bagging, baling, and shrink-wrapping machines, bag sealers, forklifts and pallet jacks. Packaging operators stack the sealed bags and place the finished goods in the correct warehouse locations.

INSTALLATION/SERVICE TECHNICIANS

Installation workers assemble wood heating systems for customers to use, while service technicians are able to troubleshoot and repair malfunctioning systems. Most of the required skills heavily overlap with education in Heating, Ventilation, and Air Condition (HVAC) systems, plumbing systems, or electrical systems. Oftentimes it is enough to follow those educational pathways with a brief course on wood heat for a worker to be able to successfully carry out this job. Wood systems function best when they are running at full capacity, so workers must be able to appropriately size systems so that they don't over or under fire. Significant customer interactions and some sales experience are necessary.

CHIMNEY SWEEP OR TECHNICIAN

Chimney sweeps or technicians are types of service technician that can service and install wood pellet stoves and related chimney products, as well as cleaning dryer vents. Currently there is a special need for pellet stove service technicians in Vermont.

BIOMASS — ELECTRICAL PLANTS

Wood is a major source of energy for heat and electricity in the United States. Wood slabs can be ground (or “hogged”) up and burned to generate heat, like firewood and charcoal, the latter of which are sometimes generated from wood chips and sawdust. Other times the heat generated from burning wood is used to create steam or hot water in some electrical plants (cogeneration). Some plants specialize in biomass gasification, where wood is heated in the absence of oxygen to create solid charcoal fuel and gas. Gasification captures these gases and burns them for energy, which can then be used to operate boilers or even large-scale machines. Bio-oil is produced when these gases are condensed into a liquid, similar to ethanol, which can also be used in boilers and furnaces. The quality of biomass materials depends on density and moisture.

ELECTRICAL ENGINEER

Electrical engineers research and develop electrical systems and equipment, and can act as supervisors who oversee the manufacture and installation of those systems. They must abide by project and safety specifications, detail their own standards, scopes, timelines, and budgets, and use drawings and formulas to make those designs tangible. Much of their technical work is done on computers and using computer aided design technology (CAD), while much of their supervising is done on site. They must keep up to date and write reports on current and past electrical engineering studies and projects as well as keeping in contact with clients and customers about current or potential future projects and developments. For electrical engineers in the biomass industry, a knowledge of forestry is also very helpful.

PLANT OPERATOR

Plant technicians have intricate knowledge about the technical workings of plant machinery. Workers perform routine maintenance and repair of equipment and operate the technical aspects of the machinery, allowing them to keep detailed documentation of operational data. The data is analyzed to track malfunctions, usage, and general monitoring information that can be used to advise the supervisor. On the ground, workers regularly adjust the controls of the machinery to ensure machine output is at the correct level and operations are happening at a functional and productive rate. Like operators, they are responsible for the housekeeping and cleaning duties around the plant too.

MANAGEMENT/CONTROL ROOM OPERATIONS

Workers plan and direct activities in compliance with regulatory requirements and maximizing capacity while minimizing operating costs. Workers frequently monitor the operating status of the plant or mill from the control room with computers, switchboards, and gauges. Conducting field inspections within the plant and mill to ensure safe operating conditions and investigate abnormalities is also required. Monitoring often involves multi-tasking, as there are typically multiple simultaneous processes occurring. Workers are in charge of the business end of the mill too, reviewing logs and reports, identifying market trends, managing budget plans, and communicating with potential customers.

Work Context

Wood pellets and chips are the main biomass products used for heat and electricity in Vermont. Vermont has two wood-fueled electricity generating plants, and currently one wood pellet mill, but wood residues can also be used to power kilns that dry lumber, or sent to paper mills as pulp. Jobs in the biomass industry are very procedure-oriented, with a lot of collaboration and teamwork amongst those on the floor, monitoring multiple processes and machines operating, recording data, performing quality assurance/quality control, troubleshooting and problem-solving, and keeping in mind the specifications of the project at every step. Work on the ground is very physical and requires people to be able to lift multiple pounds, sometimes walk on ladders and bridges, and use their hands to perform precise, repetitive tasks. There is much exposure to hazardous materials both indoors and outdoors, and common protective gear must be worn. Interpersonal relationships between team members and customers/clients are essential. There is a lot of interfacing between biomass workers and foresters, loggers, and sawmill workers. Oftentimes foresters come to inspect and buy the wood chips, and sawmill and logging companies act as chip dealers to the biomass mills and plants. In Vermont there is a need for reliable logging or sawmill companies with the equipment and consistency to create a good quality chip.

Work Values and Skills

Qualities employers look for when hiring in this field are dependability, active listening, physical stamina and precision, detail-orientation, analytical thinking, cooperation, adaptability, stress tolerance, and initiative. Management especially needs leadership skills and the ability to set and achieve one's goals. Communication and problem-solving is valued all around. Additional skills include troubleshooting, quality assurance/quality control, inventory/record-keeping, machine maintenance, basic math skills, and especially competence with computers. Engineers must know how to use CAD software and have a background in chemistry, physics, and mechanics. Management is aided by some knowledge of economics and accounting, and on the job must also know about personnel and human resources and have some clerical knowledge. All workers must have knowledge of public safety and the principles of production and processing.

Education

For technicians and operators, typical entry-level education is a high school diploma or equivalent. On-the-job training requires 1-12 months, with no experience needed. For management, entry-level education is usually a Bachelor's degree and 5 years or more of work experience is needed. Specific vocational training requires over 2-4 years.

- 64% of management workers have a Bachelor's degree; 22% have an Associate's degree; and 11% have a high school diploma or equivalent
- 65% of technical workers have a high school diploma or equivalent; 31% have a certificate or some college with no degree.

Wage and Employment Data

HVAC INSTALLERS AND MECHANICS



2021 Median
Hourly Wage

\$28.55

2021 Median
Annual Wage

\$59,380

Annual Projected
VT Job Openings

111

U.S. Trend: Projected growth of job opportunities is increasing.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

ELECTRICAL ENGINEERS



2021 Median
Annual Wage

\$47.76

2021 Median
Annual Wage

\$99,340

Annual Projected
VT Job Openings

52

U.S. Trend: Projected growth of job opportunities is increasing.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

BIOMASS POWER PLANT MANAGERS



2021 Median
Annual Wage

\$47.07

2021 Median
Annual Wage

\$97,910

Annual Projected
VT Job Openings

36

U.S. Trend: Projected growth of job opportunities is slightly decreasing.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

BIOMASS PLANT TECHNICIANS



2021 Median
Hourly Wage

\$37.19

2021 Median
Annual Wage

\$77,360

Annual Projected
VT Job Openings

8

U.S. Trend: Projected growth of job opportunities is flat.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

POWER PLANT OPERATORS



2021 Median
Annual Wage

\$37.19

2021 Median
Annual Wage

\$77,360

Annual Projected
VT Job Openings

8

U.S. Trend: Projected growth of job opportunities is flat.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University

Degree Program

Vermont Technical College
Randolph, Vermont

[Forestry](#)

VTC offers sawyer training programs through its Continuing Education Program.

Paul Smith College
Smiths, New York

[Forestry Program](#)

Forestry students manage the college-owned land and transform the timber into finished boards at Paul Smith's sawmill.

University of New Hampshire
Durham, New Hampshire

[A.A.S. in Forest Technology – Thompson School of Applied Science](#)

UNH has a sawmill connected to their campus that students in this program use as a part of their hands-on curriculum.

Vermont Career and Technical Centers

Career and Technical Center	Program
Center for Technology Essex	Computer Systems Technology
Burlington Tech Center Burlington	Advanced Manufacturing and Engineering for a Sustainable Future
Green Mountain Technology and Career Center Hyde Park	Electrical Technology
River Valley Technical Center Springfield	Advanced Manufacturing/Engineering Industrial Trades
Riverbend Career and Technical Center Bradford	Construction Academy and Residential Energy

Related Licenses and Certifications

Certification/License	Where to Get It
Energy Efficiency Management Certificate Program Public Power Manager	American Public Power Association – Core

Other Training Opportunities

Many big manufacturing companies, like [Messersmith](#) and [Harman](#), have programs to train their employees on their specific products/biomass systems.

BIOCHAR

Biochar is a solid material obtained from the thermochemical conversion of biomass in an oxygen-limited environment. The process creates a fine-grained, highly porous charcoal that helps soils retain nutrients and water. Biochar is found in soils around the world, like the Amazon, as a result of vegetation fires and historic soil management practices. Biochar can be an important tool to increase food security and cropland diversity in areas with severely depleted soils, scarce organic resources, and inadequate water and chemical fertilizer supplies. Biochar also improves water quality and quantity by increasing soil retention of nutrients and agrochemicals for plant and crop utilization.

EMERGING TECHNOLOGY: WOOD NANOTECHNOLOGY

NANOTECHNOLOGY ENGINEERS

Nanotechnology engineers are the masterminds behind the development of molecule-size materials that are used to make packaging, textiles, and other everyday products. They conduct research using advanced tools and microscopy techniques to synthesize and characterize the nanomaterials and eventually develop new products.

NANOTECHNOLOGY TECHNOLOGISTS/TECHNICIANS

Under the supervision of nanotechnology engineers, nanotechnology technologists/technicians are responsible for implementing production of their designs using advanced precision and microscopy skills in the lab. They compile research and engineering data, develop and modify protocols, write materials for grants and patent applications, and may prepare contracts and disclosures.

Work Context

Nanotechnology is an emerging area of potentially large growth. Nanoparticles are one-millionth of a millimeter, and this area of study uses nano-metals and nano-delivery systems to make wood more durable and resistant to moisture changes, decay, fire, UV light, pests, and fungi, opening up new and commercially important areas for product development. Work is done in laboratories or in other environmentally controlled indoor environments and focuses on updating and applying relevant knowledge and analyzing information. New products are designed and tested in the laboratory before being brought to market. The research conducted is broad, ranging from packaging, heat transfer, fluorescence detection, nanoparticle dispersion, hybrid systems, liquid systems, nanocomposites, nanofabrication, optoelectronics, and nanolithography, among many others.

Work Values and Skills

Nanotechnology engineers require formal education and training in science and engineering. Workers often have backgrounds in a mix of mathematics, physics, chemistry, biology, design, engineering, and technology. Workers are proficient with computers and use software like computer aided design (CAD). It is very important for all these professionals to not only be organized, but accurate and exact when carrying out the activities of their job.

Work Values and Skills

A bachelor's degree is the minimum level of education for work in this area, with more advanced jobs requiring a master's or doctoral degree.

- More than 50% of nanotechnology engineers have a doctoral degree and 42% have a master's degree or post BA certificate.
- 8% of nanotechnology technicians have a doctoral degree; 84% have a bachelor's or associate degree.

Wage and Employment Data

NANOTECHNOLOGY ENGINEERS

2021 Median Annual Wage	\$47.49	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$98,780		National info: CareerOneStop
Annual Projected VT Job Openings	13		

Wage and Employment Data

NANOTECHNOLOGY TECHNOLOGISTS/TECHNICIANS

2021 Median Annual Wage	\$23.40	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$48,670		National info: CareerOneStop
Annual Projected VT Job Openings	125		

Educational Opportunities

College / University	Degree Program
Middlebury College Middlebury	Chemistry and Biochemistry
Norwich University Norwich	Chemistry
University of Vermont Burlington	Chemistry Biochemistry



WOOD MANUFACTURING

VENEER AND PLYWOOD

Veneer is wood or bark usually thinner than 3 mm and typically glued on core panels to be used as doors, tops, and side panels, for cabinets, furniture, and flooring. Plywood is made from multiple sheets of veneer glued in alternating directions to resist shrinking and growth. Plywood is commonly used for floors, walls, roofs, and garages in residential construction.

SPECIALTY MILLWORK AND FURNITURE

Jobs in specialty millwork consist of skilled craftspeople engaged in manufacturing custom designed interiors or products made of wood (architectural woodwork, fine furniture). Common products custom manufactured are trim, built-in shelving or cabinetry, doors, windows, casings and other architectural detail, wall paneling, and furniture.

UTENSILS AND WOODWARE

Many of the items we use every day are made of wood such as cutting boards, games, and wooden utensils. These items are most often made in a manufacturing setting, though can also be considered fine woodworking for specialty items.

Work Context

Vermont employs nearly 1,000 workers in wood manufacturing jobs, and an additional 1,300 in furniture making. Many jobs in wood manufacturing involve operating and overseeing woodworking machinery and inspecting the final product for quality and defects. The work environment on the ground can be loud and typically requires safety gear, such as protective eye wear.

Work Values and Skills

Employers look for creativity, precision, accuracy, detail-orientation, independence, and dependability. Workers use equipment like bandsaws, planers, measuring devices, hand tools, drills, various saws, lathes, and machinery in their work, which requires fine motor skills. Soft skills such as active listening, good communication, and collaboration with coworkers are important, and knowledge in mathematics, mechanics, production and processing principles, and skills in customer service, monitoring, quality control analysis, and time management are preferred.

Education

A high school diploma or equivalent is typically required for entry-level positions. On-the-job training can range from one to twelve months.

- 73% of wood manufacturing workers have a high school diploma or equivalent; 5% have some college or a certificate.

“A lot of us enjoy the product development process, we have a very robust product development committee. We just tallied up and we introduced 106 new products this year. That’s actually fairly typical for recent years, but it’s a lot of creative work that goes into that process, so that’s very fun.”

Mike Rainville
Owner
Maple Landmark
Woodcraft



Wage and Employment Data

Annual salaries for jobs in manufacturing range from \$31,170 to \$64,880, with starting hourly rates around \$18/hour. Some of the potential job titles in this field include CNC Operator, Wood Finishing Specialist, Woodworking Production Supervisor, Manufacturing Production Technician, and Manufacturing Engineer.

Educational Opportunities

College / University	Degree Program
Community College of Vermont Montpelier, Vermont	CAD/CADD Drafting and/or Design Technology/ Technician (Computer Aided Design and Drafting)
Shelburne Craft School Shelburne, Vermont	Resident Woodworker Program -Emerging Woodworker -Proficient Woodworker -Advanced Woodworker
University of Vermont Burlington, Vermont	Mechanical Engineering
Vermont Technical College Randolph, Vermont	Mechanical Engineering Technology
Vermont Woodworking School Cambridge, Vermont	Immersion Program
Yestermorrow Design/Build School Waitsfield, Vermont	Residential Design and Construction Green Woodworking Certificate

Vermont Career and Technical Centers

Career and Technical Center	Program
Burlington Technical Center Burlington	Advanced Manufacturing and Engineering for a Sustainable Future Pre-Tech Innovation, Technology & Design
Patricia A. Hannaford Career Center Middlebury	Mechanical Science Engineering & Architecture Design Industrial Design & Fabrication
Hartford Area Career and Technology Center Hartford	Building Trades STEM: Introduction to Engineering Design STEM: Principles of Engineering

Randolph Technical Career Center Randolph	Advanced Manufacturing Math Programs Pre-Technical Foundations
River Valley Technical Center Springfield	Advanced Manufacturing/Engineering Carpentry Pre-Technical Studies
Riverbend Career and Technical Center Bradford	Heavy Equipment
St. Johnsbury Academy St. Johnsbury	Technical Career Intensive - Woodworking
Southwest Vermont Career Development Center Bennington	Building Trades Manufacturing Technology

Related Licenses and Certifications

Certification/License	Where to Get It
Operator Certification	Concrete Sawing and Drilling Association
Certified Craftsman	National Wood Flooring Association

Types of Secondary Manufacturing: Millwork

CUT STOCK, RESAWING LUMBER, AND PLANING

Jobs in this industry are primarily engaged in the manufacture of dimension lumber (from purchased lumber) or dimension or cut stock, resawing sawmill output, and planing purchased lumber. Wood-working machinery like jointers, planers, lathers, and routers to shape the wood are commonly used. Products include bowling pins, handles, textile machine accessories, furniture squares, gun stock blanks, and vehicle stock.

PREFABRICATED WOOD BUILDING MATERIALS

Pre-fabrication refers to materials that have been already constructed and manufactured at a place other than the building site, thus making for quick and more economical assembly and erection of the parts once they're taken to the building site. Common prefabricated materials include doors, stairs, window walls, window panels, floor panels, and roof and floor trusses, made from glue laminated wood, pre-engineered wood, or metal-connected wood. Even buildings and homes, the typical final products, can themselves be prefabricated. Other final products include chicken coops, garages, cabins, panels, and sheds.

CUSTOM ARCHITECTURAL WOODWORK AND MILLWORK MANUFACTURING

Jobs in this industry consist of skilled craftspeople engaged in manufacturing custom designed interiors made of wood and its products (architectural woodwork, fixtures), as well as plastic laminates. Output is made to an individual order on a job shop basis. Common products custom manufactured are display fixtures, gondolas, wall shelving units, entrance and window architectural detail, sales and reception counters, wall paneling, and matching furniture.

Work Context

Work in this field is very similar to wood manufacturing, with workers on the production floor operating machinery and tools to build and inspect the final product. The woodwork manufactured at mills are made from the raw lumber cut at sawmills. Millwork refers to products like door and window units and frames, sash, molding, trim, flooring, wall paneling, crown molding, and decorative products like mantels and door castings. Millwork products are easy and convenient, needing only nails, screws or adhesives to be installed. Clear finger and joint wood moldings, decorative wood moldings (base, chair rail, crown, shoe), ornamental woodwork (cornices, mantel), stairwork (newel posts, railings, stairs, staircases), floorings, and shutters are other examples.

Prefabricated wood building manufacturing is a growing industry with different types of job emerging, from management/leaderships positions responsible for having the technical knowledge to make projects come to fruition, to design positions that prepare drawings based off of mathematical formulas and knowledge about installation. Wood manufacturing also includes jobs responsible for the actual building and construction of those designs, and to the jobs responsible for the delivery of the product, including sales and transportation.

See Wood Manufacturing for Wage Data, Education, Possible Next Steps, and Related Licenses and Certifications



FINE WOODWORKING

FURNITURE—OFFICE AND HOUSEHOLD (UPHOLSTERED AND NON-UPHOLSTERED)

Wood furniture may be manufactured on a stock or custom base, and be assembled or unassembled. Office products commonly include bookcases, cabinets, chairs, desks, filing cabinets, tables, and modular furniture systems. Household items include bedroom furniture, bookcases, buffets, coffee tables, dining room furniture, chairs, sofas, ottomans, and recliners. Compared to other types of wood manufacturing, furniture manufacturers typically must consider aesthetics, matching materials for characteristics like color, grain, and texture, attending to features like the knots in wood, and adding decorative or functional accessories. Furniture manufacturers also need to consider and account for the functionality of their products.

FURNITURE FINISHING

Furniture finishers shape, finish, and refinish high-grade furniture and upholstery to a specified color or finish for both decorative and protective purposes. The materials can be used, damaged, or new. The appropriate finishing ingredients are selected and mixed to obtain desired shades and colors, and brushed, sprayed, or hand-rubbed onto the grain, smoothing cracks or depressions and trying to remove marks and repair broken parts. Lacquer and other sealers are also applied. The idea is to get the product as free of imperfections as possible.

WOOD MODEL MAKING

Wood model makers construct full-sized scale precision models, patterns, templates, full-scale mock-ups, and molds for product parts and production tools. To form the patterns and models, they trim and shave wooden surfaces and use hand tools to fit and assemble the parts together. Sometimes they even fabricate work aids like scrapers and templates.

WOOD PATTERNMAKING

Wood patternmakers plan and construct wooden units, sectional patterns, models, templates, and full-scale mock-ups to shape the parts of products. Sand molds used for castings are one of the main products patternmakers create. They use a variety of woodworking machines and hand tools to achieve these ends and assemble the wood parts together to form those materials. If there are defects in castings, they have the ability to compensate the patterns to fix them.

CABINETRY

Cabinet makers and bench carpenters use tools to cut and assemble wooden articles, and operate machines to create products ranging from store fixtures, cabinets, high-end furniture, office equipment, countertops, and bathroom vanities on a stock or custom basis. Workers are also able to install hardware like hinges, handles, catchers, and drawer pulls. Cabinetry is often combined with other forms of carpentry.

MUSICAL/STRING INSTRUMENTS

Instrument making could be considered a category of its own, with its emphasis on forging, filing, and silver soldering. The body of the instrument is typically made in a CNC mill, while a lot of the finer work is done by hand. It takes a detailed-eye and fine handiwork to pick the right wood and master the instrument's patterns, correctly placing all the parts to make a functioning instrument. This industry is becoming increasingly mechanized. Guitars and other string instruments are common products, as are woodwind and reed instruments.

SPECIALTY ITEMS

Specialty Items include things like stand-up paddleboards, wooden skis, salad bowls, and holiday ornaments.

Work Context

Fine woodworkers combine a high level of craftsmanship with artisanship. Many types of jobs fall under fine-woodworking, from production-level jobs that require specific tasks, to the creative design and intricate sculpting jobs, and to the technical jobs in the shop. All workers must have an eye for imperfections and aesthetic appeal. Some jobs require more technical work that ensures the functionality of the products.

Work Values and Skills

Employers look for creativity, precision/accuracy, detail-orientation, complex problem-solving abilities, active listening, an understanding how to analyze the needs and product requirements to create a design, and an ability to visualize the work being done. Workers must be skilled with their hands and have quick reflexes. Mathematics knowledge is necessary for computing dimensions, areas, volumes, and weights, and a background in art and design has also served many fine wood-workers well in their craft. Knowledge in the principles of building, construction, production, processing, engineering, and technology is also helpful.

Education

A high school diploma is all that's required for entry-level jobs, with no previous experience necessary. Without experience, on-the-job training requires an average of 1-12 months, and more specific vocational training an average of 1-2 years.

- 48% of wood model makers have a high school diploma or equivalent, 36% have a certificate, or some college/no degree, and 16% have less than a high school diploma.
- 56% of wood patternmakers have a certificate or some college/no degree, 28% have a high school diploma or equivalent, 12% have less than a high school diploma, and 4% have an Associate's degree.
- 61% of furniture finishers have a high school diploma or equivalent, 36% have less than a high school diploma, and 3% have a certificate or some college/no degree.
- 62% of cabinet makers and bench carpenters have a high school diploma or equivalent, 27% have a certificate or some college/no degree, and 11% have less than a high school diploma.

“We want to love every design we create for our clients. If we wouldn’t want it in our own homes, then we go back to the drawing board.”

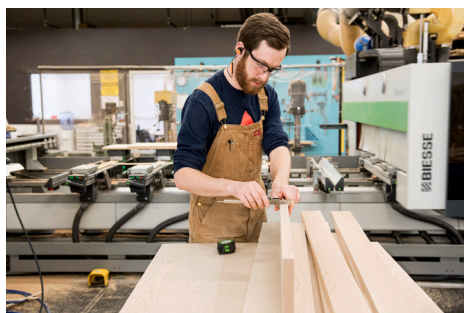
Jared Williams
Co-Founder
Towards Nightfall



Wage and Employment Data

Annual salaries for jobs in manufacturing range from \$31,170 to \$64,880, with starting hourly rates around \$18/hour.

FURNITURE FINISHERS



2021 Median
Hourly Wage

\$17.42

2021 Median
Annual Wage

\$36,230

Annual Projected
VT Job Openings

22

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

WOOD MODEL MAKERS



2020 Median
Hourly Wage (US)

\$30.79

2020 Median
Annual Wage (US)

\$64,050

Annual Projected
VT Job Openings

22

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

PATTERNMAKERS



2020 Median
Hourly Wage (US)

\$31.31

2020 Median
Annual Wage (US)

\$65,120

Annual Projected
VT Job Openings

22

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

CABINETMAKERS AND BENCH CARPENTERS



2021 Median
Hourly Wage

\$18.52

2021 Median
Annual Wage

\$38,520

Annual Projected
VT Job Openings

48

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#)

National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
Community College of Vermont Montpelier, Vermont	CAD/CADD Drafting and/or Design Technology/ Technician (Computer Aided Design and Drafting)
Shelburne Craft School Shelburne, Vermont	Resident Woodworker Program -Emerging Woodworker -Proficient Woodworker -Advanced Woodworker
University of Vermont Burlington, Vermont	Mechanical Engineering
Vermont Technical College Randolph, Vermont	Mechanical Engineering Technology
Vermont Woodworking School Cambridge, Vermont	Immersion Program
Yestermorrow Design/Build School Waitsfield, Vermont	Residential Design and Construction Green Woodworking Certificate

A man and a woman are working together at a wooden table in a rustic setting. The man, wearing glasses and a blue and white checkered shirt, is seated and looking at a smartphone. The woman, wearing glasses and a red sweater, is standing and leaning over the table, smiling. On the table are a laptop, a glass of water, and some papers. In the background, there is a fireplace with a large black and white photograph of a lion's face on the wall above it. A window with a wooden frame is visible on the left.

ENGINEERING AND DESIGN

ARCHITECT/BUILDING DESIGNER

Architects are the creative minds behind building design. They meet with clients to discuss their goals for the building, focusing on architectural and structural features like form, space, ambiance, and other aspects of the physical environment. They merge their creative capabilities and theoretical thinking with an understanding of the functional and scientific aspects of building design. They are often the ones carrying out much of the preliminary research on projects (costs, timelines, building codes, potential structural issues). At times, architects oversee the contractors who are hired to build and construct their designs.

STRUCTURAL/CIVIL ENGINEER

Structural engineers use mathematic and scientific principles to translate an architect's building design into quantifiable terms that both hold up to physics and follow specifications (monitoring specifications, safety specifications, financial specifications, timelines). They survey and assess the risks of building designs, construction methods, and materials with attention to safety, cost, environmental issues, and government regulations. Engineers are often able to travel to the construction site and oversee the work and help with potential problem-solving. At times they are called upon to present their findings and projects.

Work Context

Architects and engineers often work for private firms specialized in their fields. In Vermont, there is a cluster of engineering groups in the Burlington area, and a smaller number of firms throughout the state. Engineers and designers could also find themselves working at a nonprofit, like [WoodWorks](#), which gives free consulting and design assistance on various wood building projects, including [mass timber](#) projects. Many workers in this field become specialized in certain forms of building design.

Work Values and Skills

Both architects and engineers must be adept at using computer-aided design and drafting (CADD) programs on the job. Though engineers and designers may still draw out their designs by hand, CADD software is essential for producing drawings of their proposed structures. Prospective employers look for dependability, independence, detail-orientation, and integrity. Creativity is important for architects, while a background in mathematics is essential for engineers. Soft skills include complex problem-solving, active listening, critical thinking, and communication with co-workers as well as clients. Hard skills include the use of CADD and drafting software and various measuring device tools. Both architect and engineers should have knowledge in engineering, building technology, and construction principles.

Education

An Associate's degree is needed for architectural entry-level jobs, while a Bachelor's degree is needed for entry-level engineering jobs.

“Some of the things I really like with my current role now are being able to work with a variety of people on a variety of different projects. I like being able to span across a broad spectrum not just on the scale of the projects but on different wood products and wood materials that they’re using, and really being able to broaden my perspective on the building design.”

Ricky McLain
Engineering and
Architectural Consultant
WoodWorks

Wage and Employment Data

ARCHITECTURAL AND CIVIL DRAFTERS



2021 Median
Hourly Wage

\$29.22

2021 Median
Annual Wage

\$60,780

Annual Projected
VT Job Openings

24

U.S. Trend: Projected growth of job opportunities is slightly increased.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

STRUCTURAL/CIVIL ENGINEERS



2021 Median
Annual Wage

\$37.29

2021 Median
Annual Wage

\$77,560

Annual Projected
VT Job Openings

59

U.S. Trend: Projected growth of job opportunities is below average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University	Degree Program
Bennington College Bennington, Vermont	Architecture
Middlebury College Middlebury, Vermont	Architecture
Norwich College Norwich, Vermont	Architecture Construction Management Engineering

Saint Michael's College Colchester, Vermont	Engineering
University of Vermont Burlington, Vermont	Engineering
Vermont Technical College Randolph, Vermont	Engineering

Vermont Career and Technical Centers

Career and Technical Center	Program
Patricia A. Hannaford Career Center Middlebury	Engineering and Architecture Design Mechanical Science Construction Technology Industrial Design and Fabrication
Randolph Technical Career Center Randolph	Construction Trades and Management



CONSTRUCTION AND CARPENTRY

CONSTRUCTION CARPENTER

Carpenters construct, erect, install, or repair structures and fixtures made of wood including houses, commercial buildings, bridges, tunnels, additions, and decks.

FINISH CARPENTER

Finish Carpenters perform duties like constructing built-in wood cabinets on site, installing molding, trim, paneling, millwork, and countertops, and constructing doors and frames.

Work Context

Construction carpenters work with blueprints, architectural sketches, interior design drawings, or building plans to bring a structure from paper to reality. They are responsible for determining the best materials and use a variety of hand and power tools in their work. They may work alone or with subcontractors, such as electricians and plumbers. The work is often outside and can be physically demanding. Jobs in carpentry can range from entry level “helper” positions up to management or small business owner.

Work Values and Skills

Employers look for attention to detail, familiarity with hand and power tools, basic math skills, and good communication. Carpentry requires visualization and precision, as the carpenter is responsible for taking a plan or drawing to the next step with the selection and measurement of materials. Dependability is also important.

Education

Vocational training typically requires three to twelve months; however, some employers will offer on-the-job training which may be much less.

- 54% of construction carpenters have a high school diploma or equivalent; 45% have some college, a certificate, or associate degree.

Wage and Employment Data

CARPENTERS



2021 Median
Hourly Wage

\$22.94

2021 Median
Annual Wage

No data

Annual Projected
VT Job Openings

501

U.S. Trend: Projected growth of job opportunities slightly increases.

Local info: [Vermont Department of Labor](https://www.vermont.gov/business/employment)

National info: [CareerOneStop](https://www.careeronestop.org/)

OPERATING ENGINEERS AND OTHER EQUIPMENT OPERATORS



2021 Median
Hourly Wage

\$22.83

2021 Median
Annual Wage

No data

Annual Projected
VT Job Openings

115

U.S. Trend: Projected growth of job opportunities is much faster than average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

HELPER CARPENTER



2020 Median
Hourly Wage

\$16.98

2020 Median
Annual Wage

\$35,320

Annual Projected
VT Job Openings

26

U.S. Trend: Projected growth of job opportunities is faster than average.

Local info: [Vermont Department of Labor](#) National info: [CareerOneStop](#)

Educational Opportunities

College / University

Yestermorrow Design/Build School
Waitsfield, Vermont

Degree Program

[Residential Design and Construction
Green Woodworking Certificate](#)

Vermont Career and Technical Centers

Career and Technical Center	Program
Green Mountain Technology and Career Center Hyde Park	Construction Technology
North Country Career Center Newport	Building Trades
Patricia A. Hannaford Career Center Middlebury	Construction Technology Industrial Design and Fabrication
Randolph Technical Career Center Randolph	Construction Trades and Management
River Valley Technical Center Springfield	Carpentry
Riverbend Career and Technical Center	Construction Academy and Residential Energy
St. Johnsbury Academy St. Johnsbury	Technical Career Intensive - Construction
Stafford Technical Center Rutland	Construction Technology

Related Licenses and Certifications

Certification/License	Where to Get It
Installation Masters	Fenestration and Glazing Industry Alliance
Certified Graduate Builder	National Association of Home Builders
Architectural Openings Consultants	Door and Hardware Institute
Certified Construction Manager	Construction Manager Certification Institute
Construction Site Safety Supervisor	National Center for Construction Education and Research
Safety Trained Supervisor Construction	Board of Certified Safety Professionals

EMERGING TECHNOLOGY: MASS TIMBER

Mass timber is an emerging type of structural material for building construction. According to the nonprofit consulting firm WoodWorks, it is “a category of framing styles, typically characterized by the use of large solid wood panels for wall, floor, and roof construction.” It is favored by designers for its strength, aesthetics, construction efficiency, and reduced carbon footprint. Many engineering and architectural firms have workers who have not participated on mass timber projects, so aspiring designers, engineers, construction workers or other developers who specialize in this technology will really stand out on the job market.

The focus of mass timber projects has been on the construction of “tall wood buildings” made either from all wood products or a mix of wood and other materials, of which mass timber can easily work alongside. These buildings are designed and constructed to minimize environmental impacts at the forefront: the use of wood as a material generates a smaller carbon footprint, and building upwards with “taller” buildings as opposed to outwards with “wider” buildings minimizes the building’s footprint.

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN

As wood makes its journey from the forest to the mill, to the factory or woodshop, and finally into the hands of consumers, there are a number of professions that surround and support the industry. Many people in the forest economy are also small business owners, wearing multiple hats throughout the course of the workday. Larger operations may require administrative support—such as bookkeeping and accounting—and positions dedicated to warehouse logistics and operations, while some products may require sales or retail expertise. Advocacy for forest health and industry, through education and environmental law, is another area of related work.

Education

The typical entry-level education needed for most jobs along the supply chain is a bachelor's degree; however, some positions may require a more advanced degree, while others - namely technical assistance jobs - may only require a high school diploma or equivalent, and perhaps some vocational or on-the-job training.

- 87% of purchasing agents have a bachelor's degree or higher.
- 42% of accountants have a bachelor's degree; 39% have a certificate or some college.
- 65% of sales managers have a bachelor's degree; 17% have a master's degree.
- 70% of stock clerks have a high school diploma or equivalent; 17% have less than a high school diploma.

“The best part is working with Vermont woodworkers and furniture makers - you’re not going to find better people than that. They’re just the salt of the earth, and hard-working, and they’re just really nice people to deal with. But the customers are also very nice to deal with, because the customers are looking for something we feel really deeply about. They’re looking for sustainable, hand-made, American made, Vermont-made furniture, and they’re willing to pay a fair price for it. So you know, the people on both sides of us, who sell the furniture and buy the furniture, are what keeps us going.”

Peggy Farabaugh, owner of Vermont Wood Studios, a retail furniture store

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN: SALES

WHOLESALER/BROKER

Wholesalers purchase goods in large quantities directly from manufacturers (e.g., sawmills are the primary manufacturers) or distributors and resell to other businesses, mainly for retail. Sometimes a wholesaler will act as a lumber grader when the product is passed through the planer, pulling out materials their customers don't want. Brokers have a similar job, but the difference is that they own the products they sell.

SALES REPRESENTATIVE

Sales representatives sell goods on behalf of wholesalers and manufacturers and communicate with customers to solicit orders from them. They demonstrate and explain products, provide catalogs, find out customer needs and interests, then supply recommendations, estimates, bids, and answer questions regarding the product and its terms.

PURCHASING AGENT

Buyers and purchasing agents buy products and services for organizations to use or resell. They evaluate suppliers, negotiate contracts, and review the quality of products.

RETAILER

Once the product is available to the general public, such as at a furniture store or lumber warehouse, retailers and salespersons who are knowledgeable about the products can help facilitate a sale. Sometimes, marketing expertise is required to help promote a product to a specific audience.

Work Context

In Vermont, success is not only built on the exchange of money but on relationships and trust. Communication and word-of-mouth matters. It helps to be a creative thinker and an accurate and exact worker, able to organize and prioritize responsibilities, and not make mistakes in your transactions.

Work Values and Skills

Qualities employers look for when hiring in this field are customer service orientation, initiative, integrity, social perceptiveness, leadership, creativity, and the ability to set, prioritize, and meet challenging goals for oneself. Wholesalers, sales representatives, and purchasing agents should have excellent communication and negotiation skills. Retailers should also have good communications skills, though more geared towards marketing and customer service. It is important to be precise so as to minimize mistakes in your transactions. Hard skills include computer proficiency and the use of computer software applications like customer relationship management (CRM). A background in finance, sales and marketing, and small business is preferred.

Wage and Employment Data

WHOLESALEERS/BROKERS

2021 Median Hourly Wage	\$29.45	U.S. Trend: Projected growth of job opportunities is below average.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$61,260		National info: CareerOneStop
Annual Projected VT Job Openings	43		

SALES REPRESENTATIVES

2021 Median Hourly Wage	\$29.00	U.S. Trend: Projected job openings are very bright in the future.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$60,320		National info: CareerOneStop
Annual Projected VT Job Openings	210		

Wage and Employment Data

PURCHASING AGENTS

2021 Median Hourly Wage	\$29.45	U.S. Trend: Projected growth of job opportunities is below average.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$61,260		National info: CareerOneStop
Annual Projected VT Job Openings	43		

RETAILERS

2021 Median Hourly Wage	\$14.23	U.S. Trend: Projected growth of job opportunities is below average.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$29,590		National info: CareerOneStop
Annual Projected VT Job Openings	1,184		

Educational Opportunities

College / University	Degree Program
Bennington College Bennington, Vermont	Entrepreneurship/Entrepreneurial Studies
Castleton University Castleton, Vermont	Marketing Business Administration Media and Communication Degree Program
Champlain College Burlington, Vermont	Marketing Business Administration Finance
Community College of Vermont Montpelier, Vermont	Business
Landmark College Putney, Vermont	Business Studies
Northern Vermont University Johnson, Vermont	Business Administration
Norwich University Norwich, Vermont	Business Administration
Saint Michael's College Colchester, Vermont	Business Administration
University of Vermont Burlington, Vermont	Business Administration
Vermont Technical College Randolph, Vermont	Applied Business Management

Vermont Career and Technical Centers

Career and Technical Center	Program
Cold Hollow Career Center Enosburg	Business Leadership
Green Mountain Technology and Career Center Hyde Park	Business Administration
Hartford Area Career and Technology Center Hartford	Business Administration
River Valley Technical Center Springfield	Business & Financial Services Information Technology Human Services
Southwest Vermont Career Development St. Johnsbury	Business Management Human Services
Stafford Technical Center Rutland	Human Services

Related Licenses and Certifications

Certification/License	Where to Get It
Certified Product Marketing Manager	Association of International Product Marketing and Management - Advanced
Certified Advertising Specialist	Promotional Products Association International - Specialty
Certified Professional Purchasing Consultant	American Purchasing Society - Advanced
Certified Green Purchasing Professional	American Purchasing Society - Specialty
Certified Professional Public Buyer	Universal Public Purchasing Certification Council - Core

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN: FINANCIAL ASSISTANCE

BOOKKEEPER

Many business owners rely on professional bookkeepers to maintain their accounts and ledgers. They record transactions and prepare financial reports for supervisors.

ACCOUNTANT

An accountant is a professional who is responsible for keeping and interpreting financial records. They are responsible for a wide array of financial tasks, from budgeting to tax preparation.

Work Values and Skills

Bookkeepers and accountants should be detail-oriented with have an eye for accuracy and precision, and an ability to manage their time well. A background in mathematics, economics, or accounting is preferred.

Wage and Employment Data

BOOKKEEPERS

2021 Median Hourly Wage	\$22.70	U.S. Trend: Projected growth of job opportunities is below average.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$47,210		National info: CareerOneStop
Annual Projected VT Job Openings	601		

ACCOUNTANTS

2021 Median Hourly Wage	\$33.43	U.S. Trend: Job opportunities are projected to increase.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$69,530		National info: CareerOneStop
Annual Projected VT Job Openings	324		

Educational Opportunities

College / University	Degree Program
Bennington College Bennington, Vermont	Economics Mathematics
Castleton University Castleton, Vermont	Accounting Business Management Mathematics
Champlain College Burlington, Vermont	Accounting Finance
Community College of Vermont Montpelier, Vermont	Accounting
Northern Vermont University Johnson, Vermont	Accounting Mathematics
Norwich College Norwich, Vermont	Accounting
Saint Michael's College Colchester, Vermont	Accounting Economics Mathematics
University of Vermont Burlington, Vermont	Accounting Mathematics Statistics

Vermont Career and Technical Centers

Career and Technical Center	Program
Southwest Vermont Career Development St. Johnsbury	Accounting and Finance

Related Licenses and Certifications

Certification/License	Where to Get It
Certified Public Accountant License	Vermont Secretary of State Office of Professional Regulation Board of Public Accountancy
Certified Public Accountant	American Institute of Certified Public Accountants – Advanced
Accredited Business Accountant/Advisor	Accreditation Council for Accountancy and Taxation – Core
Accredited Management Accountant	American Academy of Financial Management – Advanced

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN: LOGISTICS

STOCKERS AND ORDER FILLERS

Stock clerks are responsible for receiving, counting, and inspecting materials and equipment received at warehouses or storage yards, performing record-keeping and inspection duties, disposing or returning items with defects and distributing items that meet acceptable standards to customers or co-workers.

LOGISTICS MANAGER

Logistics managers are responsible for coordinating the movement of goods between warehouses and customers. They develop policies and strategies for transportation, warehouse activities, safety performance, and quality management, keeping in mind cost-effectiveness, efficiency, and accuracy, and weighing the potential financial impacts. They direct distribution center operations.

Work Values and Skills

Employers look for dependability, integrity, detail-orientation, accuracy and precision, stress tolerance, and adaptability. For logistics managers especially, they look for leadership capabilities and enterprising personalities. Soft skills include analytical thinking, communication and collaboration, customer service, and an ability to investigate discrepancies and adjust for errors. Hard skills include a background in mathematics and the use of various software programs (e.g. enterprise resource planning (ERP) software, database user interface and query software). Stock Clerks use various labelling equipment like identification tags, stamps, and electronic marking tools to keep records. All workers benefit from the knowledge of production, processing, transportation, and administration management principles.

Wage and Employment Data

STOCKERS AND ORDER FILLERS

2021 Median Hourly Wage	\$14.23	U.S. Trend: Projected to have a large number of job openings.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$29,590		National info: CareerOneStop
Annual Projected VT Job Openings	392		

LOGISTICS MANAGERS

2021 Median Hourly Wage	\$38.39	U.S. Trend: Job opportunities are projected to increase.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$79,840		National info: CareerOneStop
Annual Projected VT Job Openings	16		

Educational Opportunities

College / University	Degree Program
Castleton University Castleton, Vermont	Management
Champlain College Burlington, Vermont	Supply Chain Management and Security
Community College of Vermont Montpelier, Vermont	Information Technology

Vermont Career and Technical Centers

Career and Technical Center	Program
River Valley Technical Center Springfield	Information Technology
Southwest Vermont Career Development St. Johnsbury	Human Services
Stafford Technical Center Rutland	Human Services

Related Licenses and Certifications

Certification/License	Where to Get It
Certified Professional in Distribution and Warehouse Management	American Purchasing Society - Core
Certified Warehouse Logistic Professional Tier I	International Warehouse Logistics Association
Certified Pricing Professional	Professional Pricing Society – Core
Senior Professional in Supply Management - 4	Next Level Purchasing Association

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN: ENVIRONMENTAL LAW

LAWYER

Environmental lawyers apply aspects of the law that provide protection to the environment and regulate management of specific natural resources, including forests. Lawyers may be called upon to interpret laws, draw up legal documents, resolve disputes, or represent clients in legal proceedings.

PARALEGAL

Paralegals are employed by a lawyer, law office, corporation, governmental agency or other entity and perform specifically delegated substantive legal work for which a lawyer is responsible.

Work Context

Legal work in the forest economy requires extensive knowledge of the laws and regulations that govern the industry, including water quality, pollution control, forest resources, wildlife and plants, sustainable development, and impact assessments. Environmental lawyers can work at many organizations that are resources for, or employ foresters. They can work for trade organizations that represent a portion of the industry, or at conservation organizations like the [Nature Conservancy](#). They can also work for law firms specifically meant either to provide policy expertise or to directly represent clients regarding environmental issues in the public. Environmental lawyers use their knowledge of the law to perform advocacy for environmental conservation and safety. Nonprofits like the [Vermont Conservation Law Foundation](#) employ lawyers specializing in environmental legal expertise. The [Vermont Natural Resources Council](#) combines scientific research and policy expertise to provide resources and education to the public, and advocates at the state legislature for policies regarding protecting the state's natural resources and community health.

Work Values and Skills

Lawyers are analytical thinkers who are skilled in communication, negotiation, conflict resolution, and the ability to evaluation information.

Education

Most lawyers have a Juris Doctor (JD), an advanced degree conferred upon the completion of law school. Paralegals typically need a bachelor's or associate degree.

100% of lawyers have a professional or doctoral degree.

Wage and Employment Data

LAWYERS

2021 Median Hourly Wage	\$37.73	U.S. Trend: New job opportunities are likely in the future.	Local info: Vermont Department of Labor
2021 Median Annual Wage	\$78,480		National info: CareerOneStop
Annual Projected VT Job Openings	83		

Educational Opportunities

College / University	Degree Program
Vermont Law School South Royalton, Vermont	Master of Environmental Law and Policy Juris Doctor
Champlain College Burlington, Vermont	Law
Northern Vermont University Johnson/Lyndon, Vermont	Pre-Law

Vermont Career and Technical Centers

Career and Technical Center	Program
Southwest Vermont Career Development St. Johnsbury	Pre-Law

Related Licenses and Certifications

Certification/License	Where to Get It
Attorney	Vermont Judiciary Office of Attorney Licensing
Board Certification in Civil Trial Law	National Board of Trial Advocacy – Specialty
Credit and Collection Compliance Attorney	Association of Credit and Collection Professionals – Advanced

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN: EDUCATORS

EDUCATOR

Educators are employed to communicate knowledge and train others. In the forest economy, jobs in education may include teaching forestry, conservation, or science at a college or university, or engaging the general public to improve understanding of overall forest health.

“The two things I like most about my job and working with students and working with foresters and other professionals. I’m wired—I was a forestry student—and so I can relate on some level to all that good stuff, to where the students are at and all that growth going on in their brain right now, as they’re really learning more than just tree species. Likewise with foresters, that’s where I wanted to go with my career before I got into an academic route, and so I really just enjoy having that time with them and really learning from them. They’re the experts in what they do, so it’s always a conversation that’s very enriching for me to learn from, and also at the same time feel needed if there’s things I can help with too.”

Tony D’Amato, forestry professor at the University of Vermont

Work Context

Professors at the university level are often involved with research as well as teaching students, and usually have a high level of expertise in their area. Being an educator is also helpful in community outreach positions where, though you may not be a teacher by trade, educating the public on important environmental issues is an essential part of the work. Many professionals ranging from foresters to sawmill owners to government employees run educational programs to expose young people to their field, or hold the position in their organization responsible for educating the general public on their work.

Work Values and Skills

Teaching, by definition, is communicating, so excellent communications skills are a must, as is the ability to adapt your communication style to the needs of your student depending on their age, culture, learning style, or ability. Deep knowledge of your field is also required of an educator, be that at the university or community level.

Education

A bachelor’s degree is the minimum requirement for obtaining a teaching certificate. For jobs at a university or college, most professors have an advanced degree in their field. This is typically done by completing a PhD program, but some professionals outside of academia are also known to have teaching positions at colleges and universities. In community outreach-type positions, no formal training is needed, just an ability to effectively communicate and connect with people.

Wage and Employment Data

KINDERGARTEN TEACHERS (EXCEPT SPECIAL EDUCATION)

2021 Median Annual Wage	\$60,130	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	24		National info: CareerOneStop

ELEMENTARY SCHOOL EDUCATION (EXCEPT SPECIAL EDUCATION)

2021 Median Annual Wage	\$61,220	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	284		National info: CareerOneStop

MIDDLE SCHOOL TEACHERS (EXCEPT SPECIAL EDUCATION)

2021 Median Annual Wage	\$60,340	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	83		National info: CareerOneStop

SECONDARY SCHOOL TEACHERS (EXCEPT SPECIAL EDUCATION)

2021 Median Annual Wage	\$61,130	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	148		National info: CareerOneStop

CAREER/TECHNICAL EDUCATION TEACHERS (MIDDLE SCHOOL)

2021 Median Annual Wage	\$61,640	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	N/A		National info: CareerOneStop

CAREER/TECHNICAL EDUCATION TEACHERS (SECONDARY SCHOOL)

2021 Median Annual Wage	\$60,430	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	14		National info: CareerOneStop

CAREER/TECHNICAL EDUCATION TEACHERS (POSTSECONDARY SCHOOL)

2020 Median Annual Wage	57,880	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	N/A		National info: CareerOneStop

TUTORS

2021 Median Annual Wage	46,730	U.S. Trend: New job opportunities are likely to increase in the future.	Local info: Vermont Department of Labor
Annual Projected VT Job Openings	135		National info: CareerOneStop

Educational Opportunities

College / University	Degree Program
Castleton University Castleton, VT	Education
Champlain College Burlington, Vermont	Education
Goddard College Plainfield, Vermont	Education
Middlebury College Middlebury, Vermont	Education Studies
Northern Vermont University Johnson/Lyndon, Vermont	Education

Educational Opportunities

Norwich University Norwich, Vermont	Education
University of Vermont Burlington, Vermont	Education

Vermont Career and Technical Centers

Career and Technical Center	Program
Randolph Technical Career Center Randolph	Education Services
Riverbend Career and Technical Center Bradford	Teacher Education

Related Licenses and Certifications

Certification/License	Where to Get It
Certified Professional Instructor	National Instruments Corporation
National Board Certification - Career & Technical Education - Early Adolescence to Young Adulthood	National Board for Professional Teaching Standards
Educator	Vermont Agency of Education - Educator Licensing

JOBS ALONG THE FOREST PRODUCTS SUPPLY CHAIN: POLICY AND ADVOCACY

POLICY ADVOCATES AND LOBBYISTS

The forest industry often employs advocates on their behalf to represent their interests at the government level. “The industry” typically refers to the economic sector, where lobbyists and policy advocates are often employed to advocate for the economic viability and active management of the forest products industry, and to protect the industry from lawsuits. Large forest-related businesses often advocate around regulations. Lobbyists and policy advocates can also represent special interest groups and associations, like woodland owners, loggers, millowners, foresters, and manufacturers. The most important work is spent speaking with lawmakers and advocating policy to them, as well as playing a large role in developing policy.

CONSULTANTS

Consultants are experts, or specialists, in certain sectors of the forestry industry. Consultants are employed by both government agencies, businesses, and nonprofit organizations to advise on policy development and provide policy analysis.

NONPROFITS/CONSERVATION ORGANIZATIONS

Many nonprofit organizations are centered around advocating for laws and regulations that conserve land and resources or support economic development opportunities within working lands businesses.

Work Context

Communication and developing interpersonal relationships are a key part of this job. Good policy analysis skills are reflected in discussions with other interested parties as policy positions are explained. Effective lobbying isn't just persuading people to your side, but about bridging divides and working with coalitions to find common ground.

Work Values and Skills

Workers that enter this field come from a variety of backgrounds, linked together mainly by their communication, collaboration, speaking skills, and ability to build social capital. It is, however, helpful to have a background in economics, law, policy, and resource management – especially natural resources management.

Educational Opportunities

College / University	Degree Program
Bennington College Bennington, Vermont	Environmental Studies
Castleton College Castleton, Vermont	Environmental Studies
Champlain College Burlington, Vermont	Applied Sustainability
Middlebury College Middlebury, Vermont	Environmental Studies
Northern Vermont University Johnson/Lyndon, Vermont	Environmental Policy and Advocacy
Norwich University Norwich, Vermont	Education
Saint Michael's College	Environmental Studies
SIT Graduate Institute Brattleboro, Vermont	Master's Degrees
Sterling College Craftsbury, Vermont	Environmental Studies
University of Vermont Burlington, Vermont	Environment and Sustainability
Vermont Law School South Royalton, Vermont	Master of Environmental Law and Policy Juris Doctor

Vermont Career and Technical Centers

Career and Technical Center	Program
Center for Technology Essex	Natural Resources
Central Vermont Career Center Barre	Natural Resources and Sustainability
Cold Hollow Career Center Enosburg	Forestry and Natural Resources
Green Mountain Technology and Career Center Hyde Park	Forestry and Land Management
Hartford Area Career and Technology Center Hartford	Natural Resources
Patricia A. Hannaford Career Center Middlebury	Natural Resource Management
Riverbend Career and Technical Center Bradford	Diversified Agriculture and Natural Resources
River Valley Technical Center Springfield	Horticulture and Natural Resources
Southwest Vermont Career Development St. Johnsbury	Pre-Law
Stafford Technical Center Rutland	Natural Resources and Forestry

Forest Products Industry Associations

Organization	Website
Vermont Forest Products Association	http://vtfpa.org/
Vermont Forestry Foundation	http://vtfpa.org/vermont-forestry-foundation/
Vermont Woodlands Association	https://www.vermontwoodlands.org/
Vermont Wood Works Council	https://vermontwood.com/
Guild of Vermont Furniture Makers	https://www.vermontfurnituremakers.com/
Kingdom Trails Association	https://www.kingdomtrails.org/
Northeast Forestry Association	http://nefainfo.org/
Northeastern Loggers Association	https://northernlogger.com/
National Association of State Foresters	https://www.stateforesters.org/
National Woodland Owners Association	https://nationalwoodlands.com/
American Forest and Paper Association	https://www.afandpa.org/

Related Organizations

Organization	Website
Vermont Traditions Coalition	https://www.vermonttraditions.org/
Vermont Natural Resources Council	https://vnrc.org/
Vermont Forest Roundtable	https://vnrc.org/healthy-forests-wildlife/
Vermont Conservation Law Foundation	https://www.clf.org/serving-new-england/vermont/
Vermont Land Trust	https://vlt.org/
NorthWoods Stewardship Center	https://www.northwoodscenter.org
Pinchot Institute for Conservation	https://pinchot.org/
American Forest Foundation	https://www.forestfoundation.org/
The Nature Conservancy	https://www.nature.org/en-us/

Sample of Vermont Forest Products Businesses

Business	Website
Baker Lumber	https://www.bakerlumber.net/
Butternut Mountain Farm	https://butternutmountainfarm.com/
Cersosimo Lumber Co.	http://www.cersosimolumber.com/
ClearLake Furniture	https://www.clearlakefurniture.com/
Creston Guitars	http://crestonguitars.com/
Currier Forest Products	https://currierforestproducts.com/
David Munyak Woodturner/Furnituremaker	https://www.davidmunyak.com/
Douglas Cox Violin Maker	https://coxviolins.com/
Energy Co-op of Vermont	https://www.ecvt.net/
Fontaine Sawmill	https://fontainesawmill.com/
Gagnon Lumber	https://gagnonlumber.com/
Goodridge Lumber	http://www.goodridgelumber.com/
Green Mountain Grain & Barrel	https://www.greenmountainbarrel.com/
Green State Biochar	https://greenstatebiochar.com/
JK Adams	https://www.jkadams.com/
Maple Landmark	https://www.maplelandmark.com/
Shackleton Thomas	https://www.shackletonthomas.com/
Towards Nightfall	https://www.towardsnightfall.com/
The Tree House Hardwoods & Millshop	https://www.treehousehardwoods.com/
Vermont Farm Table	https://www.vermontfarmtable.com/
Vermont Wood Castings	https://www.vermontcastings.com/
Vermont Wood Studios	https://vermontwoodsstudios.com/
Vermont Wood Pellet Company	https://vermontwoodpellet.com/
Winterwood Timber Frames	http://winterwoodtimberframes.com/



VERMONT Forest Economy Career Guide



Vermont Sustainable Jobs Fund

3 Pitkin Court, Montpelier, VT 05602

www.vsjf.org