January 2020

Labor Market Analysis

Forestry

California Community Colleges

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Summary

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for a forestry certificate. Four occupations related to a forestry certificate were identified for Reedley College:

- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)
- Life, Physical and Social Science Technicians, All Other (SOC 19-4099)
- Forest and Conservation Technicians (SOC 19-4093)
- Forest and Conservation Workers (SOC 45-4011)

Key findings:

- **Occupational demand —** Nearly 5,450 workers were employed in jobs related to forestry in 2018 in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. The largest occupation is First-Line Supervisors of Farming, Fishing, and Forestry Workers with 4,165 workers in 2018, a projected growth rate of 6% over the next five years, and 615 annual openings.
- **Wages —** The occupation earning the highest median wages is life, physical, and social science technicians, all other, $26.24/hour in the subregion and $19.90/hour in the region.
- **Employers —** Top employers in the subregion are Forest Service, U.S. Department of Agriculture, and Merced Union High School District.
- **Job titles —** The most common occupational title in job postings in the subregion is quality control analyst. The most common job title is quality assurance technician.
- **Skills and certifications —** The top baseline skill is English, the top specialized skill is quality assurance and control, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.
- **Education —** All four occupations are middle-skill occupations, requiring less education than a bachelor's degree and are relevant to community college education.
- **Supply —** Analysis of postsecondary completions in the region shows that on average 71 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 745 trained workers in the subregion and 1,030 workers in the region. The Center of Excellence recommends that Reedley College work with the Agriculture, Water and Environmental Science regional director, the college's advisory board, and local industry in the expansion of programs to address the shortage of workers with a forestry certificate in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Reedley College to provide labor market information for a forestry certificate. Review of the Taxonomy of Programs (TOP) found the following programs are appropriate for this analysis:

- Forestry-011400
- Natural Resources-011500
- Parks and Outdoor Recreation-011510

The geographical focus for this report is the South Central Valley/Southern Mother Lode (SCV/SML) subregion, but regional demand and supply data has been included for broader applicability and use. Analysis of the program and occupational data related to a forestry certificate resulted in the identification of forestry applicable occupations. The Standard Occupational Classification (SOC) System titles and codes used in this report are:

- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)
- Life, Physical, and Social Science Technicians, All Other (SOC 19-4099)
- Forest and Conservation Technicians (SOC 19-4093)
- Forest and Conservation Workers (SOC 45-4011)

The SOC codes, occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown in Exhibit 1. O*NET data was not available for First-Line Supervisors of Farming, Fishing, and Forestry Workers; and Life, Physical, and Social Science Technicians, All Other.
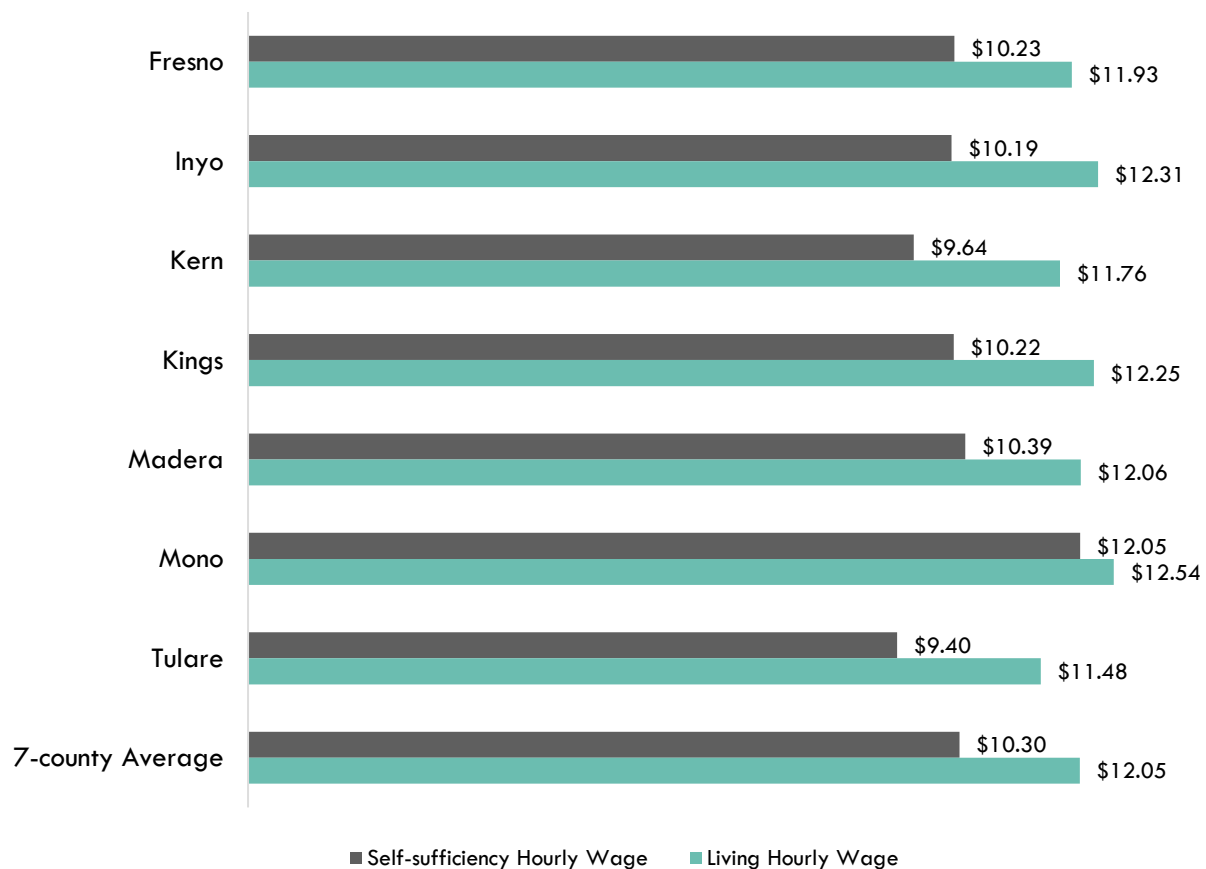
Exhibit 1. SOC titles, job descriptions, sample job titles, and knowledge and skills for a forestry certificate

SOC Title & Code	Description	Sample Job Titles	Knowledge & Skills
Forest and Conservation Technicians (SOC 19-4093)	Provide technical assistance regarding the conservation of soil, water, forests, or related natural resources. May compile data pertaining to size, content, condition, and other characteristics of forest tracts, under the direction of foresters; or train and lead forest workers in forest propagation, fire prevention and suppression. May assist conservation scientists in managing, improving, and protecting rangelands and wildlife habitats.	Biological Science Aide, Conservationist, County Ranger, Forest Technician, Forestry Aide, Forestry Technician, Resource Manager, Resource Specialist, Resource Technician, Timber Appraiser	**Knowledge** Public Safety and Security English Language Customer and Personal Service Law and Government Administration and Management **Skills** Active Listening Critical Thinking Reading Comprehension Judgment and Decision Making Speaking
Forest and Conservation	Under supervision, perform manual labor necessary to develop, maintain, or protect	Conservation Officer, Crew Leader, Field	**Knowledge** Geography English Language

SOC Title & Code	Description	Sample Job Titles	Knowledge & Skills
Workers (SOC 45-4011)	areas such as forests, forested areas, woodlands, wetlands, and rangelands through such activities as raising and transporting seedlings; combating insects, pests, and diseases harmful to plant life; and building structures to control water, erosion, and leaching of soil. Includes forester aides, seedling pullers, and tree planters.	Laborer, Foreman, Forest Resource Specialist, Forestry Support Specialist, Geographic Information Systems Coordinator (GIS Coordinator), Park Maintainer, Reforestation Worker, Tree Planter	Public Safety and Security Clerical Biology **Skills** Coordination Speaking Active Listening Critical Thinking Judgment and Decision Making

The average self-sufficiency wage for a single adult in the South Central Valley/Southern Mother Lode (SCV/SML) subregion is $10.30/hour, and the current average living wage for a single adult is $12.05/hour. Self-sufficiency and living wage data by county and the overall seven-county average are shown in Exhibit 2. In the wages sections of this report, the 25th percentile denotes entry-level wages, and median represents experienced wages.

Exhibit 2. Self-sufficiency and living wages in the SCV/SML subregion

County	Self-sufficiency Hourly Wage	Living Hourly Wage
Fresno	$10.23	$11.93
Inyo	$10.19	$12.31
Kern	$9.64	$11.76
Kings	$10.22	$12.25
Madera	$10.39	$12.06
Mono	$12.05	$12.54
Tulare	$9.40	$11.48
7-county Average	$10.30	$12.05

■ Self-sufficiency Hourly Wage   ■ Living Hourly Wage

Occupational Demand

The South Central Valley/Southern Mother Lode subregion employed 5,449 workers in forestry occupations in 2018 (Exhibit 3). The largest occupation is First-Line Supervisors of Farming, Fishing, and Forestry Workers with 4,165 workers in 2018. This occupation is projected to grow by 6% over the next five years and has the greatest number of projected annual openings, 615.
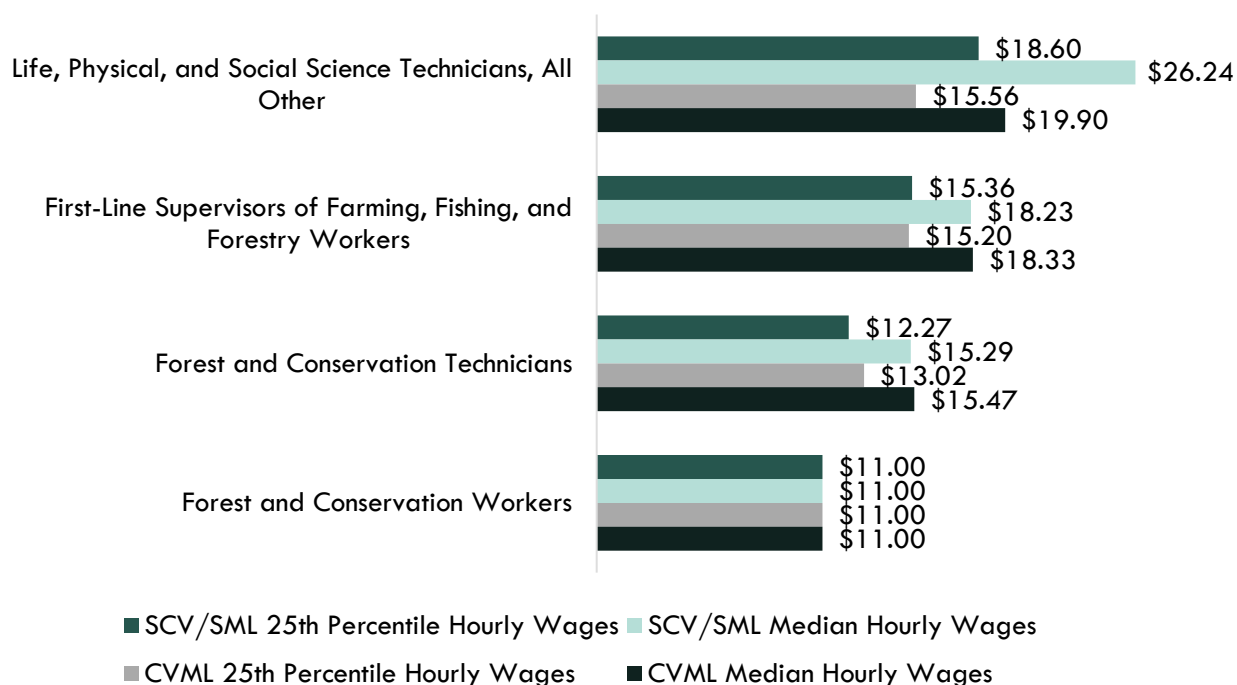
Exhibit 3. Forestry employment and occupational projections in the SCV/SML subregion

Occupation	2018 Jobs	2023 Jobs	5-year Change	5-year % Change	Annual Openings
First-Line Supervisors of Farming, Fishing, and Forestry Workers	4,165	4,405	240	6%	615
Forest and Conservation Technicians	621	629	8	1%	75
Forest and Conservation Workers	399	394	(5)	(1%)	63
Life, Physical, and Social Science Technicians, All Other	264	283	19	7%	35
Total	**5,449**	**5,712**	**262**	**5%**	**788**

Wages

Exhibit 4 compares the entry-level and experienced wages of the forestry certificate occupations. The entry-level and median wages of forest and conservation workers fall below the region's average living wage. The occupation earning the highest median wages is life, physical, and social science technicians, all other, $26.24/hour in the subregion and $19.90/hour in the region.

Exhibit 4. Entry-level and experienced wage comparison for a forestry certificate in the SCV/SML subregion and region

Life, Physical, and Social Science Technicians, All Other
- $18.60
- $26.24
- $15.56
- $19.90

First-Line Supervisors of Farming, Fishing, and Forestry Workers
- $15.36
- $18.23
- $15.20
- $18.33

Forest and Conservation Technicians
- $12.27
- $15.29
- $13.02
- $15.47

Forest and Conservation Workers
- $11.00
- $11.00
- $11.00
- $11.00

■ SCV/SML 25th Percentile Hourly Wages   ■ SCV/SML Median Hourly Wages
■ CVML 25th Percentile Hourly Wages   ■ CVML Median Hourly Wages

Job Postings

There were 562 job postings for the four occupations in the SCV/SML subregion from January 2019 through December 2019. The top employers advertising these job postings are listed in Exhibit 5.

Exhibit 5. Top employers by number of job postings for a forestry certificate

Employer	Job Postings
Forest Service	32
U.S. Department of Agriculture	16
Merced Union High School District	14
California Dairies Incorporated	8
Califia Farms	7
Kern High School District	7
Vulcan Materials Company	7
Army National Guard	6
Bristol Hospice	6
Dignity Health	6

Job posting analysis also included the top industries hiring positions related to forestry certificate (Exhibit 6).

Exhibit 6. Top industries by number of job postings for a forestry certificate

Industry	Job Postings
Administration of Economic Program	53
Support Activities for Forestry	32
General Medical and Surgical Hospitals	23
Elementary and Secondary Schools	21
National Security and International Affairs	18
Employment Services	16
Administration of Environmental Quality Programs	14
Executive, Legislative, and Other General Government Support	13
Depository Credit Intermediation	11
Aerospace Product and Parts Manufacturing	10

Job Titles

Exhibit 7 shows how job postings for the targeted occupations in the SCV/SML subregion are distributed across seven O*NET OnLine occupations. The occupational title quality control analysts is listed in the most job postings, 405, followed by forest and conservation technicians, 141 job postings.

Exhibit 7. Top occupational titles in job postings for a forestry certificate

Occupational Title	Job Postings
Quality Control Analysts	405
Forest and Conservation Technicians	141
Life, Physical, and Social Science Technicians, All Other	17
Precision Agriculture Technicians	15
First-Line Supervisors of Agricultural Crop and Horticultural Workers	7
Forest and Conservation Workers	6
First-Line Supervisors of Animal Husbandry and Animal Care Workers	1

Analysis of the 562 advertised job titles for the targeted occupations reveals the top title is quality assurance technician, occurring in 99 job postings, followed by quality control technician, 81 job postings (Exhibit 8).

Exhibit 8. Top job titles by number of job postings for a forestry certificate

Job Title	Job Postings
Quality Assurance Technician	99
Quality Control Technician	81
Forestry Technician	53
Quality Specialist	50
Quality Coordinator	44
Forestry Technician, Recreation	24
Quality Control Supervisor	21
J + + Fire Control Specialist	19
Quality Control Specialist	15
Quality Control Analyst	14

Salaries

Exhibit 9 shows the "Market Salaries" for forestry certificate occupations that are calculated by Burning Glass which uses a machine learning model built off of millions of job postings every year, and accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

Exhibit 9. Salaries for a forestry certificate

Market Salary Percentile	Salary Amount
10th Percentile	29,483
25th Percentile	32,309
50th Percentile	40,687
75th Percentile	55,778
90th Percentile	72,100

Education

Of the 562 job postings, 411 listed an education level preferred for the positions being filled. Of those, 47% requested a bachelor's degree, 39% requested a high school diploma or vocational training, and 7% requested a master's degree (Exhibit 10).
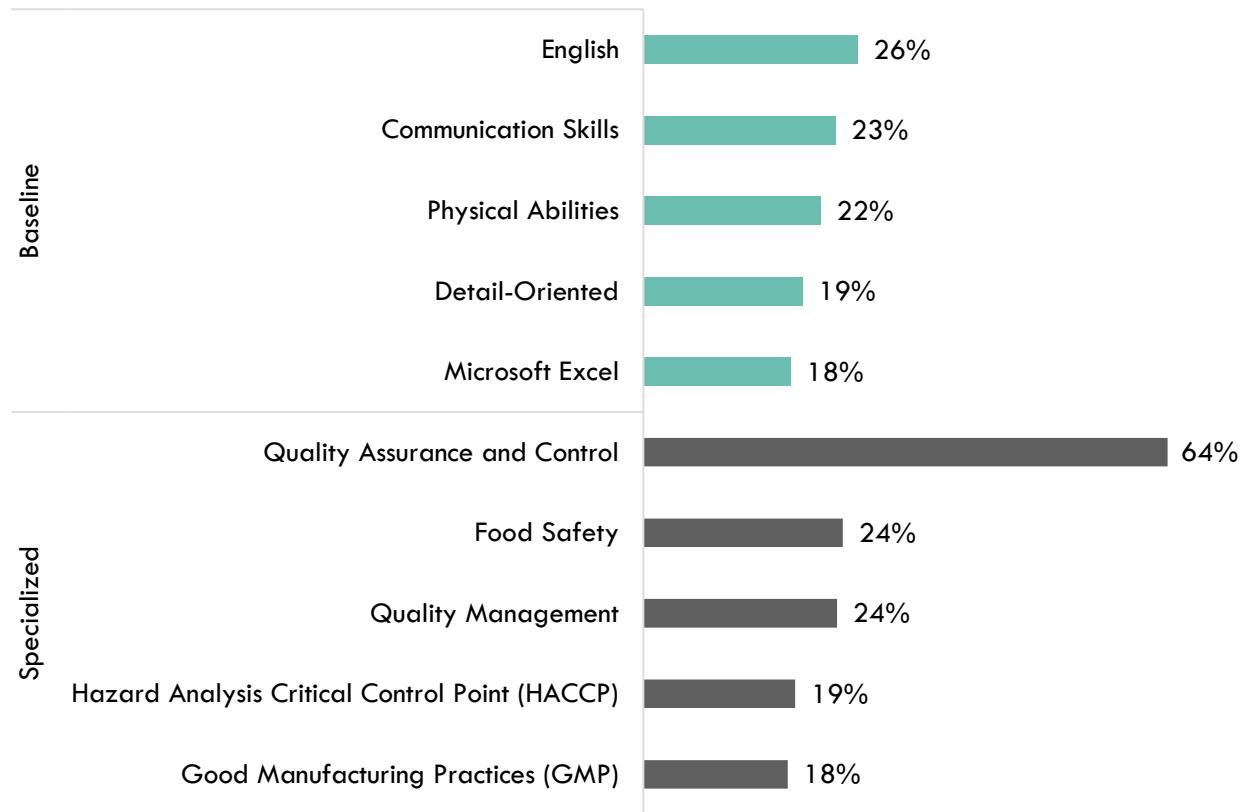
Exhibit 10. Education levels requested in job postings for a forestry certificate
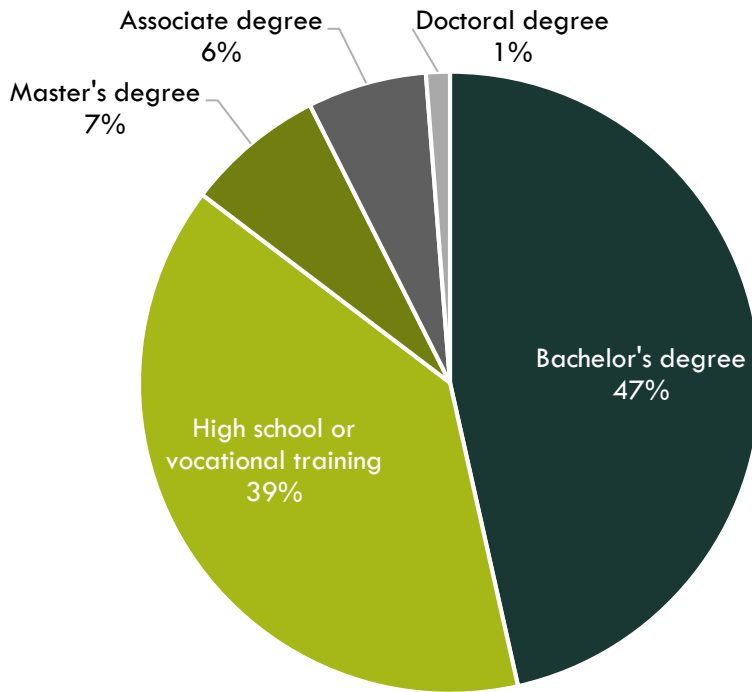
Baseline and Specialized Skills

Exhibit 11 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are English, 26% of job postings, communication, 23%, and physical abilities, 22%. The top three specialized skills are quality assurance and control, 64% of job postings, food safety, 24%, and quality management, 24%.

Exhibit 11. In-demand forestry baseline and specialized skills

Baseline	
English	26%
Communication Skills	23%
Physical Abilities	22%
Detail-Oriented	19%
Microsoft Excel	18%

Specialized	
Quality Assurance and Control	64%
Food Safety	24%
Quality Management	24%
Hazard Analysis Critical Control Point (HACCP)	19%
Good Manufacturing Practices (GMP)	18%

Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Excel and Office rank first and second (Exhibit 12).
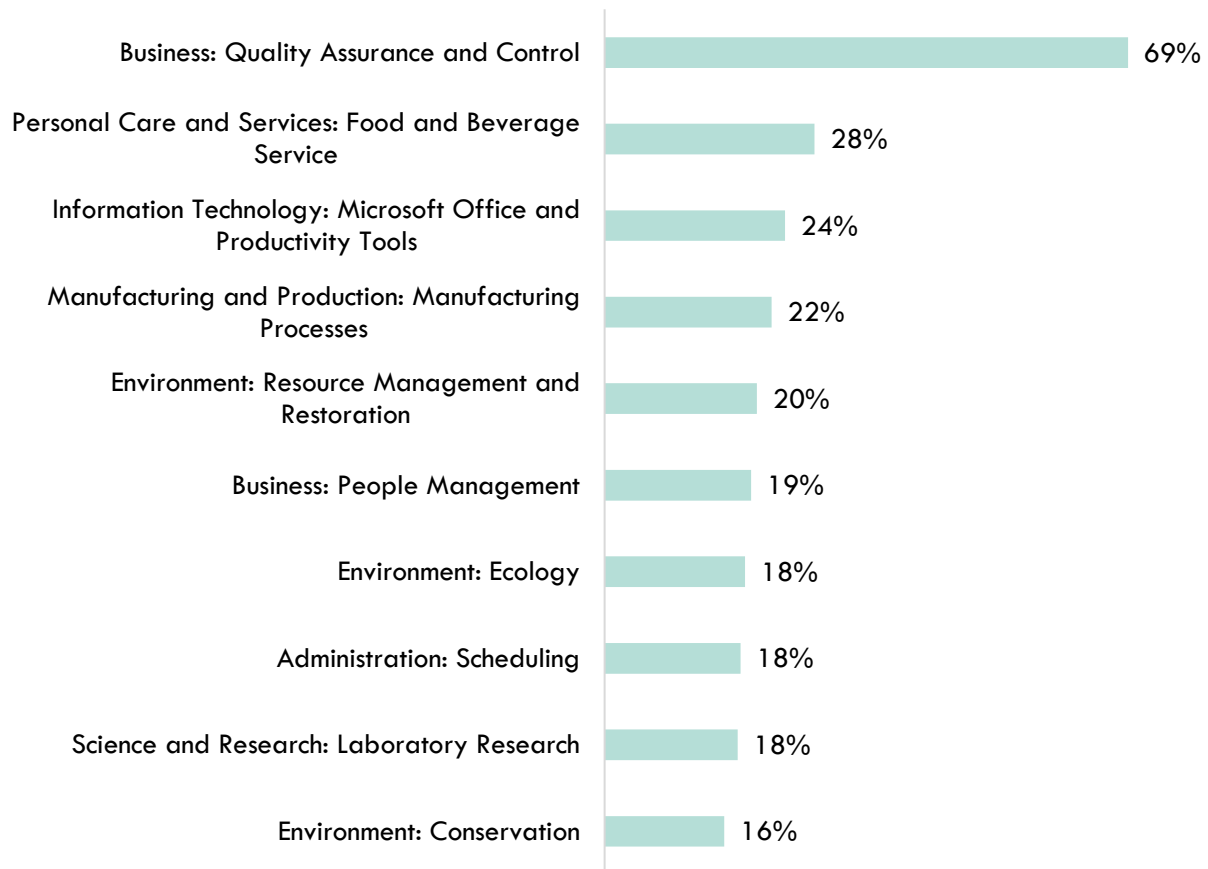
Exhibit 12. In-demand forestry certificate software skills

Software	Percent
Microsoft Excel	18%
Microsoft Office	13%
Microsoft Word	9%
Microsoft Powerpoint	7%
Microsoft Access	4%
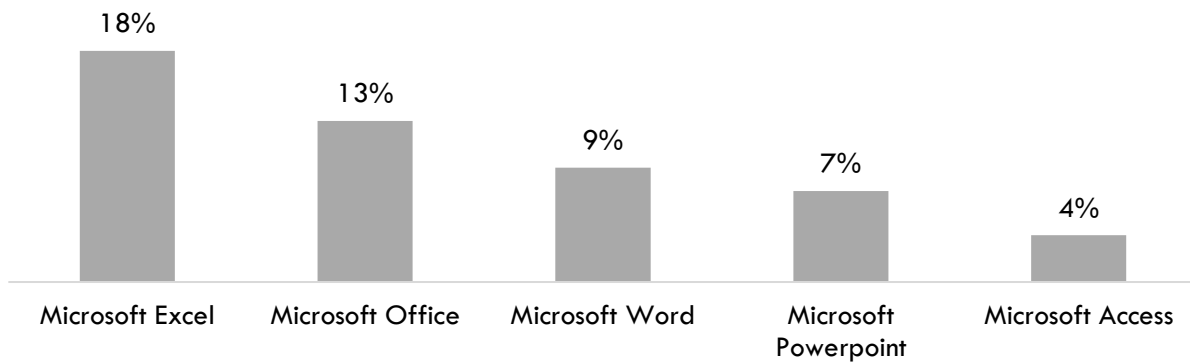
Skill Cluster Projections

Of the 562 job postings, 514 postings contained skill projections. An evaluation of the skill clusters that will have the greatest gains in level of importance shows that the top areas are business: quality assurance and control (69%); personal care and services: food and beverage service (28%); and information technology: Microsoft Office and productivity tools (24%) (Exhibit 13).
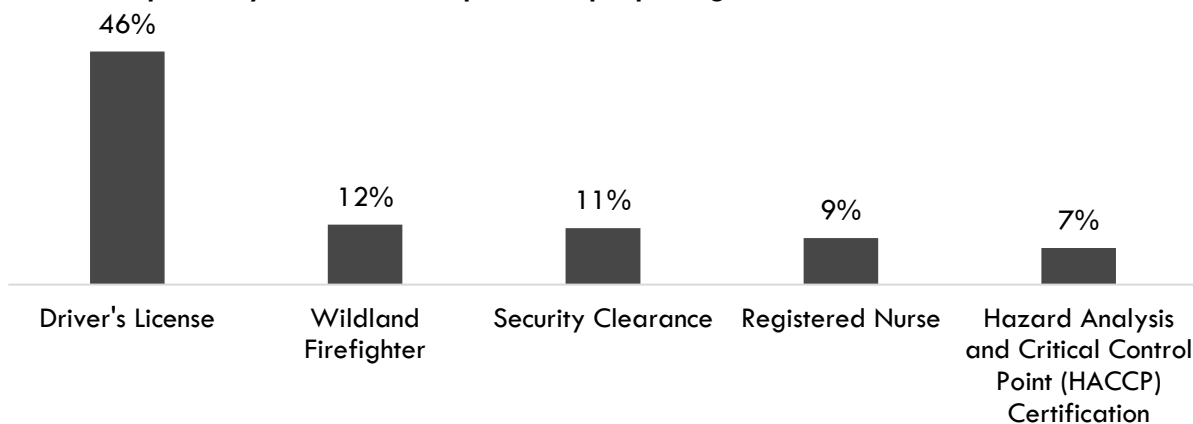
Exhibit 13. Skill cluster projections for a forestry certificate

Skill Cluster	Percentage
Business: Quality Assurance and Control	69%
Personal Care and Services: Food and Beverage Service	28%
Information Technology: Microsoft Office and Productivity Tools	24%
Manufacturing and Production: Manufacturing Processes	22%
Environment: Resource Management and Restoration	20%
Business: People Management	19%
Environment: Ecology	18%
Administration: Scheduling	18%
Science and Research: Laboratory Research	18%
Environment: Conservation	16%

Certifications

Of the 562 job postings, 152 contained certification data. Of those, 46% indicated a need for a driver's license. The next top certifications are Wildland Firefighter and security clearance (Exhibit 14). (Due to the low number of job postings with certifications listed, the chart below may not be representative of the full sample.)

Exhibit 14. Top forestry certifications requested in job postings

Certification	Percentage
Driver's License	46%
Wildland Firefighter	12%
Security Clearance	11%
Registered Nurse	9%
Hazard Analysis and Critical Control Point (HACCP) Certification	7%

Education, Work Experience & Training

Two occupations typically require a high school diploma or the equivalent—forest and conservation workers, and first-line supervisors of farming, fishing, and forestry workers (Exhibit 15). An associate degree is typically required for forest and conservation technicians, and life, physical, and social science technicians, all other.

Exhibit 15. Education, work experience, training and Current Population Survey results for forestry certificate occupations[1]

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Forest and Conservation Technicians	Associate degree	None	None	34.5%
Life, Physical, and Social Science Technicians, All Other	Associate degree	None	None	34.5%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	23.6%
Forest and Conservation Workers	High school diploma or equivalent	None	Moderate-term	35.1%

Supply

Analysis of program data from the California Community Colleges Chancellor's Office Data Mart included the TOP codes: Forestry-011400, Natural Resources-011500, and Parks and Outdoor Recreation-011510. Analysis of the last three years of TOP code data shows that, on average, 71 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 16).

Exhibit 16. Postsecondary supply for forestry certificate occupations in the region

TOP Title and Code	College	Certificates	Degrees	Subtotal
Forestry-011400	Bakersfield	4	11	15
	Columbia	1	7	8
	Modesto Junior	0	0	1
	Reedley College	10	11	21
Natural Resources-011500	Columbia	8	11	19
	Reedley College	5	1	7
Parks and Outdoor Recreation-011510	Modesto Junior	0	0	1
	Reedley College	1		1
Total		**30**	**42**	**71**

Gap Analysis

There is an undersupply of 745 workers in the SCV/SML subregion and 1,030 workers in the region (Exhibit 17).

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[1] "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, https://www.bls.gov/cps/.

Exhibit 17. Forestry certificate workforce annual demand and supply in the SCV/SML subregion and region

Legend: ■ Demand ■ Gap ■ Supply

Region	Demand	Gap	Supply
SCV/SML	788	745	44
CVML	1,101	1,030	71
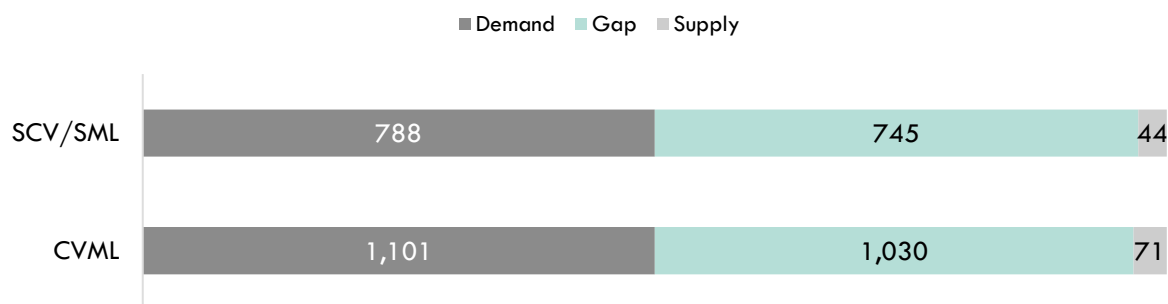
Student Outcomes

Exhibit 18 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP codes related to a forestry certificate. Across the region, 45 forestry students received a degree or certificate, and 52 transferred; by comparison, 31 natural resources received a degree or certificate, and 44 transferred. A higher percentage of forestry students reported obtaining a job closely related to their field of study and a median change in earnings.

Exhibit 18: Regional metrics for the TOP codes related to a forestry certificate

Metric	Forestry-011400	Natural Resources-011500
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	45	31
Number of Students Who Transferred	52	44
Job Closely Related to Field of Study	71%	57%
Median Change in Earnings	61%	48%
Attained a Living Wage	48%	52%
* denotes data not available.		

Conclusion

The entry-level wages of three of the four occupations exceed the SCV/SML subregion's self-sufficiency and living wages for one adult. The exception is forest and conservation workers. There were 562 job postings in the past 12 months for occupations related to a forestry certificate in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is English, and the top specialized skill is quality assurance and control.
- The top software skill is Microsoft Excel.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 745 in the SCV/SML subregion and 1,030 in the region.

Recommendation

Based on these findings, it is recommended that Reedley College work with the Agriculture, Water and Environmental Technologies regional director, the college's advisory board, and local industry in the expansion of programs to address the shortage of workers with a forestry certificate in the region.

Appendix A: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor's Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com.
Living Wage	A living wage calculator that estimates the cost of living in a specific community or region: livingwage.mit.edu.
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm.
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov.
Job Posting and Skills Data	Burning Glass: burning-glass.com/.
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org.

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

Wages Family Compositions: The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).