September 2021

Labor Market Analysis

Forestry and Natural Resources Management

POWERED BY

California Community Colleges

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Prepared by the Central Valley/Mother Lode Center of Excellence

Table of Contents

COVID-19 Statement: This report includes employment projection data by Emsi. Emsi's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

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Summary

Please note the COVID-19 statement on page 2 when considering this report's findings.

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for forestry and natural resources management. Five occupations related to forestry and natural resources management were identified for Bakersfield College:

- 45-1011, First-Line Supervisors of Farming, Fishing, and Forestry Workers
- 19-4071, Forest and Conservation Technicians
- 33-1021, First-Line Supervisors of Firefighting and Prevention Workers
- 19-1032, Foresters
- 33-2022, Forest Fire Inspectors and Prevention Specialists

Key findings:

- **Occupational demand —** Nearly 4,600 workers were employed in jobs related to forestry and natural resources management in 2020 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 3,759 workers in 2020, a projected growth rate of 1% over the next five years, and 522 annual openings.

- **Wages —** Forest fire inspectors and prevention specialists earn the highest entry-level wage, $41.09/hour in the subregion.

- **Employers —** Employers with the most job postings in the subregion are the Forest Service, U.S. Department of Agriculture, and Davey Tree Expert Company.

- **Occupational titles —** The most common occupational title in job postings in the subregion is forest and conservation technicians. The most common job title is field service technician.

- **Skills and certifications —** The top baseline skill is planning, the top specialized skill is personnel management, and the top software skill is Microsoft Office. The most in-demand certification is a driver's license.

- **Education —** Either a high school diploma or an associate degree are typically required for four of the five occupations. A bachelor's degree is typically required for foresters.

- **Supply —** Analysis of postsecondary completions in the region shows that on average 82 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 546 trained workers in the subregion and 796 workers in the region. The Center of Excellence recommends that Bakersfield College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of forestry and natural resources management workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Bakersfield College to provide labor market information for forestry and natural resources management. 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. The average living wage for a single adult in the SCV/SML subregion is $11.91/hour.[1] Analysis of the program and occupational data related to forestry and natural resources management resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 45-1011, First-Line Supervisors of Farming, Fishing, and Forestry Workers
- 19-4071, Forest and Conservation Technicians
- 33-1021, First-Line Supervisors of Firefighting and Prevention Workers
- 19-1032, Foresters
- 33-2022, Forest Fire Inspectors and Prevention Specialists

The occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below.

First-Line Supervisors of Farming, Fishing, and Forestry Workers
Job Description: Directly supervise and coordinate the activities of agricultural, forestry, aquacultural, and related workers.
Knowledge: Administration and Management, Production and Processing, Mechanical, Education and Training, English Language
Skills: Active Listening, Judgement and Decision Making, Monitoring, Critical Thinking, Management of Personnel Resources

Forest and Conservation Technicians
Job Description: 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 and fire prevention and suppression. May assist conservation scientists in managing, improving, and protecting rangelands and wildlife habitats.
Knowledge: Public Safety and Security, English Language, Customer and Personal Service, Law and Government, Administration and Management
Skills: Active Listening, Critical Thinking, Reading Comprehension, Judgement and Decision Making, Speaking

First-Line Supervisors of Firefighting and Prevention Workers
Job Description: Directly supervise and coordinate activities of workers engaged in firefighting and fire prevention and control.
Knowledge: Public Safety and Security, Customer and Personal Service, Administration and Management, Education and Training, English Language, Education and Training
Skills: Critical Thinking, Monitoring, Speaking, Active Listening, Reading Comprehension, Complex Problem Solving

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[1] The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: https://insightcced.org/tools-metrics/self-sufficiency-standard-tool-for-california/.

Foresters
Job Description: Manage public and private forested lands for economic, recreational, and conservation purposes. May inventory the type, amount, and location of standing timber, appraise the timber's worth, negotiate the purchase, and draw up contracts for procurement. May determine how to conserve wildlife habitats, creek beds, water quality, and soil stability, and how best to comply with environmental regulations. May devise plans for planting and growing new trees, monitor trees for healthy growth, and determine optimal harvesting schedules.
Knowledge: Mathematics, English Language, Computers and Electronics, Law and Government, Customer and Personal Service
Skills: Monitoring, Reading Comprehension, Speaking, Critical Thinking, Judgement and Decision Making

Forest Fire Inspectors and Prevention Specialists
Job Description: Enforce fire regulations, inspect forest for fire hazards, and recommend forest fire prevention or control measures. May report forest fires and weather conditions.
Knowledge: Administration and Management, Customer and Personal Service, Education and Training, Personnel and Human Resources, Public Safety and Security
Skills: Critical Thinking, Coordination, Speaking, Active Listening, Judgement and Decision Making

Occupational Demand

The South Central Valley/Southern Mother Lode subregion employed 4,595 workers in forestry and natural resources management occupations in 2020 (Exhibit 1). The largest occupation is first-line supervisors of farming, fishing, and forestry workers with 3,759 workers in 2020. This occupation is projected to grow by 1% over the next five years and has the greatest number of projected annual openings, 522.
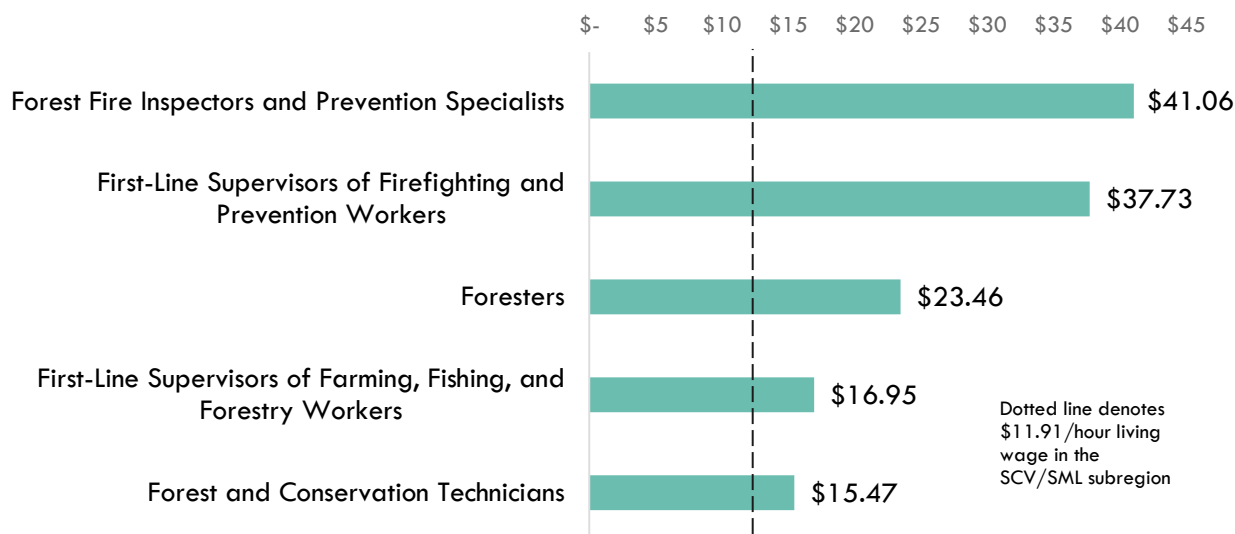
Exhibit 1. Forestry and natural resources management employment and occupational projections in the SCV/SML subregion

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
First-Line Supervisors of Farming, Fishing, and Forestry Workers	3,759	3,796	37	1%	522
Forest and Conservation Technicians	478	492	14	3%	57
First-Line Supervisors of Firefighting and Prevention Workers	256	280	24	10%	20
Foresters	66	74	8	12%	8
Forest Fire Inspectors and Prevention Specialists	36	42	6	17%	5
TOTAL	**4,595**	**4,684**	**89**	**2%**	**612**

Wages

Exhibit 2 shows the entry-level hourly wages of the forestry and natural resources management occupations. Forest fire inspectors and prevention specialists earn the highest entry-level wage, $41.09/hour in the subregion. Entry-level wages are derived from the 25th percentile.

Exhibit 2. Forestry and natural resources management entry-level wages in the SCV/SML subregion

Occupation	Wage
Forest Fire Inspectors and Prevention Specialists	$41.06
First-Line Supervisors of Firefighting and Prevention Workers	$37.73
Foresters	$23.46
First-Line Supervisors of Farming, Fishing, and Forestry Workers	$16.95
Forest and Conservation Technicians	$15.47

Dotted line denotes $11.91/hour living wage in the SCV/SML subregion

Job Postings

There were 141 job postings for the five occupations in the SCV/SML subregion from March 2021 to August 2021.[2] The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of forestry and natural resources management workers by number of job postings

Employer	Job Postings	% Job Postings
Forest Service	29	23%
US Department of Agriculture	15	12%
Davey Tree Expert Company	13	10%
ACRT Pacific, LLC	6	5%
Kern County	5	4%
Bureau of Land Management	4	3%
County Kern	4	3%
Sierra Forestry Consulting	4	3%
National Park Service	3	2%
TRC Companies Incorporated	3	2%

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[2] Other than occupation titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

Exhibit 4 shows how job postings for the targeted occupations in the SCV/SML subregion are distributed across eight O*NET OnLine occupations. The occupational title forest and conservation technicians is listed in 56 job postings. Note how this occupational title dominates the job posting results, as does foresters. Common job titles in postings include Field Service Technician in 25 job postings, Roustabout in nine job postings, and Rig Operator in 8 job postings.

Exhibit 4. Top occupational titles in job postings for forestry and natural resources management

Occupational Title	Job Postings	% of Job Postings
Forest and Conservation Technicians	56	40%
Foresters	47	33%
Municipal Fire Fighting and Prevention Supervisors	13	9%
Forest Fire Fighting and Prevention Supervisors	8	6%
Forest Fire Inspectors and Prevention Specialists	7	5%
First-Line Supervisors of Agricultural Crop and Horticultural Workers	4	3%
First-Line Supervisors of Aquacultural Workers	4	3%
First-Line Supervisors of Animal Husbandry and Animal Care Workers	2	1%

Salaries

Exhibit 5 shows the "Market Salaries" for forestry and natural resources management 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 5. Salaries for forestry and natural resources management occupations

Market Salary Percentile	Salary Amount
10th Percentile	$30,549
25th Percentile	$37,783
50th Percentile	$40,412
75th Percentile	$46,243
90th Percentile	$73,186

Education

Of the 141 job postings, 58 listed an education level preferred for the positions being filled. Of those, 48% requested a bachelor's degree, 38% requested high school or vocational training, and 24% requested a master's degree (Exhibit 6). A job posting can indicate more than one education level. Hence, the percentages shown in the chart below may total more than 100%.
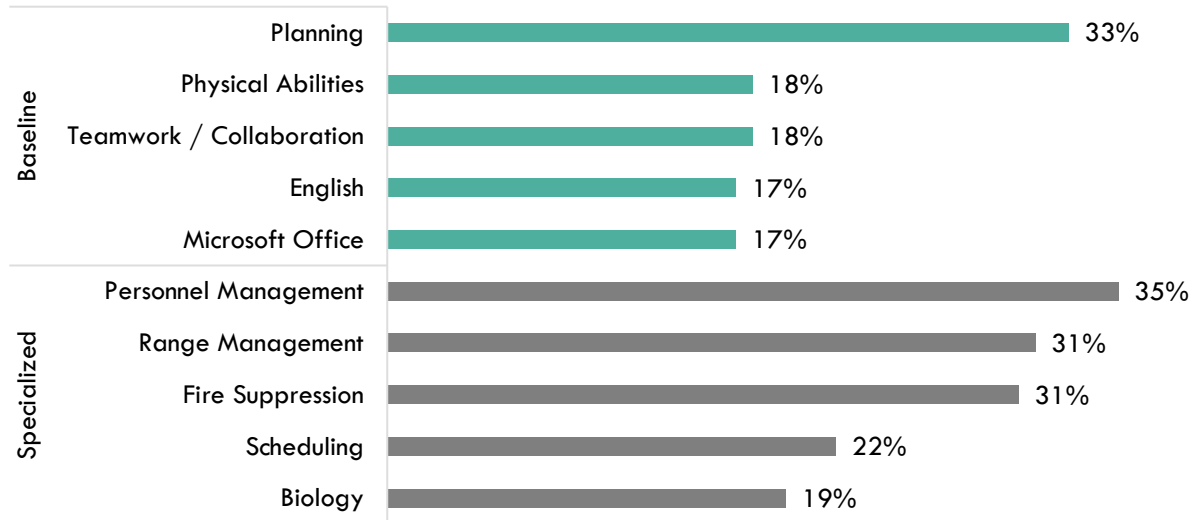
Exhibit 6. Education levels requested in job postings for forestry and natural resources management

Education Level	Job Postings	% of Job Postings
Bachelor's degree	28	48%
High school or vocational training	22	38%
Master's degree	14	24%
Associate degree	5	9%
Doctoral degree	1	2%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are planning, 33% of job postings, physical abilities, 18%, and teamwork/collaboration, 18%. The top three specialized skills are personnel management, 35% of job postings, range management, 31%, and fire suppression, 31%.
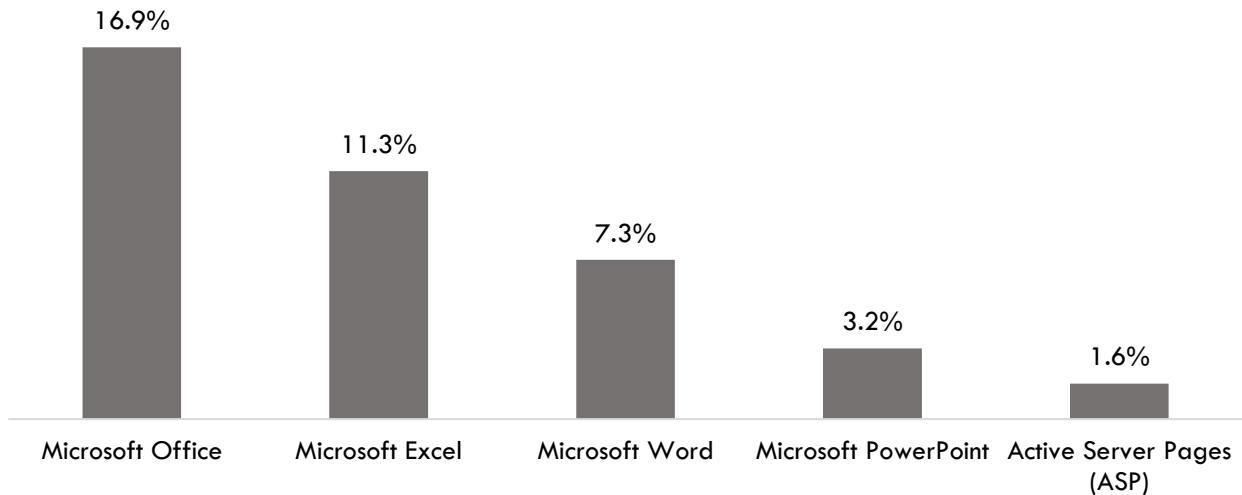
Exhibit 7. In-demand forestry and natural resources management baseline and specialized skills

Baseline		
Planning		33%
Physical Abilities		18%
Teamwork / Collaboration		18%
English		17%
Microsoft Office		17%

Specialized		
Personnel Management		35%
Range Management		31%
Fire Suppression		31%
Scheduling		22%
Biology		19%

Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Office and Excel were the top two software skills identified in job postings (Exhibit 8).

Exhibit 8. In-demand forestry and natural resources management software skills

Software	Percentage
Microsoft Office	16.9%
Microsoft Excel	11.3%
Microsoft Word	7.3%
Microsoft PowerPoint	3.2%
Active Server Pages (ASP)	1.6%

Certifications

Of the 141 job postings, 89 contained certification data. Among those, 90% indicated a need for a driver's license. The next top certifications are certified arborist and first aid/CPR/AED (Exhibit 9). (Due to the low number of job postings with certifications listed, the chart below may not be representative of the full sample.)

Exhibit 9. Top forestry and natural resources management certifications requested in job postings
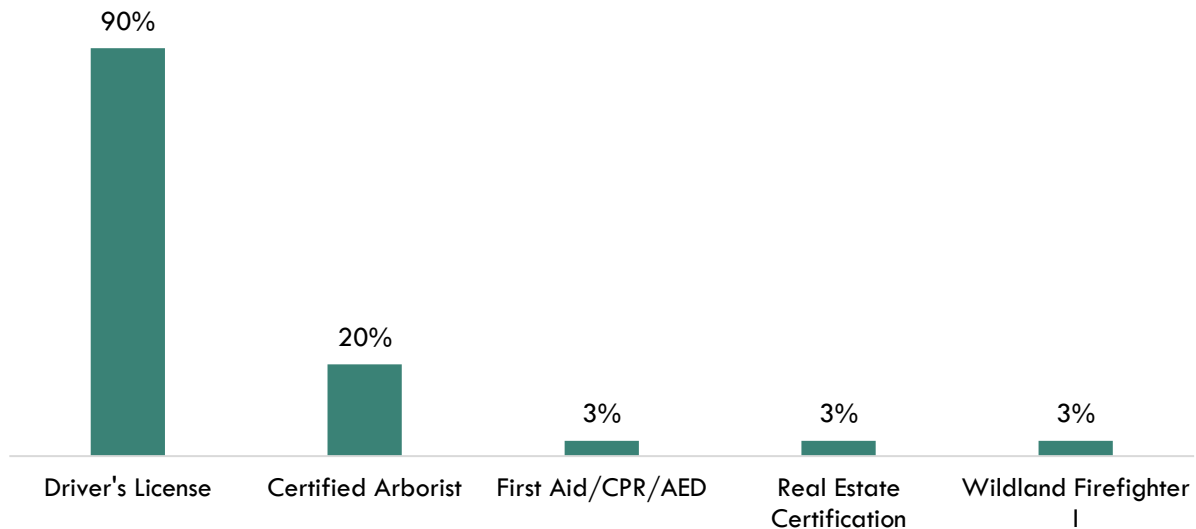
Education, Work Experience & Training

Either a high school diploma or an associate degree are typically required for four of the five occupations (Exhibit 10). A bachelor's degree is typically required for foresters.

Exhibit 10. Education, work experience, training, and Current Population Survey results for forestry and natural resources management occupations[3]

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	21.9%
Forest and Conservation Technicians	Associate degree	None	None	37.1%
First-Line Supervisors of Firefighting and Prevention Workers	Postsecondary nondegree award	Less than 5 years	Moderate-term	55.2%
Foresters	Bachelor's degree	None	None	0.0%
Forest Fire Inspectors and Prevention Specialists	High school diploma or equivalent	Less than 5 years	Moderate-term	44.1%

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

Supply

Analysis of program data from the California Community Colleges Chancellor's Office Data Mart included the TOP codes and titles: 011400 - Forestry and 213310 - Wildland Fire Technology. Analysis of the last three years of data shows that, on average, 82 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

Exhibit 11. Postsecondary supply for forestry and natural resources management occupations in the region

TOP/CIP Code-Title	College	Associate Degree	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Subtotal
011400 - Forestry	Bakersfield	19			2		21
	Columbia	11			4	2	16
	Reedley College	10	5	9			23
213310 - Wildland Fire Technology	Bakersfield	3				0	3
	Porterville					18	18
TOTAL		**42**	**5**	**9**	**6**	**20**	**82**

There is an undersupply of 546 forestry and natural resources management workers in the SCV/SML subregion and 796 workers in the region (Exhibit 12

Exhibit 12. Forestry and natural resources management workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the SCV/SML subregion and region
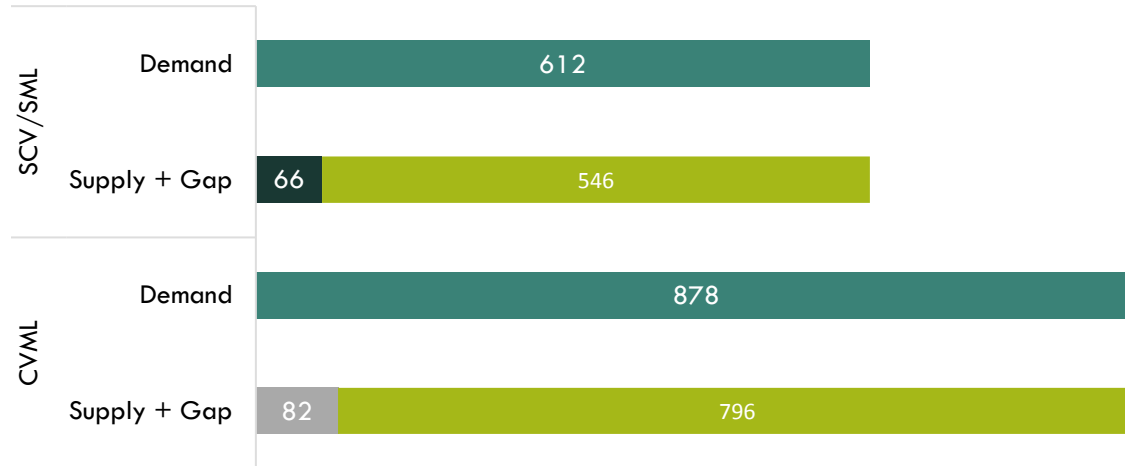
Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP code related to forestry and natural resources management. Of note, there were 42 forestry students who received a degree or certificate or attained apprenticeship journey status; 54 students transferred; 53% of students obtained a job closely related to their field of study; 39% reported a median change in earnings; and 46% attained a living wage.

Exhibit 13. Regional metrics for the TOP code related to forestry and natural resources management

Metric	Forestry 011400	Wildland Fire Technology 213310
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	42	*
Number of Students Who Transferred	54	*
Job Closely Related to Field of Study	53%	*
Median Change in Earnings	39%	38%
Attained a Living Wage	46%	68%
* denotes data not available.		

Conclusion

The entry-level wages of the five occupations exceed the SCV/SML subregion's average living wage. There were 141 job postings in the past six months for occupations related to forestry and natural resources management in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is planning, and the top specialized skill is personnel management.
- The top software skill is Microsoft Office.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 546 in the SCV/SML subregion and 796 in the region.

Recommendation

Based on these findings, it is recommended that Bakersfield College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of forestry and natural resources management in the region.

Appendix A: Methodology & 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.
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.