April 2023

Labor Market Analysis

Fuels and Prescribed Fire Applications

Prepared by Central Valley/Mother Lode Center of Excellence

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COVID-19 Statement: This report includes employment projection data by Lightcast. Lightcast'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

The Central Valley/Mother Lode Center of Excellence developed this report for Reedley College to determine whether there is demand in the local labor market that is not being met by the supply from community college programs. This report summarizes labor market demand, wages, skills, and postsecondary supply for *Fuels and Prescribed Fire Applications Occupations*, which include:

- Forest and Conservation Technicians (19-4071)
- Firefighters (33-2011)
- Forest Fire Inspectors and Prevention Specialists (33-2022)
- Forest and Conservation Workers (45-4011)

Key Findings

- **Occupational Demand —** *Fuels and Prescribed Fire Applications Occupations* have a labor market demand of 390 annual job openings in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. Between 2021 and 2026, firefighters are projected to have the most demand with 214 annual job openings and a projected growth rate of nine percent.

- **Wages —** Average entry-level earnings of $18.53/hour for *Fuels and Prescribed Fire Applications Occupations* are higher than the living wage in the SCV/SML subregion, which is $11.91/hour for a single adult.[1] Firefighters earn the highest entry-level wage, $25.07/hour.

- **Employers and Titles —** Employers in the SCV/SML subregion include Forest Service, National Park Service, and Wildfire Defense Systems. The most common job title is forestry technicians.

- **Skills and Certifications —** The top baseline skill is operations, the top specialized skill is forestry, and the top software skill is geographic information systems. The most in-demand certification is a Firefighter I Certification.

- **Education —** A high school diploma or equivalent is typically required for forest and conservation workers and forest fire inspectors and prevention specialists. A postsecondary nondegree is typically required for firefighters. An associate degree is typically required for forest and conservation technicians.

- **Supply and Demand Analysis —** Based on 390 annual openings (i.e., demand), and 58 postsecondary degrees awarded (i.e., supply), an analysis of supply and demand suggests there is an undersupply of 332 workers in the SCV/SML subregion. In the CVML region, 76 awards were conferred suggesting an undersupply of 542 workers – based on 618 annual openings in the CVML region.

Recommendation

Based on a comparison of demand and supply, there is an undersupply of trained workers in the SCV/SML subregion and the CVML region. The Center of Excellence recommends that Reedley College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Fuels and Prescribed Fire Applications workers.

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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/.

Introduction

The Central Valley/Mother Lode Center of Excellence developed this report to provide Reedley College with labor market information for Fuels and Prescribed Fire Applications. 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 Fuels and Prescribed Fire Applications resulted in the identification of relevant occupations, known as *Fuels and Prescribed Fire Applications Occupations*. The Standard Occupational Classification (SOC) System code and occupational titles used in this report from the Bureau of Labor Statistics and O*NET OnLine are shown below.

Forest and Conservation Technicians (SOC 19-4071)

- **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, Judgment and Decision Making, Speaking

Firefighters (SOC 33-2011)

- **Job Description:** Control and extinguish fires or respond to emergency situations where life, property, or the environment is at risk. Duties may include fire prevention, emergency medical service, hazardous material response, search and rescue, and disaster assistance.
- **Knowledge:** Public Safety and Security, Customer and Personal Service, Education and Training, Building and Construction, English Language
- **Skills:** Critical Thinking, Coordination, Judgment and Decision Making, Service Orientation, Active Learning

Forest Fire Inspectors and Prevention Specialists (SOC 33-2022)

- **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, Judgment and Decision Making
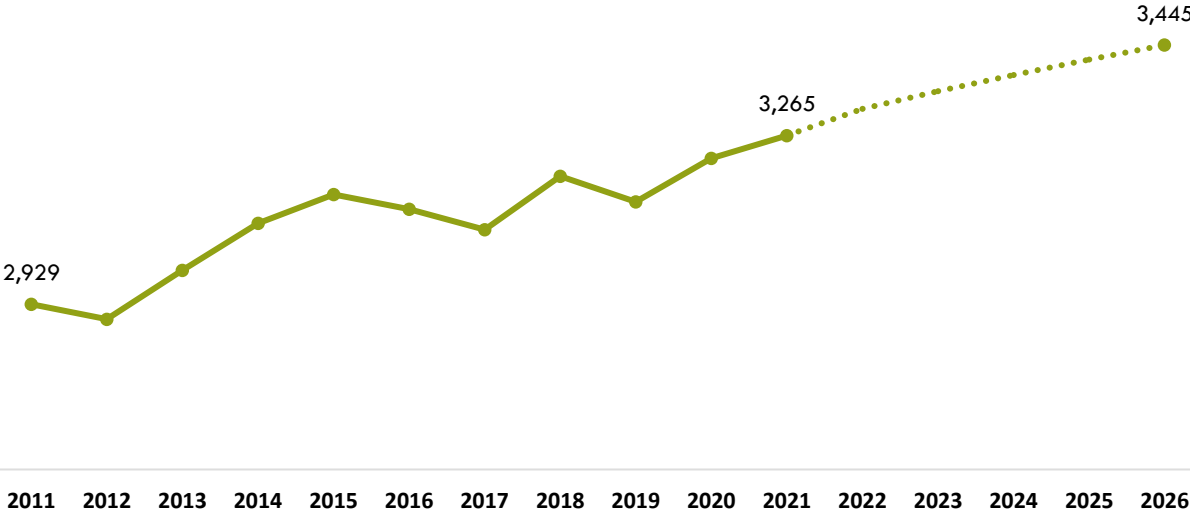
Forest and Conservation Workers (SOC 45-4011)

- **Job Description:** Under supervision, perform manual labor necessary to develop, maintain, or protect 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, tree planters, and gatherers of nontimber forestry products such as pine straw.
- **Knowledge:** Geography, English Language, Public Safety and Security, Administrative, Biology
- **Skills:** Coordination, Speaking, Active Listening, Critical Thinking, Judgment and Decision Making

Occupational Demand

Exhibit 1a shows trends for *Fuels and Prescribed Fire Applications Occupations* in the SCV/SML subregion. Between 2021 to 2026, the number of jobs for *Fuels and Prescribed Fire Applications Occupations* is projected to increase by 180 jobs, or six percent.

Exhibit 1a. Occupational projections for *Fuels and Prescribed Fire Applications Occupations* in the SCV/SML subregion

| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |

Between 2021 to 2026, demand for *Fuels and Prescribed Fire Applications Occupations* in the SCV/SML subregion is 390 annual openings (Exhibit 1b). Firefighters are projected to have the most demand with 214 annual job openings and a projected growth rate of nine percent.

Exhibit 1b. Occupational projections for *Fuels and Prescribed Fire Applications Occupations* in the SCV/SML subregion

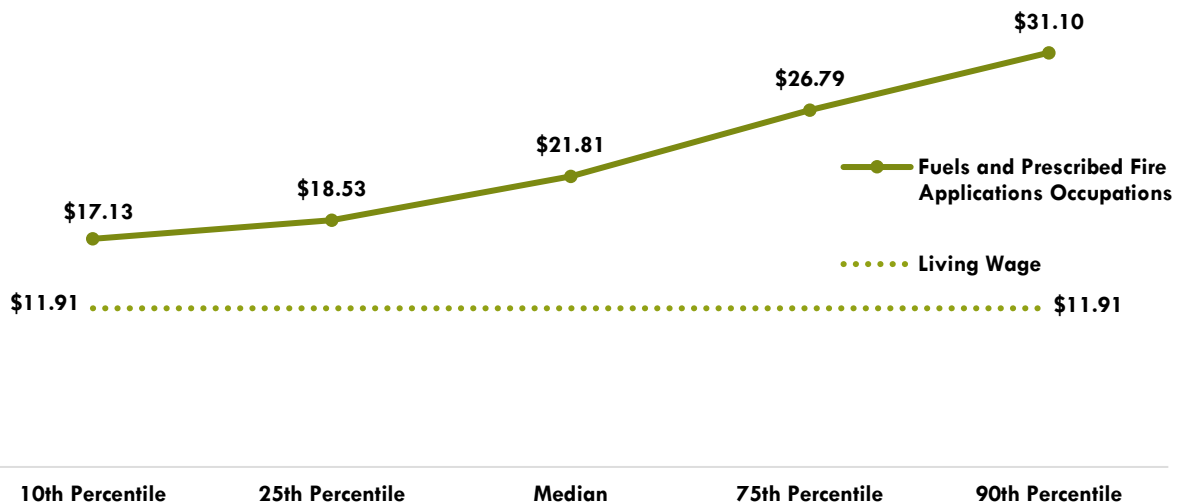| Occupation	2021 Jobs	2026 Jobs	5-Year Change	5-Year % Change	Annual Openings
Firefighters	2,108	2,298	190	9%	214
Forest and Conservation Workers	491	502	11	2%	94
Forest and Conservation Technicians	657	634	(23)	(4%)	81
Forest Fire Inspectors and Prevention Specialists	9	11	2	22%	1
TOTAL	**3,265**	**3,445**	**180**	**6%**	**390**

Wages

The average living wage for a single adult in the SCV/SML subregion is $11.91/hour.[2] Exhibit 2a shows the hourly wages of *Fuels and Prescribed Fire Applications Occupations*. Firefighters earn the highest entry-level wage, $25.07/hour in the subregion.[3] Please note 10th and 25th percentiles are considered entry-level wages while 75th and 90th are considered experienced wages, either by gained by long-term employment, extra training, etc.

Exhibit 2a. *Fuels and Prescribed Fire Applications Occupations* **hourly wages in the SCV/SML subregion**

Occupation	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings
Firefighters	$25.07	$30.44	$36.09
Forest and Conservation Technicians	$16.34	$18.00	$24.90
Forest and Conservation Workers	$14.20	$17.00	$19.38
Forest Fire Inspectors and Prevention Specialists	Insf. Data	Insf. Data	Insf. Data

Exhibit 2b shows the average hourly wages for *Fuels and Prescribed Fire Applications Occupations;* the average entry-level wage is higher than the average entry-level living wage for the SCV/SML subregion.

Exhibit 2b. *Fuels and Prescribed Fire Applications Occupations* **average hourly wages in the SCV/SML subregion**

Line chart showing:
- Fuels and Prescribed Fire Applications Occupations: $17.13 (10th Percentile), $18.53 (25th Percentile), $21.81 (Median), $26.79 (75th Percentile), $31.10 (90th Percentile)
- Living Wage: $11.91 (constant across all percentiles)

Job Postings

There were 108 job postings for *Fuels and Prescribed Fire Applications Occupations* in the SCV/SML subregion from October 2022 to March 2023.[4]

Top Employers

The top employers with the most job postings are listed in Exhibit 3. The top employers in online job postings were Forest Service, National Park Service, and Wildfire Defense Systems.

Exhibit 3. Top employers of *Fuels and Prescribed Fire Applications Occupations*

Employer
Forest Service
National Park Service
Wildfire Defense Systems
The Building People
Rural Metro Corporation
Bureau of Land Management
Big Sandy Rancheria
Revol Greens
Field Institute
Edison International

Top Titles

Exhibit 4 shows the top job titles for *Fuels and Prescribed Fire Applications Occupations* in the SCV/SML subregion. Common job titles in postings include: Forestry Technicians, Firefighters, and Wildland Firefighters.

Exhibit 4. Top titles in job postings for *Fuels and Prescribed Fire Applications Occupations*

Title
Forestry Technicians
Firefighters
Wildland Firefighters
Fire Technician
Forestry Aide

[4] 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.

Salaries

Exhibit 5 shows the "Market Salaries" for *Fuels and Prescribed Fire Applications Occupations*. These are calculated by Lightcast using a machine learning model built from millions of job postings every year. This accounts for adjustments based on location, industry, skills, experience, education, among other variables.

Exhibit 5. Market salaries for *Fuels and Prescribed Fire Applications Occupations*

Market Salary	Job Postings
$40,000-$44,999	13
$60,000-$64,999	11
$30,000-$34,999	10
$45,000-$49,999	9
$50,000-$54,999	8

Education

Of the 108 job postings, 60 listed a preferred or minimum educational requirement for the positions being filled. Among those, 60% requested a high school or GED and 27% requested a bachelor's degree (Exhibit 6).

Exhibit 6. Education levels requested in job postings for *Fuels and Prescribed Fire Applications Occupations*

Education Level	Job Postings	% of Job Postings
High school or GED	36	60%
Bachelor's degree	16	27%
Master's degree	7	12%
Associate degree	1	2%

Baseline, Specialized, and Software Skills

Exhibit 7 depicts the top baseline, specialized, and software skills in job postings. The most important baseline skills are operations, management, and communications. The top specialized skills are forestry, firefighting, and fire suppression systems. The top software is geographic information systems.

Exhibit 7. In-demand *Fuels and Prescribed Fire Applications Occupations* baseline, specialized, and software skills

Baseline Skills	Specialized Skills	Software Skills
Operations	Forestry	Geographic Information Systems
Management	Firefighting	SolarWinds
Communications	Fire Suppression Systems	ArcGIS (GIS Software)
Mathematics	Wildfire Suppression	Border Gateway Protocol
Planning	Fire Behavior	Firewall

Certifications

Of the job postings that listed certification requirements, 8% indicated a need for a Firefighter I Certification. The next top certification is a Cardiopulmonary Resuscitation (CPR) Certification (Exhibit 8).

Exhibit 8. Top *Fuels and Prescribed Fire Applications Occupations* certifications requested in job postings

Certifications	% of Job Postings
Firefighter I Certification	8%
Cardiopulmonary Resuscitation (CPR) Certification	7%
Basic Life Support (BLS) Certification	4%
Advanced Life Support	3%
CPR/AED for the Professional Rescuer	3%

Education, Work Experience, & Training

A high school diploma or equivalent is typically required for forest and conservation workers and forest fire inspectors and prevention specialists. A postsecondary nondegree is typically required for firefighters. An associate degree is typically required for forest and conservation technicians. (Exhibit 9).

Exhibit 9. Education, work experience, training, and Current Population Survey Results for *Fuels and Prescribed Fire Applications Occupations*[5]

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Firefighters	Postsecondary nondegree award	None	Long-term	59.4%
Forest and Conservation Technicians	Associate degree	None	Moderate-term	24.4%
Forest and Conservation Workers	High school diploma or equivalent	None	None	37.1%
Forest Fire Inspectors and Prevention Specialists	High school diploma or equivalent	Less than 5 years	Moderate-term	44.1%

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

Supply

An analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) for the last three program years shows that, on average, 58 awards were conferred in the SCV/SML subregion (Exhibits 10 and 11).

Exhibit 10. TOP and CIP codes for *Fuels and Prescribed Fire Applications Occupations*

| TOP Titles	CIP Titles
213310 - Wildland Fire Technology	43.0206 - Wildland/Forest Firefighting and Investigation
	03.0501 - Forestry, General
011400 - Forestry	03.0511 - Forest Technology/Technician
	03.0599 - Forestry, Other

Exhibit 11. Postsecondary supply for *Fuels and Prescribed Fire Applications Occupations*

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	Total
011400 - Forestry	Bakersfield	17					17*
	Columbia	13			4	1	18
	Reedley College	7	9	5			21*
213310 - Wildland Fire Technology	Bakersfield	2					2*
	Porterville					18	18*
SCV/SML TOTAL		**26**	**9**	**5**	**0**	**18**	**58**
CVML TOTAL		**39**	**9**	**5**	**4**	**19**	**76**

*SCV/SML awards

There is an undersupply of 332 workers in the SCV/SML subregion and an undersupply of 542 workers in the CVML region (Exhibit 12).

Exhibit 12. *Fuels and Prescribed Fire Applications Occupations* **workforce demand (annual job openings), postsecondary awards (supply), and additional students needed to fill gap in the SCV/SML subregion and CVML region**
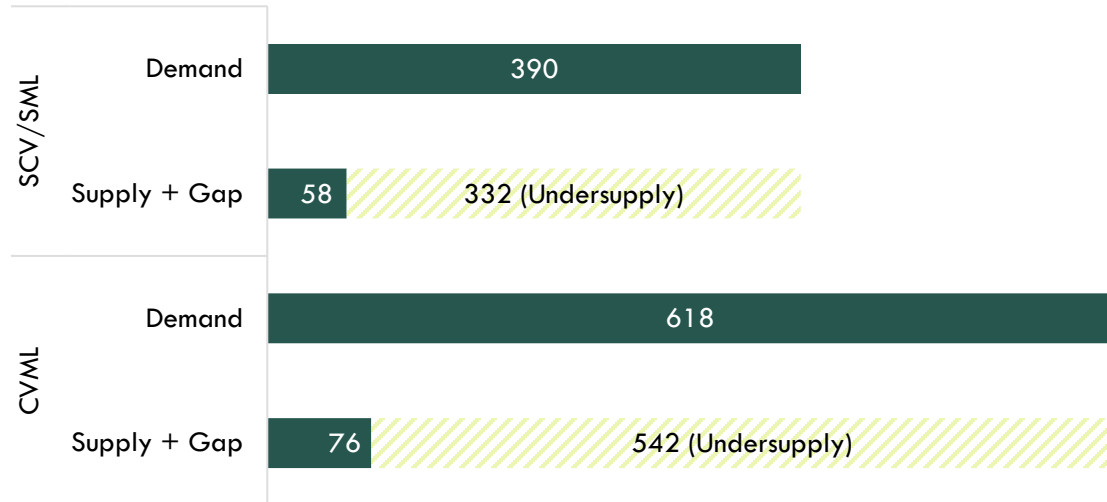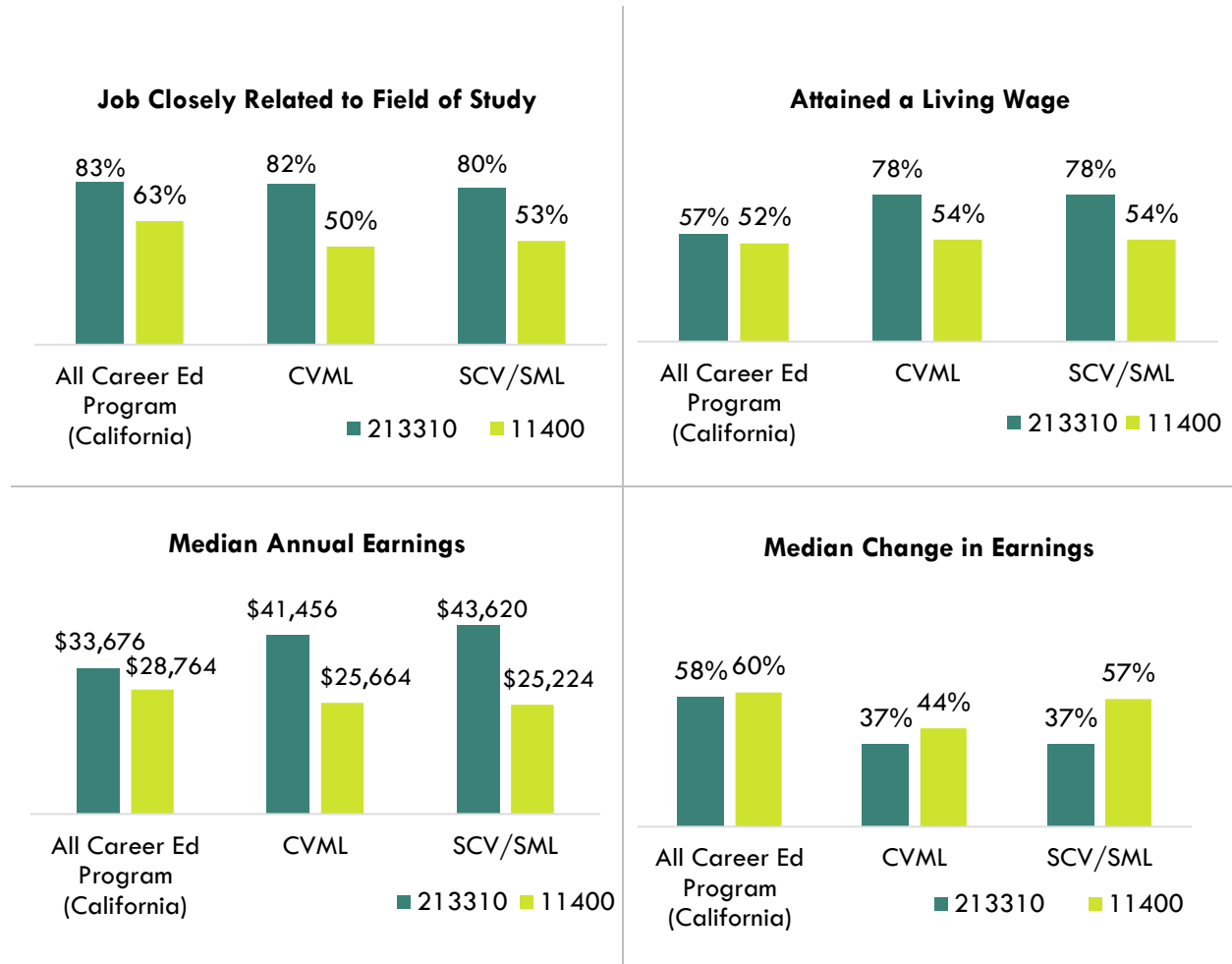

Student Outcomes

Exhibits 13a – 13b summarize outcomes from California Community College Chancellor's LaunchBoard for TOP codes related to *Fuels and Prescribed Fire Applications Occupations*. Notably, 80% of students obtained a job closely related to their field of study in the subregion and 78% attained a living wage in the subregion for TOP 213310 - Wildland Fire Technology and 53% of students obtained a job closely related to their field of study in the subregion and 54% attained a living wage in the subregion for 011400 – Forestry.

Exhibit 13a. Regional metrics for TOP 213310 - Wildland Fire Technology and 011400 - Forestry

Metric	213310 - Wildland Fire Technology	011400 - Forestry
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	*	26
Number of Students Who Transferred	*	31
*denotes data not available in table and charts		

Exhibit 13. Metrics for TOP 213310 - Wildland Fire Technology and 011400 - Forestry

Job Closely Related to Field of Study

	213310	11400
All Career Ed Program (California)	83%	63%
CVML	82%	50%
SCV/SML	80%	53%

Attained a Living Wage

	213310	11400
All Career Ed Program (California)	57%	52%
CVML	78%	54%
SCV/SML	78%	54%

Median Annual Earnings

	213310	11400
All Career Ed Program (California)	$33,676	$28,764
CVML	$41,456	$25,664
SCV/SML	$43,620	$25,224

Median Change in Earnings

	213310	11400
All Career Ed Program (California)	58%	60%
CVML	37%	44%
SCV/SML	37%	57%

Recommendation

This report suggests there is a shortage of 332 workers in the SCV/SML subregion and a shortage of 542 workers in the CVML region for *Fuels and Prescribed Fire Applications Occupations*. Based on these findings, it is recommended that Reedley College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Fuels and Prescribed Fire Applications workers in the region.

Appendix: 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. (LIGHTCAST). LIGHTCAST occupational employment data are based on final LIGHTCAST industry data and final LIGHTCAST 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 LIGHTCAST 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.
LaunchBoard	Chancellor's LaunchBoard. https://www.calpassplus.org/LaunchBoard/SWP.aspx
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov.
Job Posting and Skills Data	Lightcast.
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. (LIGHTCAST) formula that includes historical employment and economic indicators along with national, state and local trends.

LaunchBoard (Attained the Living Wage): Among SWP students who exited college and did not transfer to any postsecondary institution, the proportion who attained the district county living wage for a single adult measured immediately following academic year of exit

LaunchBoard (Median Annual Earnings): Among SWP students who exited the community college system and who did not transfer to any postsecondary institution, median earnings following the academic year of exit.

LaunchBoard (Median Change in Earnings): Among SWP students who exited and who did not transfer to any postsecondary institution, median change in earnings between the second quarter prior to the beginning of the academic year of entry and the second quarter after the end of the academic year of exit from the last college attended.

LaunchBoard (Job Closely Related to Field of Study): Among SWP students who responded to the CTE Outcomes Survey and did not transfer to any postsecondary institution, the proportion who reported that they are working in a job very closely or closely related to their field of study.

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.