**January 2020**

# Labor Market Analysis

## Wildland Fire Management
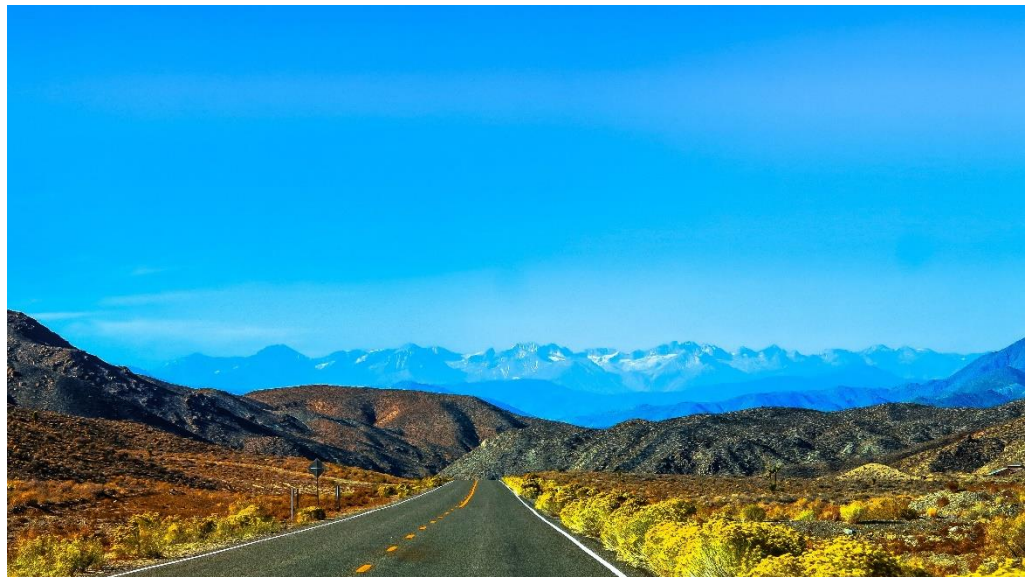
California Community Colleges

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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 wildland fire management. Ten occupations related to wildland fire management were identified for Reedley College:

- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)
- Firefighters (SOC 33-2011)
- Forest and Conservation Technicians (SOC 19-4093)
- Forest and Conservation Workers (SOC 45-4011)
- Environmental Scientists and Specialists, Including Health (SOC 19-2041)
- Life, Physical, and Social Science Technicians, All Other (SOC 19-4099)
- First-Line Supervisors of Fire Fighting and Prevention Workers (SOC 33-1021)
- Conservation Scientists (SOC 19-1031)
- Fire Inspectors and Investigators (SOC 33-2021)
- Forest Fire Inspectors and Prevention Specialists (SOC 33-2022)

**Key findings**:

- **Occupational demand —** More than 8,800 workers were employed in jobs related to wildland fire management 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 first-line supervisors of firefighting and prevention workers, $44.36/hour in the subregion and $43.72/hour in the region.
- **Employers —** Top employers in the subregion are Forest Service, U.S. Department of Agriculture, and State of California.
- **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 communication, 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 —** Eight of the ten occupations require educational attainment less than a bachelor's degree, making these middle-skill occupations that are relevant to community college education **Supply —** Analysis of postsecondary completions in the region shows that on average 182 awards were conferred in the Central Valley/Mother Lode region each year.

   Based on a comparison of occupational demand and supply, regarding fire management, there is an undersupply of 87 trained workers in the subregion and 222 workers in the region. For forestry and fire management, there is an undersupply of 910 workers in the subregion and 1,400 workers in the region. The Center of Excellence recommends 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 wildland fire management workers in the region.

# Introduction

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

- Fire Technology-213300
- Forestry-011400
- Wildland Fire Technology-213310

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 wildland fire management resulted in the identification of wildland fire management 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)
- Firefighters (SOC 33-2011)
- Forest and Conservation Technicians (SOC 19-4093)
- Forest and Conservation Workers (SOC 45-4011)
- Environmental Scientists and Specialists, Including Health (SOC 19-2041)
- Life, Physical, and Social Science Technicians, All Other (SOC 19-4099)
- First-Line Supervisors of Fire Fighting and Prevention Workers (SOC 33-1021)
- Conservation Scientists (SOC 19-1031)
- Fire Inspectors and Investigators (SOC 33-2021)
- Forest Fire Inspectors and Prevention Specialists (SOC 33-2022)

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; Firefighters; Life, Physical, and Social Science Technicians, All Other; First-Line Supervisors of Fire Fighting and Prevention Workers; Conservation Scientists; and Fire Inspectors and Investigators.

**Exhibit 1. SOC titles, job descriptions, sample job titles, and knowledge and skills for wildland fire management**

| SOC Title & Code | Description | Sample Job Titles | Knowledge & Skills |
| --- | --- | --- | --- |
| **Forest Fire Inspectors and Prevention Specialists (SOC 33-2022)** | Enforce fire regulations, inspect forest for fire hazards and recommend forest fire prevention or control measures. May report forest fires and weather conditions. | Fire Management Officer, Fire Operations Forester, Fire Prevention Officer, Fire Prevention Technician, Fire Technician, Forest Officer, Forest Patrolman, Forestry Patrolman, Wildfire Mitigation Specialist, Wildfire Prevention Specialist | **Knowledge**<br>Administration and Management<br>Customer and Personal Service<br>Education and Training<br>Personnel and Human Resources<br>Public Safety and Security<br>**Skills**<br>Critical Thinking |

| SOC Title & Code | Description | Sample Job Titles | Knowledge & Skills |
|---|---|---|---|
| | | | Coordination |
| | | | Speaking |
| | | | Active Listening |
| | | | Judgment and Decision Making |
| **Environmental Scientists and Specialists, Including Health (SOC 19-2041)** | Conduct research or perform investigation for the purpose of identifying, abating, or eliminating sources of pollutants or hazards that affect either the environment or the health of the population. Using knowledge of various scientific disciplines, may collect, synthesize, study, report, and recommend action based on data derived from measurements or observations of air, food, soil, water, and other sources. | Environmental Analyst, Environmental Health and Safety Specialist, Environmental Programs Specialist, Environmental Protection Specialist, Environmental Scientist, Environmental Specialist, Hazardous Substances Scientist, Registered Environmental Health Specialist (REHS), Research Environmental Scientist, Senior Environmental Scientist | **Knowledge** |
| | | | English Language |
| | | | Mathematics |
| | | | Law and Government |
| | | | Clerical |
| | | | Biology |
| | | | **Skills** |
| | | | Active Listening |
| | | | Critical Thinking |
| | | | Reading Comprehension |
| | | | Science |
| | | | Speaking |
| **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 | Conservation Officer, Crew Leader, Field | **Knowledge** |
| | | | Geography |

| SOC Title & Code | Description | Sample Job Titles | Knowledge & Skills |
|---|---|---|---|
| **Workers (SOC 45-4011)** | 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, and tree planters. | Laborer, Foreman, Forest Resource Specialist, Forestry Support Specialist, Geographic Information Systems Coordinator (GIS Coordinator), Park Maintainer, Reforestation Worker, Tree Planter | English Language<br>Public Safety and Security<br>Clerical<br>Biology<br>**Skills**<br>Coordination<br>Speaking<br>Active Listening<br>Critical Thinking<br>Judgment and Decision Making |

The average self-sufficiency wage for a single adult in the 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 8,811 workers in wildland fire management 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.
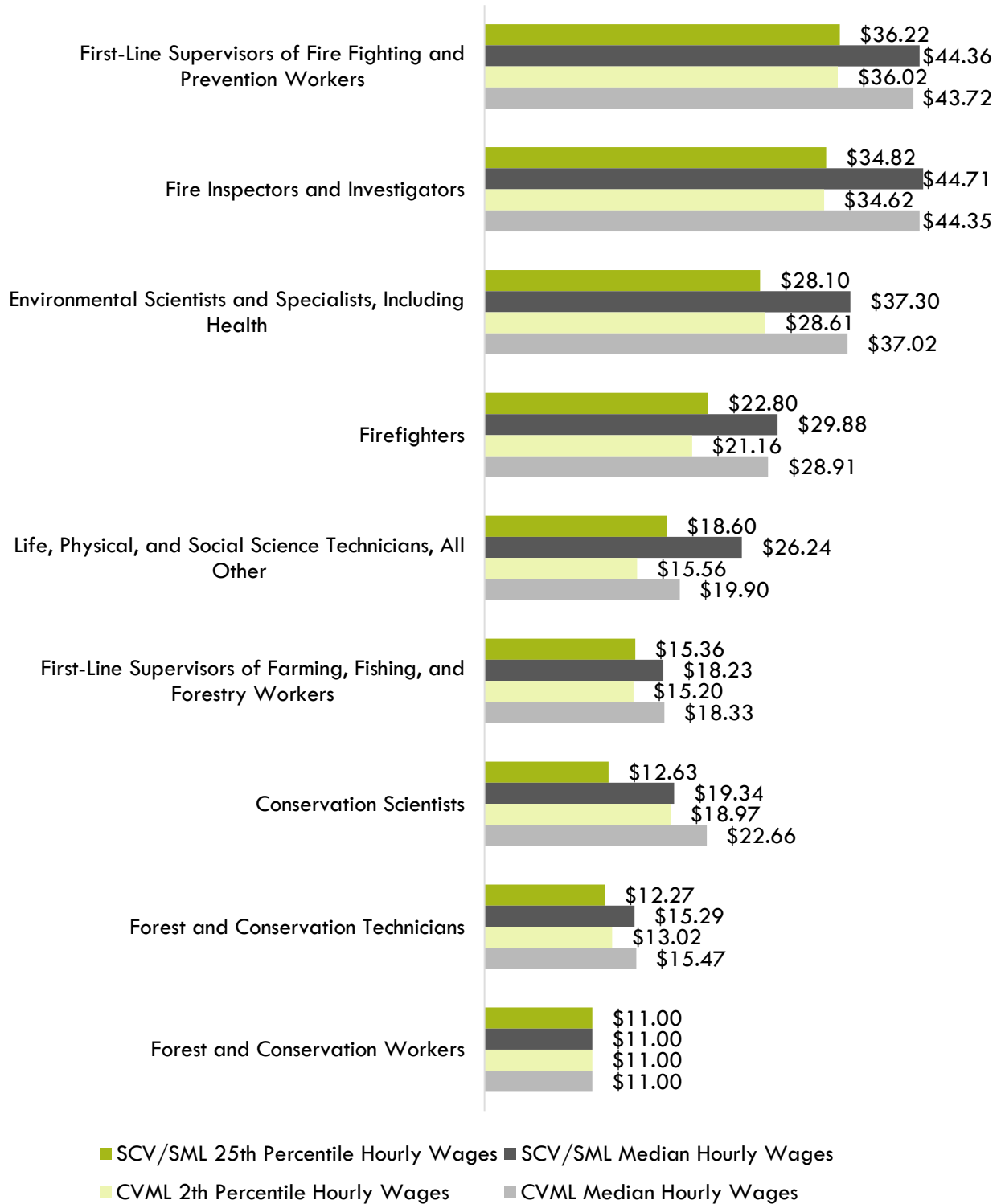
**Exhibit 3. Wildland fire management employment and occupational projections in the SCV/SML subregion**

| 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 |
| Firefighters | 2,372 | 2,484 | 112 | 5% | 181 |
| Forest and Conservation Technicians | 621 | 629 | 8 | 1% | 75 |
| Forest and Conservation Workers | 399 | 394 | (5) | (1%) | 63 |
| Environmental Scientists and Specialists, Including Health | 591 | 620 | 29 | 5% | 60 |
| Life, Physical, and Social Science Technicians, All Other | 264 | 283 | 19 | 7% | 35 |
| First-Line Supervisors of Fire Fighting and Prevention Workers | 299 | 318 | 19 | 6% | 24 |
| Conservation Scientists | 85 | 92 | 7 | 8% | 9 |
| Fire Inspectors and Investigators | 10 | 12 | 2 | 20% | Insf. Data |
| Forest Fire Inspectors and Prevention Specialists | <10 | <10 | Insf. Data | Insf. Data | Insf. Data |
| **Total** | 8,811 | 9,245 | 434 | 5% | 1,064 |

# Wages

Exhibit 4 compares the entry-level and experienced wages of the wildland fire management 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 first-line supervisors of firefighting and prevention workers, $44.36/hour in the subregion and $43.72/hour in the region. There was insufficient wage data for forest fire inspectors and prevention specialists.

**Exhibit 4. Entry-level and experienced wage comparison for wildland fire management in the SCV/SML subregion and region**

**First-Line Supervisors of Fire Fighting and Prevention Workers**
- $36.22
- $44.36
- $36.02
- $43.72

**Fire Inspectors and Investigators**
- $34.82
- $44.71
- $34.62
- $44.35

**Environmental Scientists and Specialists, Including Health**
- $28.10
- $37.30
- $28.61
- $37.02

**Firefighters**
- $22.80
- $29.88
- $21.16
- $28.91

**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

**Conservation Scientists**
- $12.63
- $19.34
- $18.97
- $22.66

**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 2th Percentile Hourly Wages  ■ CVML Median Hourly Wages

# Job Postings

There were 966 job postings for the 10 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 of wildland fire management by number of job postings**

| Employer | Job Postings |
|---|---|
| Forest Service | 39 |
| US Department of Agriculture | 28 |
| State of California | 28 |
| Qk | 20 |
| US Government | 17 |
| Stantec, Inc. | 15 |
| Merced Union High School District | 14 |
| National Park Service | 13 |
| US Air Force | 12 |
| City Fresno | 10 |

Job posting analysis also included the top industries hiring positions related to wildland fire management (Exhibit 6).

**Exhibit 6. Top industries for wildland fire management by number of job postings**

| Industry | Job Postings |
|---|---|
| Administration of Economic Program | 67 |
| National Security and International Affairs | 53 |
| Executive, Legislative, and Other General Government Support | 44 |
| Support Activities for Forestry | 38 |
| General Medical and Surgical Hospitals | 26 |
| Administration of Environmental Quality Programs | 25 |
| Architectural, Engineering, and Related Services | 23 |
| Elementary and Secondary Schools | 23 |
| Employment Services | 23 |
| Aerospace Product and Parts Manufacturing | 14 |

**Job Titles**

Exhibit 7 shows how job postings for the targeted occupations in the SCV/SML subregion are distributed across 10 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 wildland fire management**

| Occupational Title | Job Postings |
|---|---|
| Quality Control Analysts | 405 |
| Forest and Conservation Technicians | 141 |
| Environmental Scientists and Specialists, Including Health | 120 |
| Municipal Fire Fighting and Prevention Supervisors | 48 |
| Municipal Firefighters | 45 |
| Soil and Water Conservationists | 42 |
| Environmental Restoration Planners | 38 |
| Fire Inspectors | 27 |
| Park Naturalists | 26 |
| Life, Physical, and Social Science Technicians, All Other | 17 |

Analysis of the 966 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 wildland fire management**

| Job Title | Job Postings |
|---|---|
| Quality Assurance Technician | 99 |
| Quality Control Technician | 81 |
| Environmental Scientist | 68 |
| Consulting Utility Forester | 65 |
| Forestry Technician | 53 |
| Quality Specialist | 50 |
| Quality Coordinator | 44 |
| Environmental Planner | 40 |
| Forestry Technician, Recreation | 24 |
| Quality Control Supervisor | 21 |

**Salaries**

Exhibit 9 shows the "Market Salaries" for wildland fire 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 9. Salaries for wildland fire management**

| Market Salary Percentile | Salary Amount |
|---|---|
| 10th Percentile | 30,154 |
| 25th Percentile | 35,571 |
| 50th Percentile | 48,973 |
| 75th Percentile | 66,997 |
| 90th Percentile | 81,953 |

**Education**

Of the 966 job postings, 619 listed an education level preferred for the positions being filled. Of those, 49% requested a bachelor's degree, 31% requested a high school diploma or vocational training, and 12% requested a master's degree (Exhibit 10).
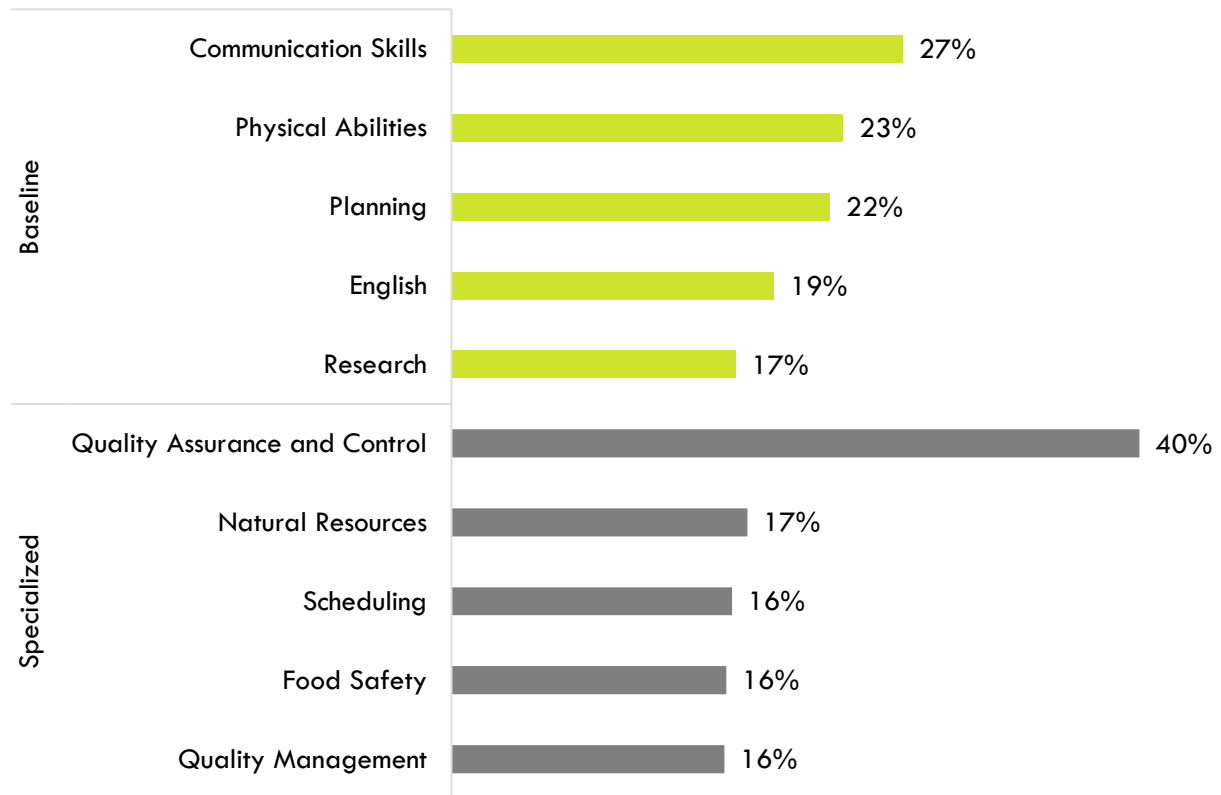
**Exhibit 10. Education levels requested in job postings for wildland fire management**
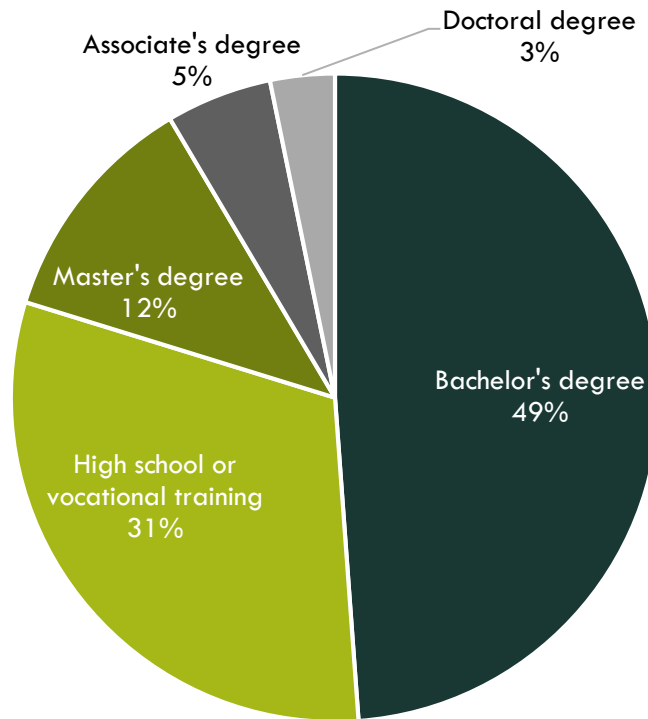


**Baseline and Specialized Skills**

Exhibit 11 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are communication, 27% of job postings, physical abilities, 23%, and planning, 22%. The top three specialized skills are quality assurance and control, 40% of job postings, natural resources, 17%, and scheduling, 16%.
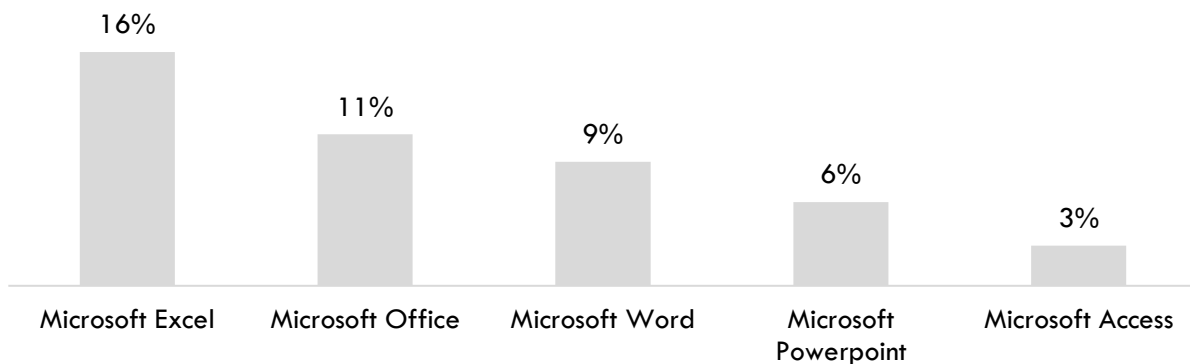
**Exhibit 11. In-demand wildland fire management baseline and specialized skills**

| | Skill | Percentage |
|---|---|---|
| **Baseline** | Communication Skills | 27% |
| | Physical Abilities | 23% |
| | Planning | 22% |
| | English | 19% |
| | Research | 17% |
| **Specialized** | Quality Assurance and Control | 40% |
| | Natural Resources | 17% |
| | Scheduling | 16% |
| | Food Safety | 16% |
| | Quality Management | 16% |

**Software Skills**

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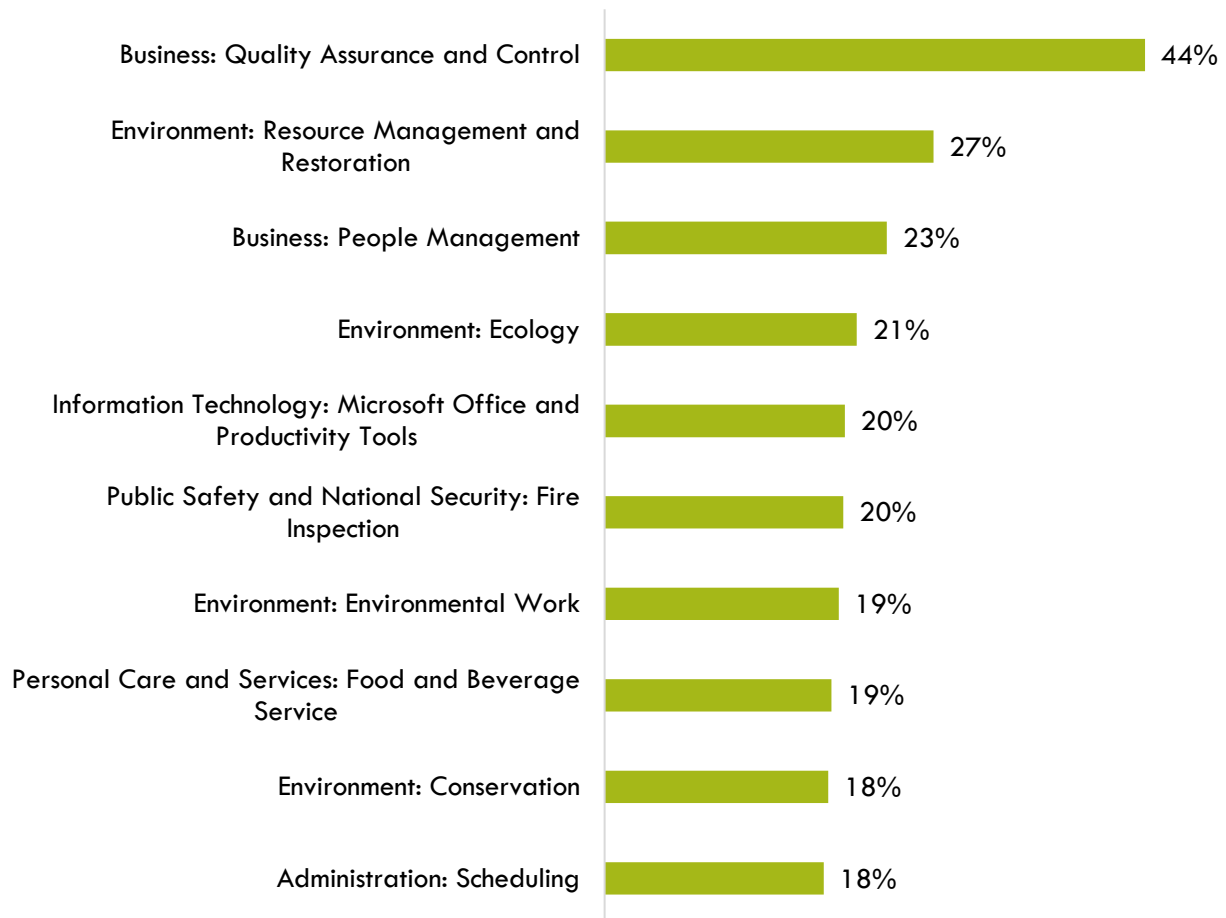
**Exhibit 12. In-demand wildland fire management software skills**

| Software | Percentage |
|---|---|
| Microsoft Excel | 16% |
| Microsoft Office | 11% |
| Microsoft Word | 9% |
| Microsoft Powerpoint | 6% |
| Microsoft Access | 3% |

**Skill Cluster Projections**

Of the 966 job postings, 810 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 (44%); environment: resource management and restoration (27%); and business: people management (23%) (Exhibit 13).
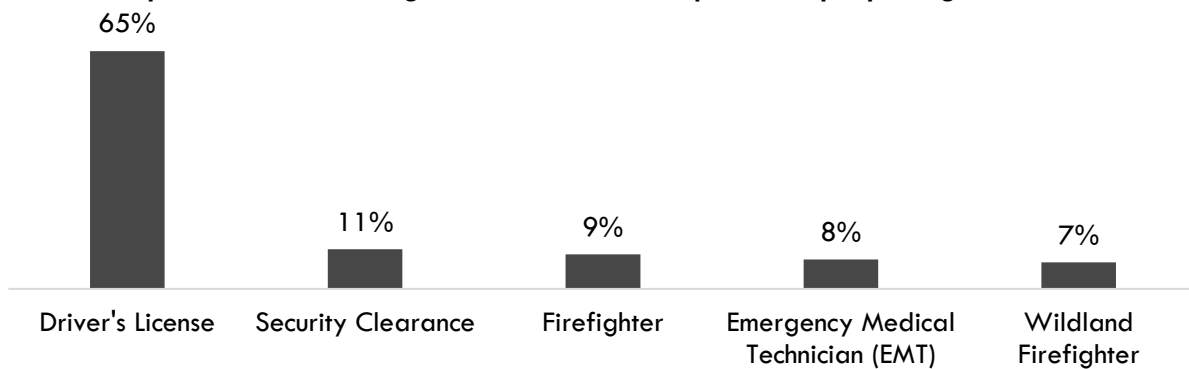
**Exhibit 13. Skill cluster projections for wildland fire management**

| Skill cluster | Percent |
|---|---|
| Business: Quality Assurance and Control | 44% |
| Environment: Resource Management and Restoration | 27% |
| Business: People Management | 23% |
| Environment: Ecology | 21% |
| Information Technology: Microsoft Office and Productivity Tools | 20% |
| Public Safety and National Security: Fire Inspection | 20% |
| Environment: Environmental Work | 19% |
| Personal Care and Services: Food and Beverage Service | 19% |
| Environment: Conservation | 18% |
| Administration: Scheduling | 18% |

**Certifications**

Of the 966 job postings, 361 contained certification data. Of those, 65% indicated a need for a driver's license. The next top certifications are Security Clearance and Firefighter (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 wildland fire management certifications requested in job postings**

| Certification | Percent |
|---|---|
| Driver's License | 65% |
| Security Clearance | 11% |
| Firefighter | 9% |
| Emergency Medical Technician (EMT) | 8% |
| Wildland Firefighter | 7% |

# Education, Work Experience & Training

Eight of the ten occupations require educational attainment less than a bachelor's degree, making these middle-skill occupations that are relevant to community college education (Exhibit 15). Two occupations typically require a bachelor's degree: conservation scientists, and environmental scientists and specialists, including health.

**Exhibit 15. Education, work experience, training and Current Population Survey results for wildland fire management occupations[1]**

| Occupation | Typical Entry-level Education | Work Experience Required | Typical On-The-Job Training | CPS |
|---|---|---|---|---|
| Conservation Scientists | Bachelor's degree | None | None | 0.0% |
| Environmental Scientists and Specialists, Including Health | Bachelor's degree | None | None | 0.0% |
| 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 Fire Fighting and Prevention Workers | Postsecondary nondegree award | Less than 5 years | Moderate-term | 49.3% |
| Firefighters | Postsecondary nondegree award | None | Long-term | 61.1% |
| Fire Inspectors and Investigators | Postsecondary nondegree award | 5 years or more | Moderate-term | 51.6% |
| Forest Fire Inspectors and Prevention Specialists | High school diploma or equivalent | Less than 5 years | Moderate-term | 51.6% |
| 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: Fire Technology-213300, Forestry-011400, and Wildland Fire Technology-213310. Analysis of the last three years of TOP code data shows that, on average, 182 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 16).

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

**Exhibit 16. Postsecondary supply for wildland fire management occupations in the region**

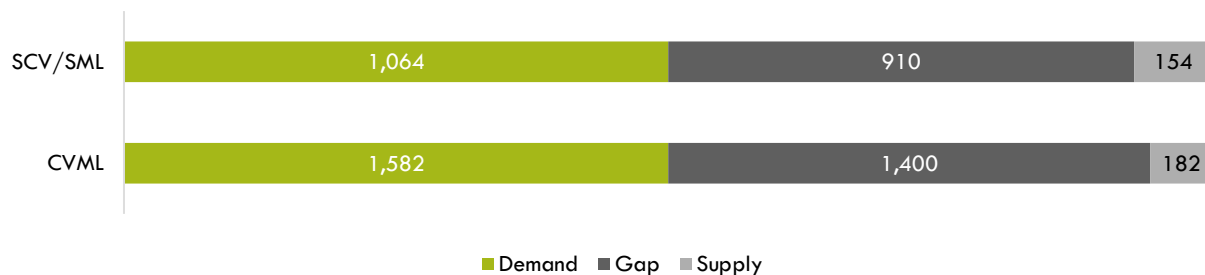| TOP Title and Code | College | Degrees | Certificates | Subtotal |
|---|---|---|---|---|
| **Fire Technology-213300** | Bakersfield | 15 | 20 | 35 |
| | Columbia | 14 | 12 | 26 |
| | Fresno City | 0 | 7 | 8 |
| | Merced | 1 | 7 | 8 |
| | Modesto Junior | 6 | 15 | 20 |
| | Porterville | 1 | | 1 |
| | San Joaquin Delta | 0 | 1 | 2 |
| | Sequoias | 1 | 10 | 12 |
| **Forestry-011400** | Bakersfield | 4 | 11 | 15 |
| | Columbia | 1 | 7 | 8 |
| | Modesto Junior | 0 | 0 | 1 |
| | Reedley College | 10 | 11 | 21 |
| **Wildland Fire Technology-213310** | Bakersfield | 1 | 2 | 3 |
| | Porterville | 24 | | 24 |
| **Total** | | **78** | **104** | **182** |

**Gap Analysis**

Regarding fire management, there is an undersupply of 87 workers in the SCV/SML subregion and 222 workers in the region (Exhibit 17). For forestry and fire management, there is an undersupply of 910 workers in the subregion and 1,400 workers in the region.

**Exhibit 17. Wildland fire management workforce annual demand and supply in the SCV/SML subregion and region**

## Fire Management

| | Demand | Gap | Supply |
|---|---|---|---|
| SCV/SML | 205 | 87 | 118 |
| CVML | 360 | 222 | 138 |

■ Demand ■ Gap ■ Supply

## Forestry and Fire Management

| | Demand | Gap | Supply |
|---|---|---|---|
| SCV/SML | 1,064 | 910 | 154 |
| CVML | 1,582 | 1,400 | 182 |

■ Demand ■ Gap ■ Supply
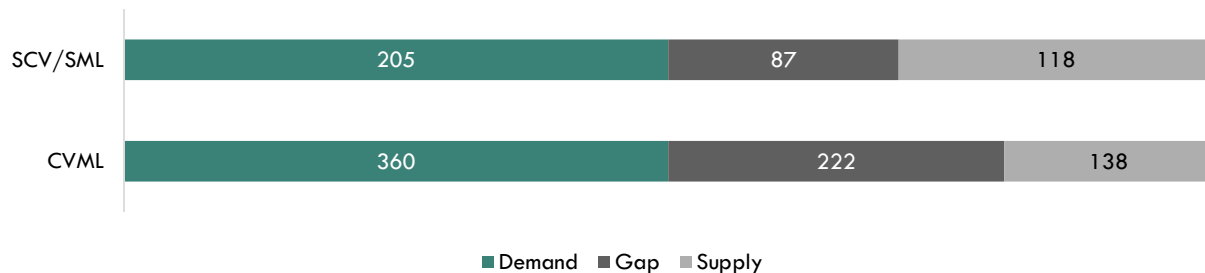
# Student Outcomes

Exhibit 18 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP codes related to wildland fire management. Across the region, 45 forestry students received a degree or certificate, and 52 transferred; by comparison, 142 fire technology received a degree or certificate, and 53 transferred. A higher percentage of fire technology students reported attaining a living wage. A higher percentage of forestry students reported a median change in earnings.

**Exhibit 18: Regional metrics for the TOP codes related to wildland fire management**

| Metric | Forestry-011400 | Fire Technology-213300 | Wildland Fire Technology-213310 |
|---|---|---|---|
| Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status | 45 | 142 | * |
| Number of Students Who Transferred | 52 | 53 | * |
| Job Closely Related to Field of Study | 71% | 80% | 83% |
| Median Change in Earnings | 61% | 37% | 15% |
| Attained a Living Wage | 48% | 81% | 45% |
| * denotes data not available. | | | |

# Conclusion

The entry-level wages of most of the occupations exceed the SCV/SML subregion's self-sufficiency and living wages for one adult. The exception is forest and conservation workers. There were 966 job postings in the past 12 months for occupations related to wildland fire management in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is communication, 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.

Regarding fire management, there is an undersupply of 87 workers in the SCV/SML subregion and 222 workers in the region. For forestry and fire management, there is an undersupply of 910 workers in the subregion and 1,400 workers 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 wildland fire management 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).