

February 2021

Labor Market Analysis

Plant Science



Prepared by the Central Valley/Mother Lode Center of Excellence

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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 plant science. Three occupations related to plant science were identified for Clovis Community College:

- 11-9013, Farmers, Ranchers, and Other Agricultural Managers
- 45-1011, First-Line Supervisors of Farming, Fishing, and Forestry Workers
- 37-3012, Pesticide Handlers, Sprayers, and Applicators, Vegetation

Key findings:

- **Occupational demand** — Nearly 20,100 workers were employed in jobs related to plant science in 2019 in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. The largest occupation is farmers, ranchers, and other agricultural managers with 16,465 workers in 2019, a projected decline in employment of 5% over the next five years, and 1,542 annual openings.
- **Wages** — Farmers, ranchers, and other agricultural managers earn the highest entry-level wage, \$17.20/hour in the subregion and \$17.79/hour in the region.
- **Employers** — Employers with the most job postings in the subregion are Wilbur Ellis, Css Farms, and Bayer Corporation.
- **Occupational titles** — The most common occupational title in job postings in the subregion is farm and ranch managers. The most common job title is farm manager.
- **Skills and certifications** — The top baseline skill is communication, the top specialized skill is farm management, and the top software skill is Microsoft Access. The most in-demand certification is a driver's license.
- **Education** — A high school diploma or the equivalent is the typical entry-level education required for all three occupations.
- **Supply** — Analysis of postsecondary completions in the region shows that on average 131 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 2,026 trained workers in the subregion and 2,942 workers in the region. The Center of Excellence recommends that Clovis Community College work with the Agriculture, Water and Environmental Technologies Regional Director, the college's advisory board, and local industry in the development of programs to address the shortage of plant science workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Clovis Community College to provide labor market information for plant science. 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 South Central Valley/Southern Mother Lode (SCV/SML) subregion is \$10.30/hour.¹

Analysis of the program and occupational data related to plant science resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 11-9013, Farmers, Ranchers, and Other Agricultural Managers
- 45-1011, First-Line Supervisors of Farming, Fishing, and Forestry Workers
- 37-3012, Pesticide Handlers, Sprayers, and Applicators, Vegetation

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.

Farmers, Ranchers, and Other Agricultural Managers

Job Description: Plan, direct, or coordinate the management or operation of farms, ranches, greenhouses, aquacultural operations, nurseries, timber tracts, or other agricultural establishments. May hire, train, and supervise farm workers or contract for services to carry out the day-to-day activities of the managed operation. May engage in or supervise planting, cultivating, harvesting, and financial and marketing activities.

Knowledge: Administration and Management, Production and Processing, Biology, Mathematics, English Language

Skills: Critical Thinking, Speaking, Monitoring, Judgement and Decision Making, Time Management

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 and Personnel Resources

Pesticide Handlers, Sprayers, and Applicators, Vegetation

Job Description: Mix or apply pesticides, herbicides, fungicides, or insecticides through sprays, dusts, vapors, soil incorporation, or chemical application on trees, shrubs, lawns, or crops. Usually requires specific training and state or federal certification.

Knowledge: Biology, Customer and Personal Service, Production and Processing, English Language, Administration and Management

Skills: Active Listening, Critical Thinking, Speaking, Time Management, Complex Problem Solving

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://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Occupational Demand

The South Central Valley/Southern Mother Lode subregion employed 20,874 workers in plant science occupations in 2019 (Exhibit 1). The largest occupation is farmers, ranchers, and other agricultural managers with 16,465 workers in 2019. This occupation is projected to contract by 5% over the next five years but has the greatest number of projected annual openings, 1,542.

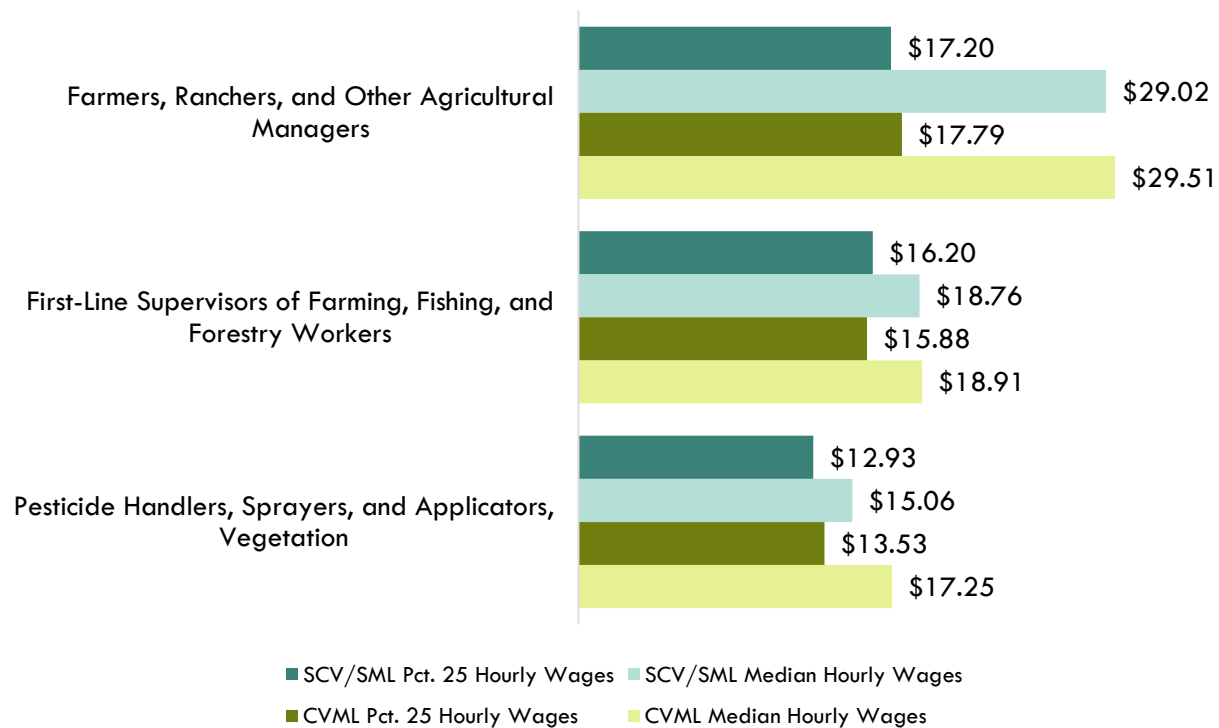
Exhibit 1. Plant science employment and occupational projections in the SCV/SML subregion

Occupation	2019 Jobs	2024 Jobs	5-Year Change	5-Year % Change	Annual Openings
Farmers, Ranchers, and Other Agricultural Managers	16,465	15,696	(769)	(5%)	1,542
First-Line Supervisors of Farming, Fishing, and Forestry Workers	3,970	3,947	(23)	(1%)	534
Pesticide Handlers, Sprayers, and Applicators, Vegetation	440	450	10	2%	56
TOTAL	20,874	20,092	(782)	(4%)	2,131

Wages

Exhibit 2 compares the entry-level and experienced wages of the plant science occupations. Farmers, ranchers, and other agricultural managers earn the highest entry-level wage, \$17.20/hour in the subregion and \$17.79/hour in the region.

Exhibit 2. Entry-level and experienced wage comparison in the SCV/SML subregion and region



Job Postings

There were 46 job postings for the three occupations in the SCV/SML subregion from August 2020 to January 2021.² The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of plant science by number of job postings

Employer	Job Postings	% Job Postings
Wilbur Ellis	4	10%
Css Farms	3	8%
Bayer Corporation	2	5%
Fruit Growers Supply Company	2	5%
Prima Wawona	2	5%
Team Green Incorporated	2	5%
Ten Star Farming	2	5%
The Farm & Land Company Inc	2	5%
Truckers Needed Corp	2	5%
Weed Man USA	2	5%

Exhibit 4 shows how job postings for the targeted occupations in the SCV/SML subregion are distributed across six O*NET OnLine occupations. The occupational title farm and ranch managers is listed in 25 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include farm manager in 10 job postings, lawn technician in four job postings, and associate farm manager in two job postings.

Exhibit 4. Top occupational titles in job postings for plant science

Occupational Title	Job Postings	% of Job Postings
Farm and Ranch Managers	25	54%
Pesticide Handlers, Sprayers, and Applicators, Vegetation	9	20%
First-Line Supervisors of Agricultural Crop and Horticultural Workers	5	11%
Aquacultural Managers	4	9%
First-Line Supervisors of Animal Husbandry and Animal Care Workers	2	4%
Nursery and Greenhouse Managers	1	2%

Salaries

Exhibit 5 shows the “Market Salaries” for plant science 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.

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 5. Salaries for plant science

Market Salary Percentile	Salary Amount
10th Percentile	\$24,692
25th Percentile	\$29,385
50th Percentile	\$43,319
75th Percentile	\$59,424
90th Percentile	\$75,361

Education

Of the 46 job postings, 25 listed an education level preferred for the positions being filled. Of those, 60% requested a bachelor's degree, 52% requested high school or vocational training, and 12% 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 total more than 100%.

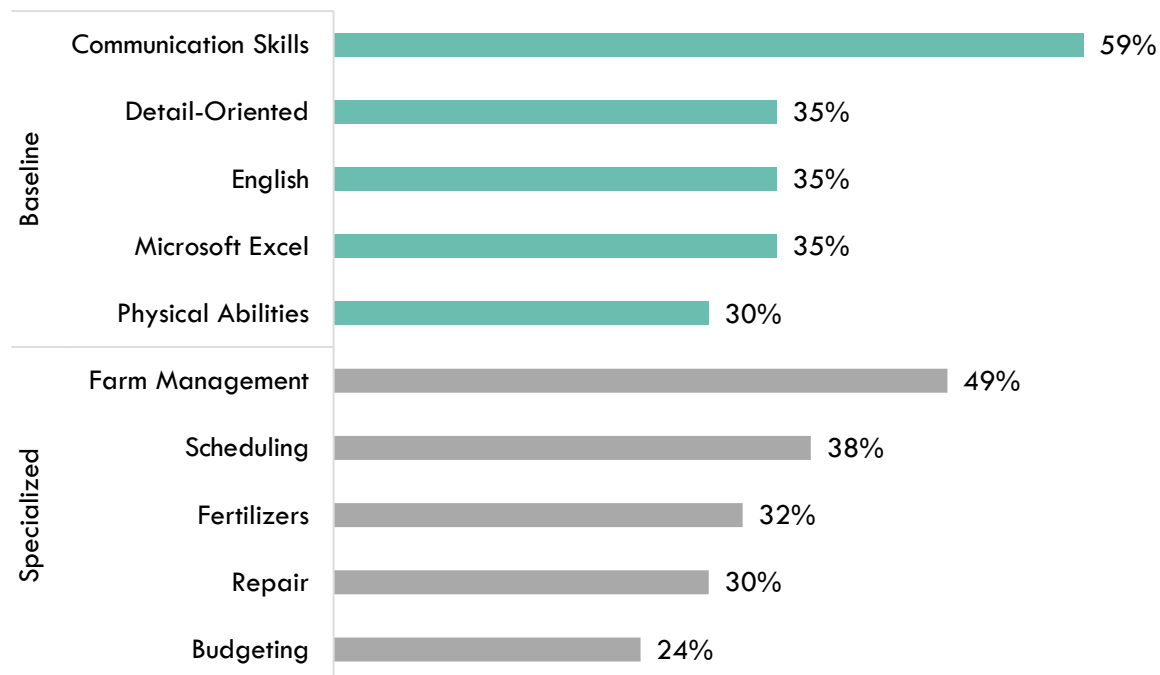
Exhibit 6. Education levels requested in job postings for plant science

Education level	Job Postings	% of Job Postings
Bachelor's degree	15	60%
High school or vocational training	13	52%
Master's degree	3	12%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are communication, 59% of job postings, detail oriented, 35%, and English, 35%. The top three specialized skills are farm management, 49% of job postings, scheduling, 38%, and fertilizers, 32%.

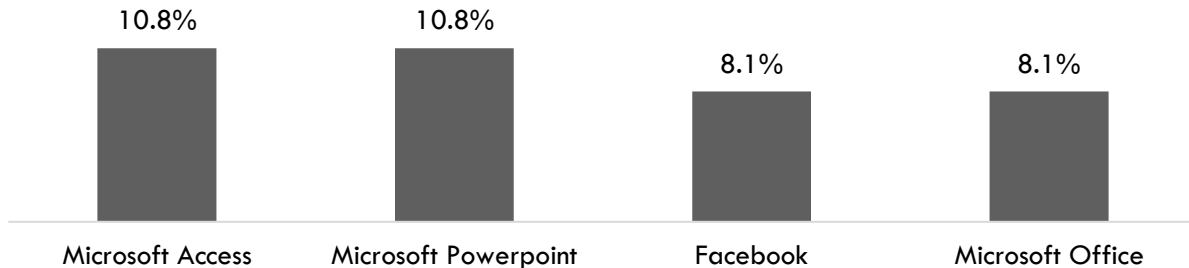
Exhibit 7. In-demand plant science baseline and specialized skills



Software Skills

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

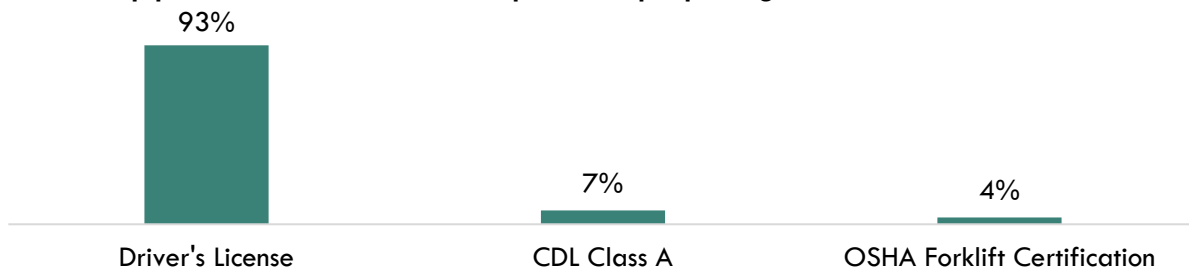
Exhibit 8. In-demand plant science software skills



Certifications

Of the 46 job postings, 28 contained certification data. Among those, 93% indicated a need for a driver's license. The next top certifications are CDL Class A and OSHA Forklift Certification (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 plant science certifications requested in job postings



Education, Work Experience & Training

A high school diploma or the equivalent is the typical entry-level education required for all three occupations (Exhibit 10).

Exhibit 10. Education, work experience, training, and Current Population Survey results for plant science occupations³

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Farmers, Ranchers, and Other Agricultural Managers	High school diploma or equivalent	5 years or more	None	30.0%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	24.9%
Pesticide Handlers, Sprayers, and Applicators, Vegetation	High school diploma or equivalent	None	Moderate-term	19.8%

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

Supply

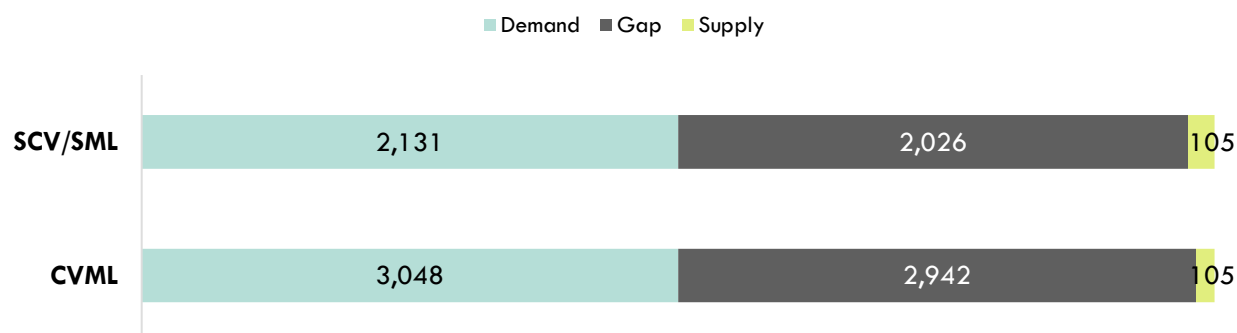
Analysis of program data from the California Community Colleges Chancellor's Office Data Mart included the TOP codes and titles: 010100-Agriculture Technology and Sciences, General and 010300-Plant Science. Analysis of the last three years of data shows that, on average, 131 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

Exhibit 11. Postsecondary supply for plant science occupations in the region

TOP Code - Title	Colleges	Associate Degree	Associate for Transfer Degree	Certificate 12 < 18 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Subtotal
010100 - Agriculture Technology and Sciences, General	Merced	10						10
	Modesto	7						7
	Porterville	7						7
	Reedley College	1			1			2
	West Hills Coalinga	2			2		1	5
010300 - Plant Science	Bakersfield	7	0			1		9
	Merced	3			1			5
	Modesto	18	0					19
	Reedley College	0	15	11	18	3		47
	San Joaquin Delta					0		0
	Sequoias	3	4		1		2	9
	West Hills Coalinga		11					11
TOTAL		58	31	11	23	5	3	131

There is an undersupply of 2,026 plant science workers in the SCV/SML subregion and 2,942 workers in the region (Exhibit 12).

Exhibit 12. Plant science workforce annual demand and supply 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 codes related to plant science. There were 119 plant science students who received a degree or certificate or attained apprenticeship journey status and 243 who transferred; 65% of students obtained a job closely related to their field of study; 35% reported a median change in earnings; and 64% attained a living wage.

Exhibit 13. Regional metrics for the TOP codes related to plant science

Metric	Agriculture Technology and Sciences, General 010100	Plant Science 010300
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	19	119
Number of Students Who Transferred	73	243
Job Closely Related to Field of Study	54%	65%
Median Change in Earnings	65%	35%
Attained a Living Wage	64%	64%
* denotes data not available.		

Conclusion

The entry-level wages of the three occupations exceed the SCV/SML subregion's average living wage. There were 46 job postings in the past six months for occupations related to plant science 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 farm management.
- The top software skill is Microsoft Access.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 2,026 in the SCV/SML subregion and 2,942 in the region.

Recommendation

Based on these findings, it is recommended that Clovis Community College work with the Agriculture, water and Environmental Technologies Regional Director, the college's advisory board, and local industry in the development of programs to address the shortage of plant science 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 .
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.