January 2023

Labor Market Analysis

Sustainable Forestry, Water, and Landscape Management

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Prepared by the 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

Please note the COVID-19 statement on page 1 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 Sustainable Forestry, Water, and Landscape Management. This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations. This report also serves a secondary purpose, which is to aid in making a data-informed decision regarding the utility of a Sustainable Forestry, Water, and Landscape Management Bachelor's degree program offered at Columbia College.

Two middle skill occupations and three above middle skill occupations related to Sustainable Forestry, Water, and Landscape Management were identified for Columbia College.

Middle Skill:
- Forest and Conservation Technicians (SOC 19-4071)
- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)

Above Middle Skill:
- Soil and Plant Scientists (SOC 19-1013)
- Conservation Scientists (SOC 19-1031)
- Foresters (SOC 19-1032)

Key findings:
- **Occupational demand —** There were 2,140 workers employed in jobs related to Sustainable Forestry, Water, and Landscape Management in 2021 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is first-line supervisors of farming, fishing, and forestry workers with 1,449 workers, a projected growth rate of 3% over the next five years, and 219 annual openings.

- **Wages —** Soil and plant scientists earn the highest entry-level wage, $32.55/hour in the subregion.

- **Employers —** Employers with the most job postings in the subregion are Foster Farms, National Park Service, and Forest Service.

- **Occupational titles —** The most common occupational title in job postings in the subregion is first-line supervisors of farming, fishing, and forestry workers. The most common job title is Ranch Managers.

- **Skills and certifications —** The top baseline skill is leadership, the top specialized skill is forestry, and the top software skill is Microsoft Excel. The most in-demand certification is Certified First

Responder.

- **Education —** A high school diploma or equivalent is typically required for first-line supervisors of farming, fishing, and forestry workers. An associate's degree is typically required for forest and conservation technicians. A bachelor's degree is typically for Soil and Plant Scientists, Conservation Scientists, and Foresters.

- **Supply —** Analysis of postsecondary completions shows that on average 103 awards were conferred in the Central Valley/Mother Lode region each year.

Recommendation:
Based on a comparison of occupational demand and supply, there is an undersupply of 268 trained workers in the subregion and an undersupply of 989 workers in the region. The Center of Excellence recommends that Columbia College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Sustainable Forestry, Water, and Landscape Management workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Columbia College to provide labor market information for Sustainable Forestry, Water, and Landscape Management. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) 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 NCV/NML subregion is $12.65/hour.[1] Analysis of the program and occupational data related to Sustainable Forestry, Water, and Landscape Management resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

Middle Skill:
- Forest and Conservation Technicians (SOC 19-4071)
- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)

Above Middle Skill:
- Soil and Plant Scientists (SOC 19-1013)
- Conservation Scientists (SOC 19-1031)
- Foresters (SOC 19-1032)

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.

<u>**Forest and Conservation Technicians**</u>
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.

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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/.

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

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, Customer and Personal Service, English Language, Mechanical
Skills: Coordination, Critical Thinking, Monitoring, Speaking, Management of Personnel Resources

Soil and Plant Scientists
Job Description: Conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity.
Knowledge: Biology, English Language, Computers and Electronics, Chemistry, Mathematics
Skills: Active Listening, Critical Thinking, Reading Comprehension, Science, Speaking

Conservation Scientists
Job Description: Manage, improve, and protect natural resources to maximize their use without damaging the environment. May conduct soil surveys and develop plans to eliminate soil erosion or to protect rangelands. May instruct farmers, agricultural production managers, or ranchers in best ways to use crop rotation, contour plowing, or terracing to conserve soil and water; in the number and kind of livestock and forage plants best suited to particular ranges; and in range and farm improvements, such as fencing and reservoirs for stock watering.
Knowledge: English Language, Biology, Geography, Mathematics, Customer and Personal Service
Skills: Active Listening, Reading Comprehension, Complex Problem Solving, Speaking, Critical Thinking

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

Occupational Demand

The NCV/NML subregion employed 2,140 workers in *Sustainable Forestry, Water, and Landscape Management Occupations* in 2021 (Exhibit 1). The occupation with the most jobs is first-line supervisors of farming, fishing, and forestry workers with 1,449 workers in 2021. This occupation is projected to grow by 3% over the next five years and has the greatest number of projected annual openings, 219.

Exhibit 1. Sustainable Forestry, Water, and Landscape Management employment and occupational projections in the NCV/NML subregion

Occupation	2021 Jobs	2026 Jobs	5-Year Change	5-Year % Change	Annual Openings
Middle Skill Occupations					
First-Line Supervisors of Farming, Fishing, and Forestry Workers	1,449	1,489	40	3%	219
Forest and Conservation Technicians	491	470	(21)	(4%)	60
SUBTOTAL	**1,940**	**1,959**	**19**	**1%**	**278**
Above Middle Skill Occupation					
Soil and Plant Scientists	90	96	6	6%	11
Conservation Scientists	80	90	9	12%	10
Foresters	30	33	4	12%	4
SUBTOTAL	**200**	**218**	**19**	**9%**	**24**
TOTAL	**2,140**	**2,178**	**38**	**2%**	**302**

Wages

Exhibit 2a shows the hourly wages of the *Sustainable Forestry, Water, and Landscape Management Occupations.* Soil and plant scientists earn the highest entry-level wage, $32.55/hour in the subregion.[2] 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, received extra training, etc.
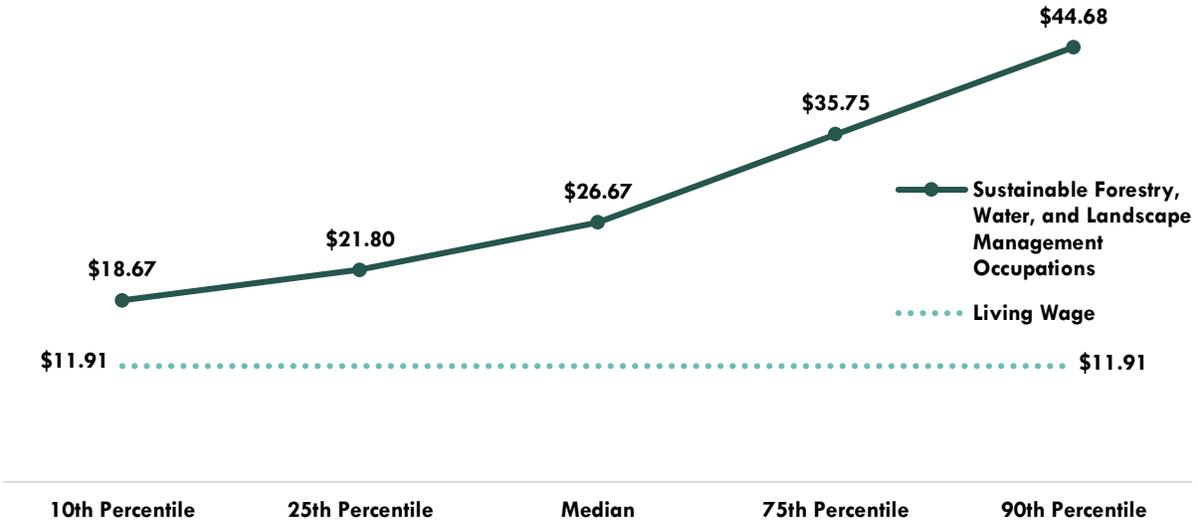
Exhibit 2a. Sustainable Forestry, Water, and Landscape Management hourly wages in the NCV/NML subregion

Occupation	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings
Middle Skill Occupations			
Forest and Conservation Technicians	$15.49	$17.04	$23.25
First-Line Supervisors of Farming, Fishing, and Forestry Workers	$14.90	$19.82	$27.07
Above Middle Occupations			
Soil and Plant Scientists	$32.55	$38.02	$50.18
Foresters	$23.13	$30.86	$41.82
Conservation Scientists	$22.91	$27.61	$36.42

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[2] Entry-level wages are derived from the 25th percentile.

Exhibit 2b shows the average hourly wages for *Sustainable Forestry, Water, and Landscape Management Occupations*, the average entry-level wage exceeds the average living wage for the North Central Valley/Northern Mother Lode NCV/NML subregion.

Exhibit 2b. Sustainable Forestry, Water, and Landscape Management average hourly wages in the NCV/NML subregion

Job Postings

There were 63 job postings for the five occupations in the NCV/NML subregion from July 2022 to December 2022.[3] The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of *Sustainable Forestry, Water, and Landscape Management Occupations* by number of job postings

Employer
Foster Farms
National Park Service
Forest Service
Treepeople
Hilmar Cheese Company
Saga Education
Sierra Pacific Industries
State of California
PeopleReady
Great Valley Conservation Corps

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[3] 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 NCV/NML subregion are distributed across five O*NET OnLine occupations. Common job titles in postings include First-Line Supervisors of Farming, Fishing, and Forestry Workers, Conservation Scientists, and Forest and Conservation Technicians.

Exhibit 4. Top occupational titles in job postings for *Sustainable Forestry, Water, and Landscape Management Occupations*

Occupational Title
First-Line Supervisors of Farming, Fishing, and Forestry Workers
Conservation Scientists
Forest and Conservation Technicians
Soil and Plant Scientists
Foresters

Salaries

Exhibit 5 shows the "Market Salaries" for Sustainable Forestry, Water, and Landscape Management occupations. These are calculated by Burning Glass using a machine learning model built off of millions of job postings every year. This accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

Exhibit 5. Salaries for *Sustainable Forestry, Water, and Landscape Management Occupations*

Market Salary	Job postings
$36,000-$39,999	27
$44,000-$47,999	6
$32,000-$35,999	5
$48,000-$51,999	4
$60,000-$500,000	3

Education

Of the 63 job postings, 63 listed an education level preferred for the positions being filled. Among those, 24% requested High school or GED, 19% requested bachelor's degree, and 3% requested a master's degree (Exhibit 6).

Exhibit 6. Education levels requested in job postings for *Sustainable Forestry, Water, and Landscape Management Occupations*

Education Level	Job Postings	% of Job Postings
High school or GED	15	24%
Bachelor's degree	12	19%
Master's degree	2	3%
Ph.D. or professional degree	2	3%

Baseline, Specialized, and Software Skills

Exhibit 7 depicts the top baseline, specialized, and software skills in job postings. The three most important baseline skills are Leadership, communications, and mathematics. The top three specialized skills are forestry, energy consumption, and animal welfare. The top software is Microsoft Excel.

Exhibit 7. In-demand *Sustainable Forestry, Water, and Landscape Management Occupations* **baseline and specialized skills**

Baseline Skills	Specialized Skills	Software Skills
Leadership	Forestry	Microsoft Excel
Communications	Energy Consumption	Microsoft Office
Mathematics	Animal Welfare	Microsoft Word
Operations	Alarm Devices	Geographic Information Systems
Sanitation	Cost-Of-Production Theory of Value	Global Positioning Systems

Certifications

Of the 63 job postings, 10 contained certification data. Among those, 20% indicated a need for a Certified First Responder. The next top certification is Wilderness First Responder and PSIA/AASI Certification (Exhibit 8).

Exhibit 8. Top *Sustainable Forestry, Water, and Landscape Management Occupations* **certifications requested in job postings**

Certifications	% of Job Postings
Certified First Responder	20%
Wilderness First Responder	20%
CDL Class B License	10%
PSIA/AASI Certification	10%
Food Handler's Card	10%

Education, Work Experience & Training

A high school diploma or equivalent is typically required for first-line supervisors of farming, fishing, and forestry workers. An associate's degree is typically required for forest and conservation technicians. A bachelor's degree is typically for Soil and Plant Scientists, Conservation Scientists, and Foresters (Exhibit 9).

Exhibit 9. Education, work experience, training, and Current Population Survey results for *Sustainable Forestry, Water, and Landscape Management Occupations*[4]

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS: Some College	CPS: Bachelor's Plus
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	21.9%	8.3%
Forest and Conservation Technicians	Associate degree	None	None	37.1%	31.9%
Soil and Plant Scientists	Bachelor's degree	None	None	0.0%	61.6%
Conservation Scientists	Bachelor's degree	None	None	0.0%	77.7%
Foresters	Bachelor's degree	None	None	0.0%	77.7%

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[4] "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, 18 awards were conferred in the NCV/NML subregion (Exhibit 10 and 11).

Exhibit 10. TOP and CIP codes for *Sustainable Forestry, Water, and Landscape Management Occupations*

TOP Titles	CIP Titles
011400 - Forestry	030501 - Forestry, General 03.0511 - Forest Technology/Technician 030599 - Forestry, Other
011500 - Natural Resources	01.0308 - Agroecology and Sustainable Agriculture 03.0101 - Natural Resources/Conservation, General

Exhibit 11. Postsecondary supply for *Sustainable Forestry, Water, and Landscape Management 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	Subtotal
011400 - Forestry	Bakersfield	19			2		21
	Columbia	11			4	2	16*
	Reedley College	10	5	9			23
011500 - Natural Resources	Columbia	12			6	1	18*
	Fresno City		0	0			1
	Reedley College	5	5	13			23
NCV/NML TOTAL		23	0	0	10	3	34
CVML TOTAL		56	10	22	12	2	103

*NCV/NML awards

There is total undersupply of 268 Sustainable Forestry, Water, and Landscape Management workers in the NCV/NML subregion and 989 workers in the region (Exhibit 12).

Exhibit 12. Sustainable Forestry, Water, and Landscape Management workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill gap in the NCV/NML subregion and region

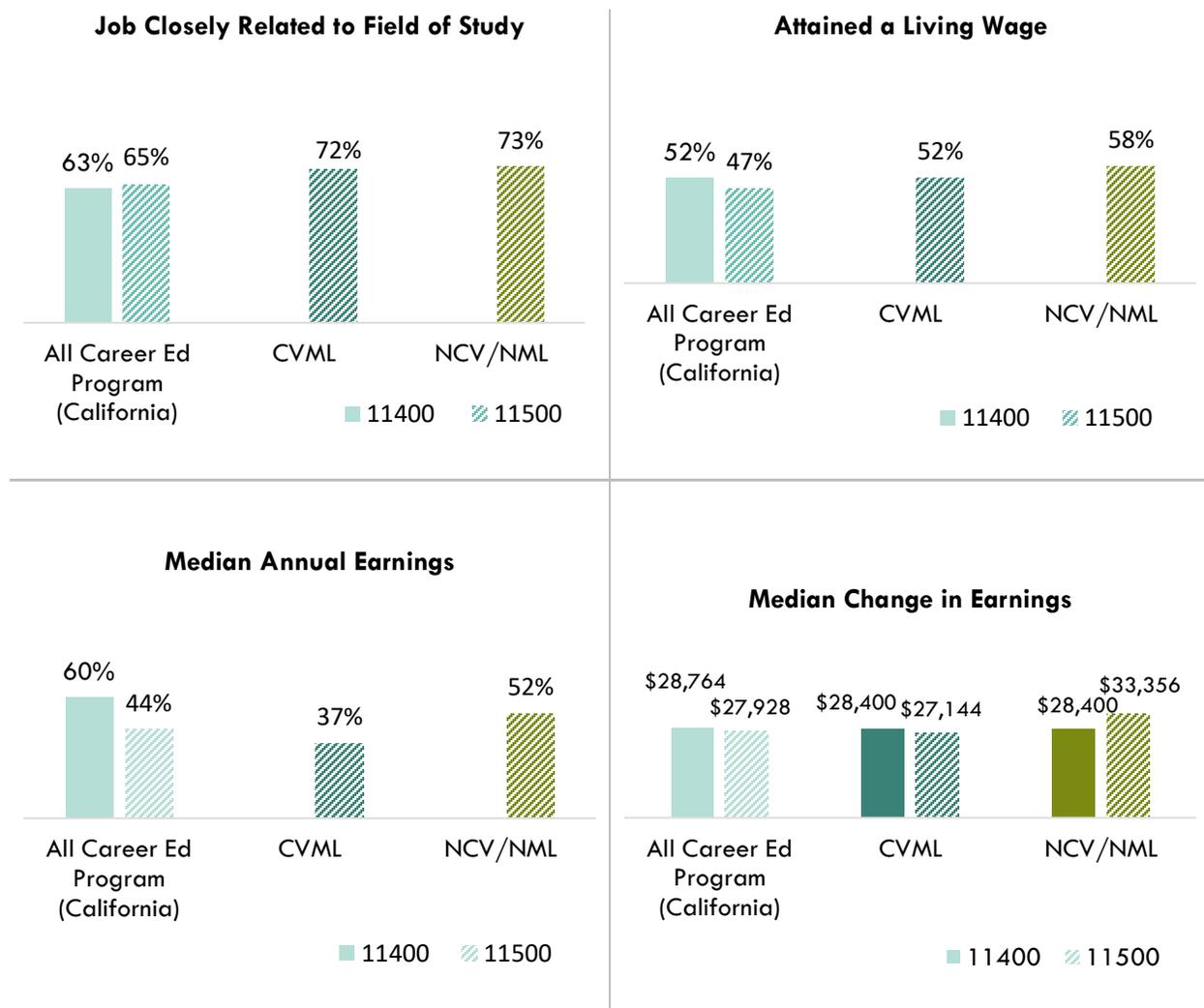| Region	Demand (Annual Openings)	Supply (Total Annual Average Supply)	Supply Gap or Oversupply
Middle Skill Occupations			
NCV/NML	278	34	244
CVML	1,015	103	912
Above Middle Skill Occupations			
NCV/NML	24	-	24
CVML	77	-	77
Middle Skill and Above Middle Skill Occupations			
NCV/NML	302	34	268
CVML	1,092	103	989

Student Outcomes

Exhibits 13a-13b summarize outcomes from California Community College Chancellor's Cal-PASS Plus LaunchBoard for TOP codes related to forestry, water, and landscape management occupations. Notably, 73% of students obtained a job closely related to their field of study in the subregion and 58% attained a living wage.

Exhibit 13a. Regional metrics for TOP 011400 - Forestry and 011500 - Natural Resources

Metric	011400 - Forestry	011500 - Natural Resources
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	13	25
Number of Students Who Transferred	*	37
*denotes data not available in table and charts		

Exhibit 13b. Metrics for 011400 - Forestry and TOP 011500 - Natural Resources

Job Closely Related to Field of Study

All Career Ed Program (California): 63%, 65%
CVML: 72%
NCV/NML: 73%

■ 11400 ▨ 11500

Attained a Living Wage

All Career Ed Program (California): 52%, 47%
CVML: 52%
NCV/NML: 58%

■ 11400 ▨ 11500

Median Annual Earnings

All Career Ed Program (California): 60%, 44%
CVML: 37%
NCV/NML: 52%

■ 11400 ▨ 11500

Median Change in Earnings

All Career Ed Program (California): $28,764, $27,928
CVML: $28,400, $27,144
NCV/NML: $28,400, $33,356

■ 11400 ▨ 11500

Recommendation

This report suggests there is a shortage of 268 workers in the NCV/NML subregion and a shortage of 989 workers in the CVML region for *Sustainable Forestry, Water, and Landscape Management Occupations*. Based on these findings, it is recommended that Columbia College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of River Sustainable Forestry, Water, and Landscape Management workers 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. (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.
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. (Lightcast) 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.