



CENTER OF EXCELLENCE
FOR LABOR MARKET RESEARCH

ORANGE COUNTY

ORANGE COUNTY SECTOR PROFILE

AGRICULTURE, WATER, AND ENVIRONMENTAL TECHNOLOGIES

2024



ORANGE COUNTY
REGIONAL CONSORTIUM

WORKFORCE
DEVELOPMENT ALLIANCE



California
Community
Colleges

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[Supplemental Appendices](#)¹ are available as a companion to this report and include the following:

Appendix E: Agriculture, Water, and Environmental Technologies Demand – Labor Market Data

Appendix F: Agriculture, Water, and Environmental Technologies Supply – Community College and Non-Community College Awards

Appendix G: Agriculture, Water, and Environmental Technologies CIP Codes



INTRODUCTION

This report is the eleventh in a series of 12 sector profiles that aim to provide a comprehensive analysis of Orange County's occupational landscape. The series dives into each of the 12 community college sectors, offering historical and projected occupational insights while building upon foundational research established through the [Orange County Labor Market Overview](#).² This sector profile focuses on Agriculture, Water, and Environmental Technologies, which the Orange County Region has ranked 11 out of the 12 sectors based on the Orange County Labor Market Overview and corresponding region-wide survey of community colleges and key partners.

The Agriculture, Water, and Environmental Technologies sector includes a wide variety of occupations focused on sustainable agriculture, environmental conservation, and resource management. This sector ranges from below middle-skill occupations like *Pest Control Workers (37-2021)**, *Tree Trimmers and Pruners (37-3013)**, and *Agricultural Equipment Operators (45-2091)**, who perform essential hands-on tasks in farming, landscaping, and forestry. Middle-skill occupations, such as *Agricultural Technicians (19-4012)* and *Veterinary Technologists and Technicians (29-2056)#*, require specialized knowledge to oversee agricultural operations, ensure compliance with health standards, and provide animal care. Above middle-skill occupations, including *Agricultural Engineers (17-2021)^*, *Conservation Scientists (19-1031)^*, and *Veterinarians (29-1131)^#*, involve advanced expertise in areas like resource management, environmental protection, and animal health. Together, these occupations contribute to the advancement of sustainable practices and the conservation of natural resources, supporting both agriculture and ecosystem health. This sector is essential for addressing today's environmental challenges while maintaining productive agricultural systems.

The Agriculture, Water, and Environmental Technologies sector is comprised of 42 occupations, 9 of which were highlighted in the Orange County Labor Market Overview. These 42 occupations account for 5% of the total number of occupations in the federal Bureau of Labor Statistics (BLS) Standard Occupational Classification (SOC) system and 7% (3) are on the U.S. News & World Report's 100 Best Jobs of 2024 list.³

Occupations are denoted throughout this report in italics, with their corresponding SOC code in parentheses, with below middle-skill occupations denoted with an * and above middle-skill occupations denoted with a ^ and occupations that are on the U.S. News & World Report's 2024 100 Best Jobs list denoted by #, such as *Environmental Engineers (17-2081)^#*.

By examining key aspects such as occupational trends, major employers, skills, program completions, and opportunities, the OC COE seeks to highlight underlying dynamics and intricacies shaping the Agriculture, Water, and Environmental Technologies sector in Orange County. Community colleges and regional stakeholders can use this information for strategic planning and data-informed decision making to address workforce needs in this sector.



AGRICULTURE, WATER, AND ENVIRONMENTAL TECHNOLOGIES OCCUPATIONAL DATA ANALYSIS

Orange County's Occupational Landscape

The Agriculture, Water, and Environmental Technologies sector is comprised of 42 occupations that accounted for 33,448 jobs in 2022, representing 2% of all jobs in Orange County. These jobs are expected to grow by 4% through 2027, resulting in 4,875 projected annual openings.

Agriculture, Water, and Environmental Technologies Sector Key Facts



33,448

Number of Jobs
in 2022



1,305

5-Year Change
through 2027



4%

5-Year Percent
Change



4,875

Annual
Openings



1,320

Establishments



\$13.48 - \$47.96

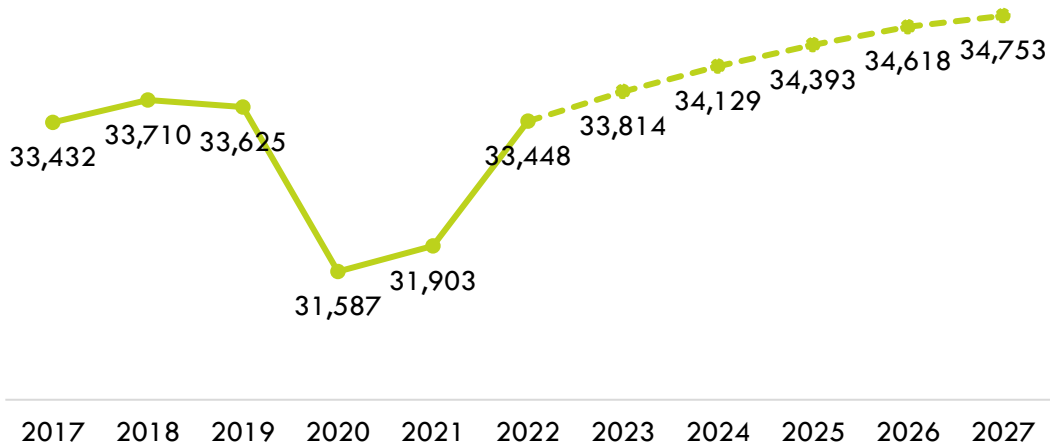
Occupational Entry-Level
Wage Range



Historical and Projected Employment

Over a 10-year period, from 2017 projected through 2027, Agriculture, Water, and Environmental Technologies jobs have been and are projected to continue steadily rising at a consistent pace, except for a sharp drop during the State's shutdown in 2020 due to the COVID-19 pandemic-related economic downturn (Exhibit 1).

Exhibit 1: Historical and Projected Agriculture, Water, and Environmental Technologies Employment in Orange County (2017-2027)



The 42 occupations in the Agriculture, Water, and Environmental Technologies sector are categorized into 16 below middle-skill, 15 middle-skill, and 11 above middle-skill occupations (Exhibit 2). In 2022, the 16 below middle-skill occupations accounted for 22,619 jobs, constituting 68% of the total Agriculture, Water, and Environmental Technologies workforce; followed by the 15 middle-skill occupations, with 8,205 jobs, representing 24% of the total workforce (Exhibit 3).

Exhibit 2: Skill-Level for Agriculture, Water, and Environmental Technologies Occupations

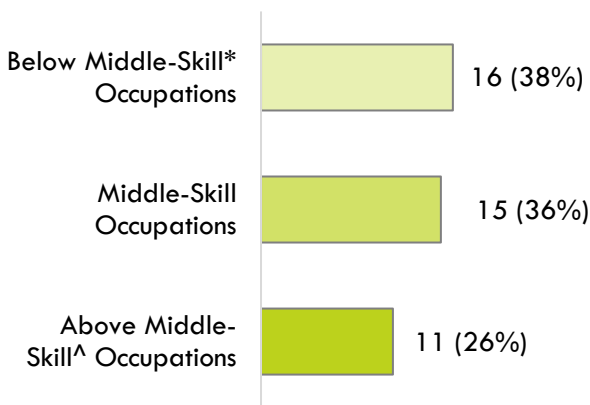
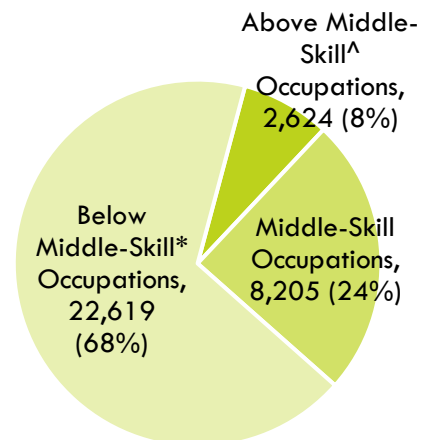


Exhibit 3: Breakdown of 2022 Jobs for Agriculture, Water, and Environmental Technologies Occupations by Skill-Level



*Note: Throughout this report, Below Middle-Skill Occupations are denoted with an * and Above Middle-Skill Occupations are denoted with a ^.*

Trends In Occupational Demand

Current trends in the Agriculture, Water, and Environmental Technologies sector in California, particularly in Orange County, reflect significant innovation and adaptation to environmental challenges. Areas of key developments include water management and recycling, agricultural technology, and environmental sustainability.

Water Management and Recycling

- **Advanced Water Recycling:** Orange County leads in water recycling through initiatives like the Orange County Water District's pioneering wastewater treatment and groundwater replenishment systems. This approach purifies wastewater to drinking water standards, addressing both water scarcity and environmental sustainability. Similarly, recycled water is used for irrigation and other non-potable needs, conserving potable water supplies.^{4 5}
- **Stormwater Capture:** Programs in Orange County, such as using the Santa Ana River system, capture and treat stormwater to recharge groundwater, bolstering local water resources against drought.⁶

Agricultural Technology

- **Robotics and Automation:** California is embracing robotics and artificial intelligence to address labor shortages, water use efficiency, and climate-smart objectives. For instance, automated solutions for irrigation, harvesting, and crop management are being developed and demonstrated, including in field crops, vineyards, and orchards.⁷
- **Climate Resilience:** Farmers are increasingly adopting climate-resilient practices, such as optimized irrigation, crop rotation, and leveraging data analytics to enhance productivity while reducing environmental impact.^{8 9}

Environmental Sustainability

- **Climate-Smart Solutions:** There is a growing emphasis on creating sustainable farming systems that balance productivity with ecosystem health. This includes innovations like biofiltration for stormwater pollutants and organic farming practices tailored to local conditions.¹⁰
- **Community Engagement:** Efforts to overcome public skepticism about water reuse and conservation have led to extensive education and transparent communication campaigns, particularly in Orange County.¹¹

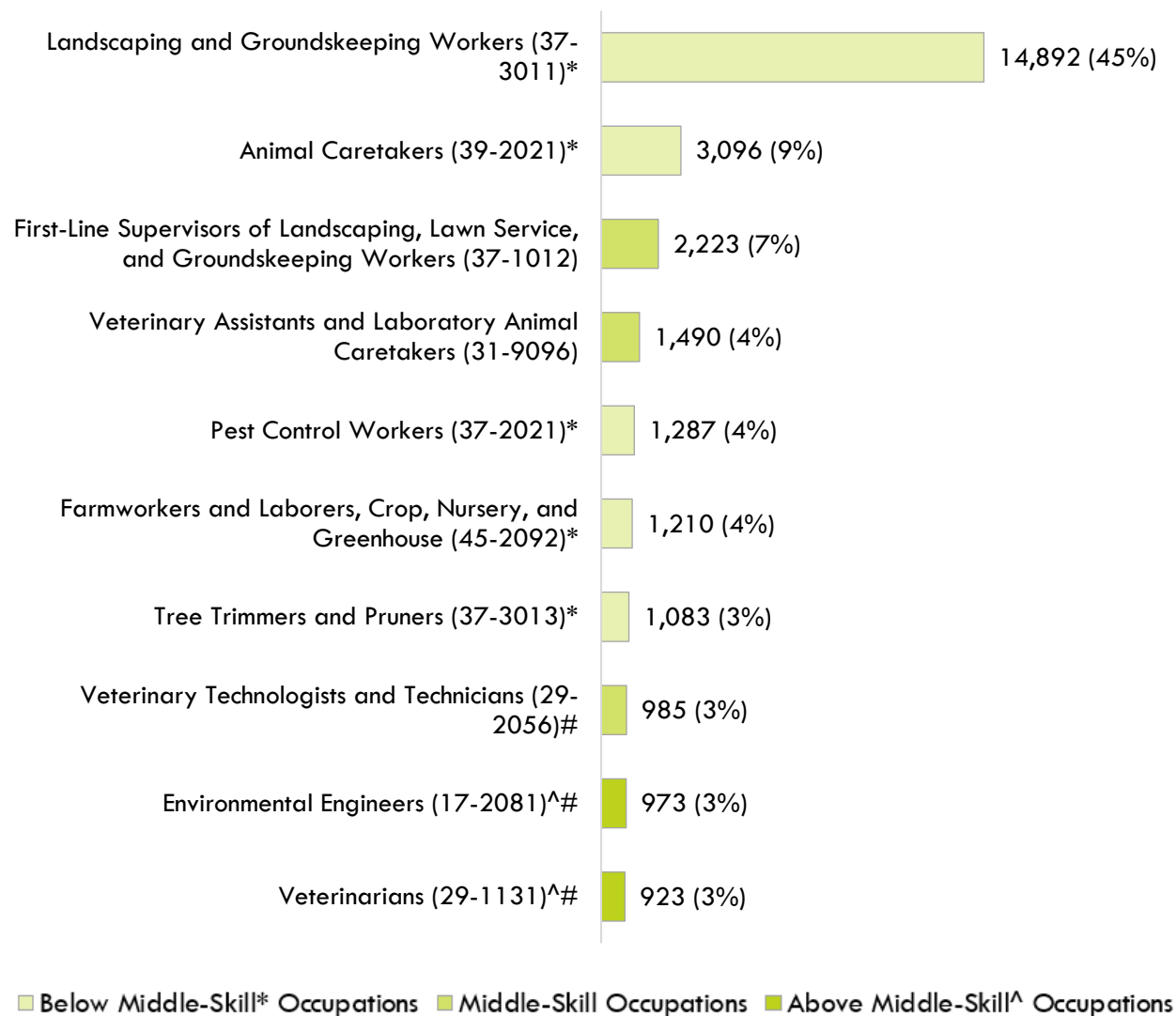
These trends highlight a collaborative approach between academia, industry, and government to enhance sustainability and resource management in response to California's environmental challenges.



Jobs

Jobs equate to the number of people currently in an occupation as opposed to unmet demand, which refers to the number of people still needed in an occupation. Comprising 45% of all jobs in the Agriculture, Water, and Environmental Technologies sector, *Landscaping and Groundskeeping Workers (37-3011)**, a below middle-skill occupation, ranks first with the most jobs (14,892), followed by *Animal Caretakers (39-2021)**, another below middle-skill occupation (3,096), and *First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers (37-1012)*, a middle-skill occupation (2,223). All top 10 Agriculture, Water, and Environmental Technologies jobs, 2022 are shown in Exhibit 4.

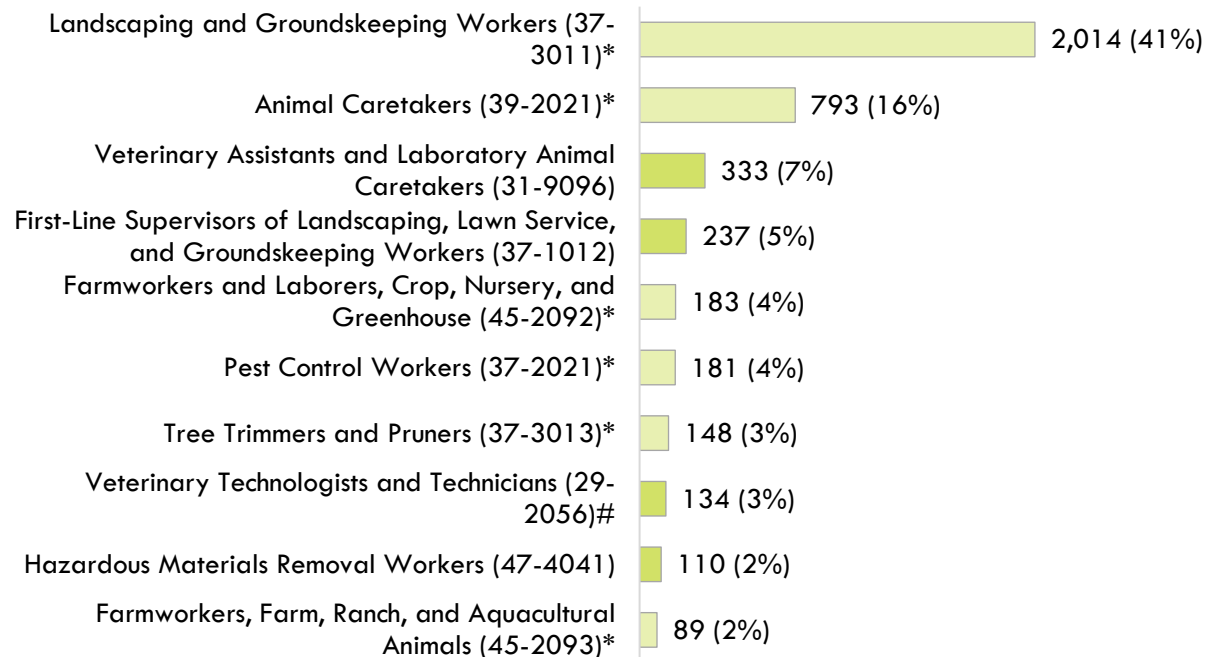
Exhibit 4: Top 10 Agriculture, Water, and Environmental Technologies Jobs, 2022



Annual Openings

There are 4,875 Agriculture, Water, and Environmental Technologies annual openings, also known as “demand” or “unmet demand”, in Orange County. *Landscaping and Groundskeeping Workers (37-3011)** accounts for the largest percentage of Agriculture, Water, and Environmental Technologies annual openings (41%), with *Hazardous Materials Removal Workers (47-4041)* and *Farmworkers, Farm, Ranch, and Aquacultural Animals (45-2093)** (2% each) rounding out the sectors’ top 10 annual openings, as shown in Exhibit 5.

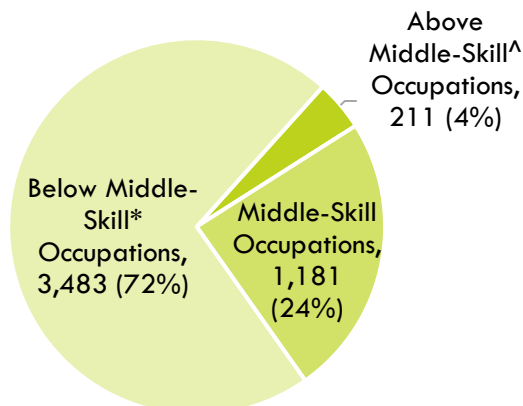
Exhibit 5: Top 10 Annual Openings by Agriculture, Water, and Environmental Technologies Occupations



■ Below Middle-Skill* Occupations ■ Middle-Skill Occupations ■ Above Middle-Skill^ Occupations

Below middle-skill occupations comprise 72% of all annual openings in the Agriculture, Water, and Environmental Technologies sector followed by middle-skill occupations (24%). Exhibit 6 shows the annual openings by skill-level.

Exhibit 6: Distribution of All Agriculture, Water, and Environmental Technologies Annual Openings by Skill-Level

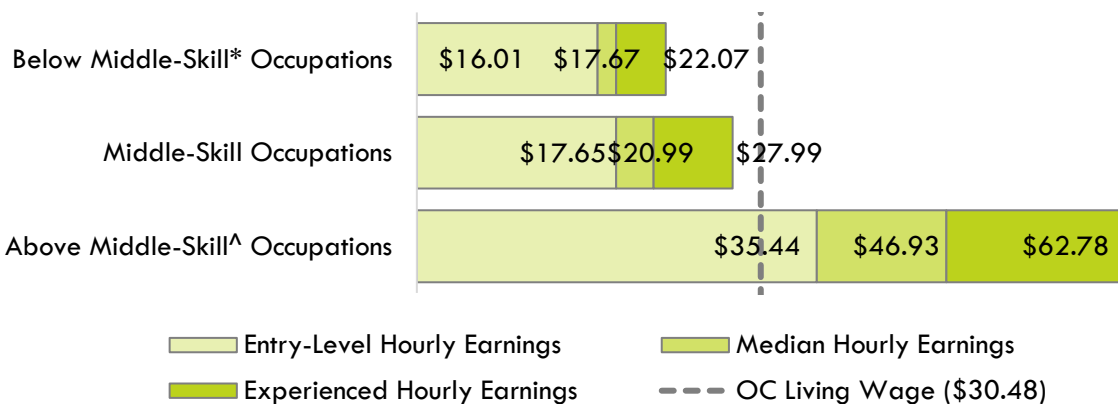


Earnings

In Orange County, the MIT Living Wage for one adult is \$30.48 per hour, which is the floor benchmark for wages in the county. Of the 42 occupations, 10% (4 occupations) have entry-level wages above Orange County's living wage. However, entry-level wages across all 42 Agriculture, Water, and Environmental Technologies occupations range from \$13.48 to \$47.96 per hour, with *Fishing and Hunting Workers (45-3031)** and *Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (17-2111)^* at the lower- and upper-end of this range, respectively.

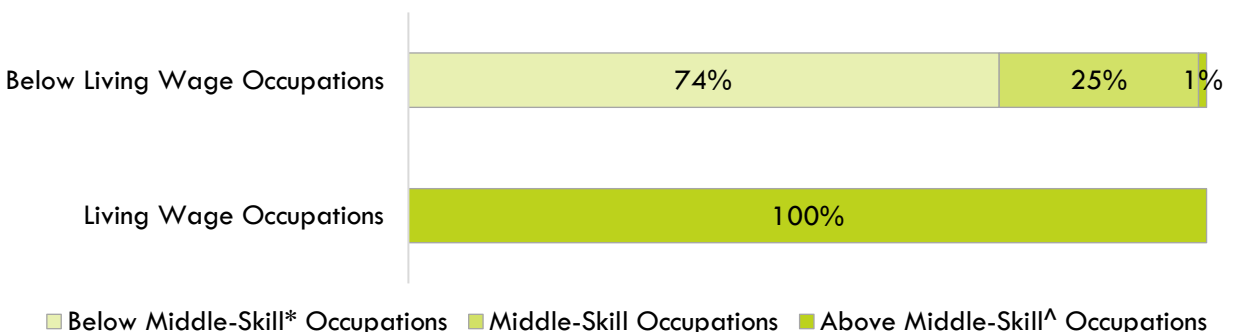
To better understand the sector's wages in Orange County, wages are weighted by the number of 2022 jobs. This accounts for wage variation between occupations by normalizing the data based on the number of jobs. It adjusts for situations like a large number of low-wage jobs, a small number of high-wage jobs, or any combination of the two. Exhibit 7 shows the full spectrum of weighted wages (from entry-level to experienced) by skill level for the 42 Agriculture, Water, and Environmental Technologies occupations, ranging from below-middle-skill entry-level wages of \$16.01 to above middle-skill experienced wages of \$62.78.

Exhibit 7: Agriculture, Water, and Environmental Technologies Occupational Wages by Skill Level, Weighted by 2022 Jobs



Notably, only 3% of the annual job openings in this sector have entry-level wages above the living wage; 100% are for above middle-skill occupations, as shown in Exhibit 8.

Exhibit 8: Comparison of Living Wages by Agriculture, Water, and Environmental Technologies Annual Openings and Skill Level

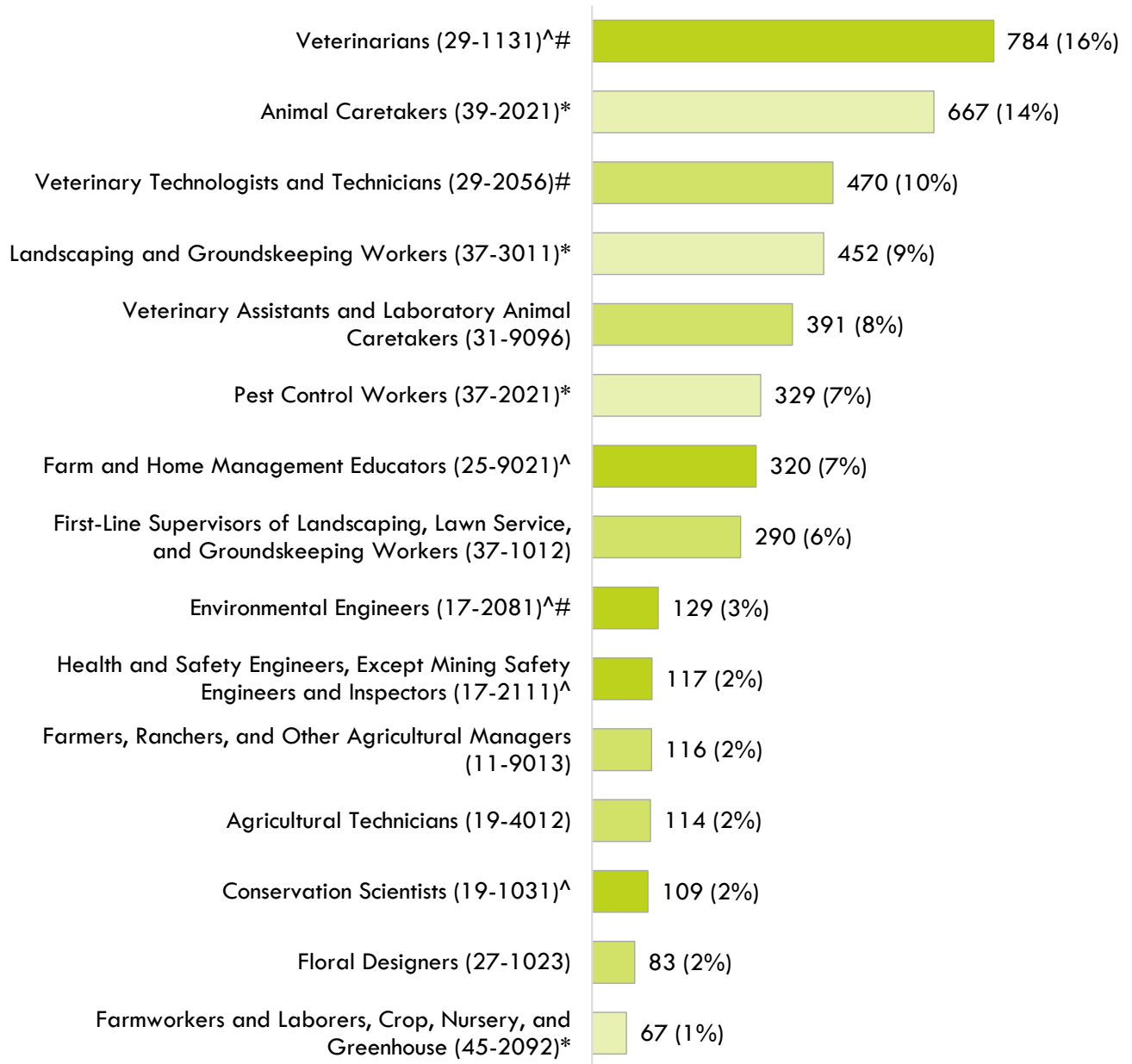


JOB POSTINGS INFORMATION

Job Postings in Orange County

Over the past 12 months (November 2023 – October 2024), there were 4,915 employer job postings within Orange County for all Agriculture, Water, and Environmental Technologies occupations. Exhibit 9 shows the 15 occupations with the highest number of job postings, which represents approximately 90% of all job postings within the sector. Most notably, Veterinarians (29-1131)^#, an above middle-skill occupation, comprise 16% of the job postings.

Exhibit 9: Top 15 Agriculture, Water, and Environmental Technologies Occupations by Number of Job Postings



■ Below Middle-Skill* Occupations ■ Middle-Skill Occupations ■ Above Middle-Skill^ Occupations

Top Employers

Orange County’s Agriculture, Water, and Environmental Technologies employers are very diverse, as shown in Exhibit 10. Employers with postings for below middle-skill occupations, such as Hawx Services and PetSmart, focus on entry-level and general labor positions. Employers with postings for middle-skill occupations include a mix of hospitals and large companies, such as VCA Animal Hospitals and PetCo. These jobs typically require more specialized skills, vocational training, apprenticeship, and/or an associate degree. Employers in the above middle-skill category offer jobs that demand higher levels of expertise, often requiring advanced degrees or extensive experience for employers including Banfield Pet Hospital and PetVet Care Centers. No employer appears in all three groups.

Exhibit 10: Top 10 Agriculture, Water, and Environmental Technologies Regional Employers with the Most Job Postings by Skill Level

Below Middle-Skill*	Middle-Skill	Above Middle-Skill^
<ol style="list-style-type: none"> Brightview PetCo Hawx Services Orkin Disney PetSmart Care.com University of California Rentokil Initial American Golf Corporation 	<ol style="list-style-type: none"> VCA Animal Hospitals Banfield Pet Hospital Landsystems PetCo Target Brightview University of California Clean Harbors Bemus Landscape BluePearl 	<ol style="list-style-type: none"> Banfield Pet Hospital Lap of Love BluePearl VCA Animal Hospitals Rancho Santiago Community College North Orange County Community College District Southern California Permanente Medical Group PetVet Care Centers WSP Global Coast Community College District

Top Job Titles

Below middle-skill job titles such as Pest Control Technicians, Groundskeepers, and Pet Sitters typically require minimal training and focus primarily on manual labor and basic technical skills. Middle-skill job titles such as Veterinary Technicians and Landscape Managers reflect positions that involve more responsibility, such as overseeing staff, planning and executing projects, or working with specialized equipment. Above middle-skill job titles typically require technical complexity and advanced education or specialized training, such as Veterinarians and Environmental Engineers. Job titles by skill level are shown in Exhibit 11 **Error! Reference source not found.**

Exhibit 11: Top Agriculture, Water, and Environmental Technologies Job Titles in Orange County by Skill Level

Below Middle-Skill *	Middle-Skill	Above Middle-Skill^
<ol style="list-style-type: none"> Pest Control Technicians Dog Groomers Kennel Attendants Groundskeepers Greenskeepers Pet Groomers Landscapers Dog Daycare Attendants Groomers Pet Sitters 	<ol style="list-style-type: none"> Veterinary Technicians Veterinary Assistants Registered Veterinary Technicians Veterinary Technician Assistants Floral Designers Landscape Managers Credentialed Veterinary Technicians Emergency Veterinary Technicians Dog Trainers Food and Beverage Attendants 	<ol style="list-style-type: none"> Veterinarians Relief Veterinarians Associate Veterinarians Emergency Veterinarians Fire Protection Engineers Environmental Engineers Clinical Veterinarians Safety Engineers Irrigation Technicians Doctors of Veterinary Medicine

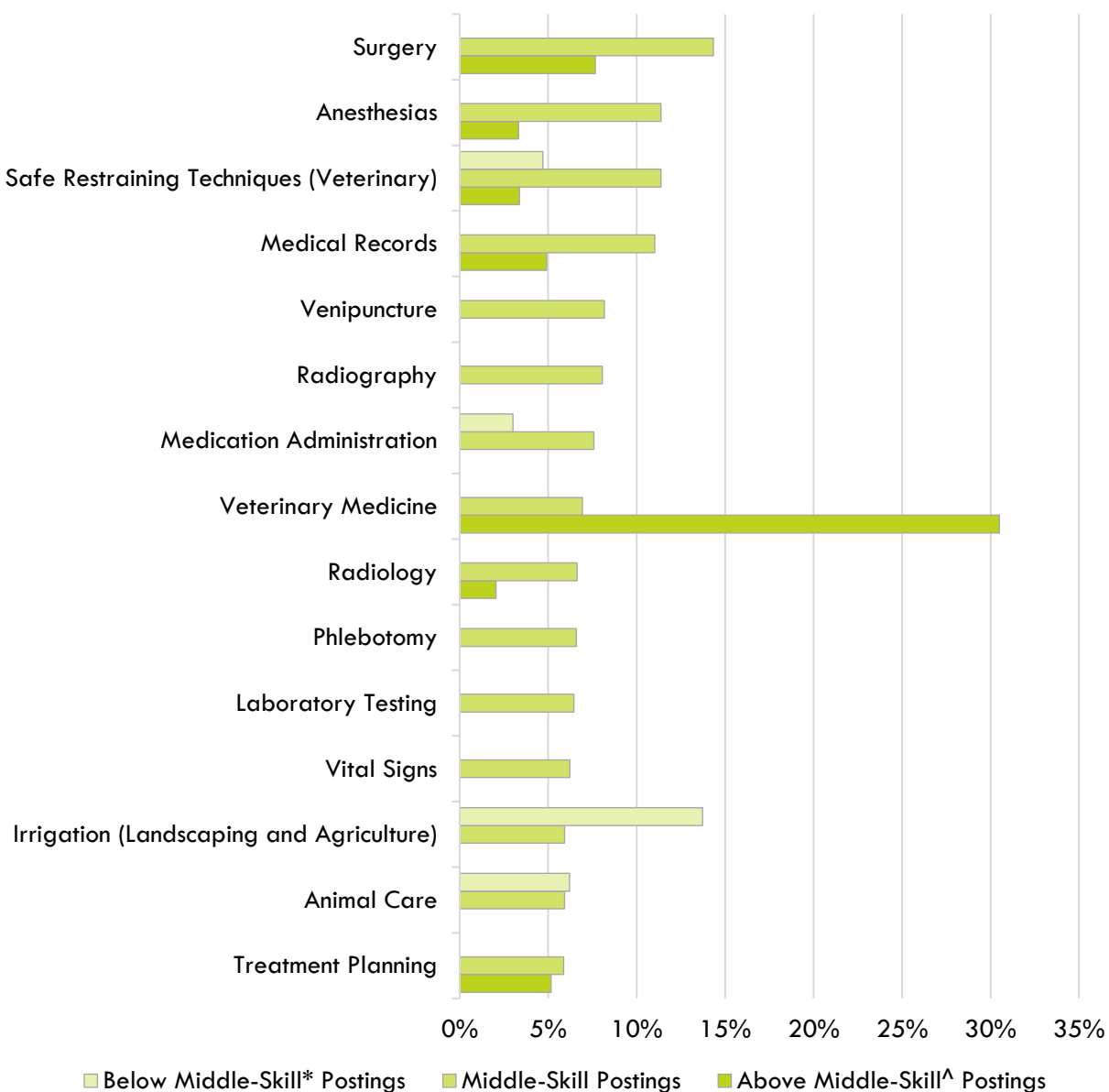
Skills in Job Postings

There are three types of skills listed in job postings: specialized (“technical” or “hard”), common (“soft” or “human”), and computer skills.

Top Specialized Skills

Among the 20 specialized skills listed, only one (1) is common across all three occupational skill levels: safe restraining techniques (veterinary). Irrigation (landscaping and agriculture) (14%) is the most requested skill in below middle-skill postings, indicating its significance in jobs such as *Landscaping and Groundskeeping Workers (37-3011)**. Surgery (14%), anesthetics (11%), safe restraining techniques (veterinary) (11%), and medical records (11%) are prevalent in middle-skill occupations, such as *Veterinary Technologists and Technicians (29-2056)#*. Notably, veterinary medicine (31%) is the most requested skill for above middle-skill postings, as shown in Exhibit 12.

Exhibit 12: Top 20 Specialized Skills in Agriculture, Water, and Environmental Technologies Occupations



Top Common Skills

Among the top 10 common skills listed in Exhibit 13, there are notable differences in the most frequently demanded overall. Communication is requested significantly more for middle-skill (37%) than above middle-skill (23%) and below middle-skill (24%) postings. Management is the second most requested skill for middle-skill postings. Similarly, leadership is requested in 28% of above middle-skill, 13% of middle-skill, and 5% of below middle-skill postings. Below middle-skill postings rank customer service (26%), communication (24%), and lifting ability (20%) as the most requested common skills.

Exhibit 13: Top 10 Common Skills in Agriculture, Water, and Environmental Technologies Occupations

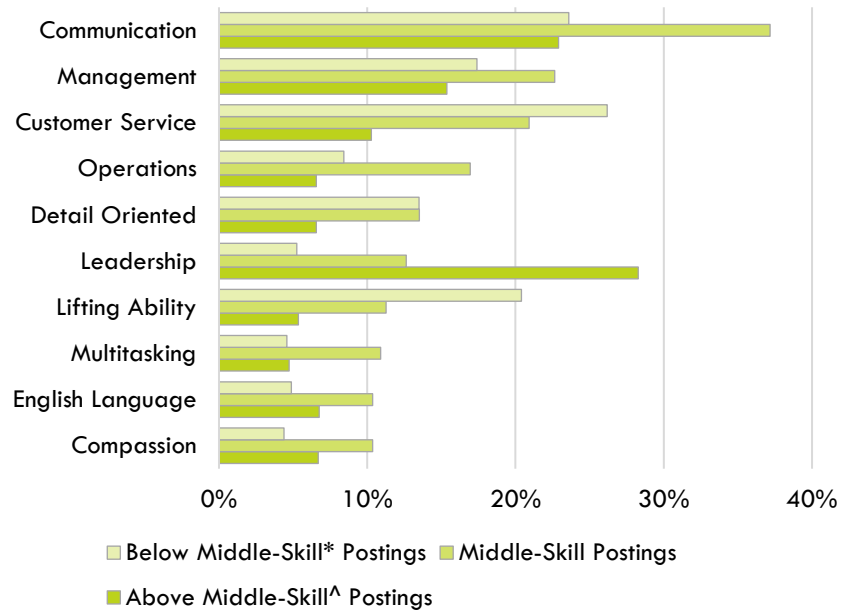
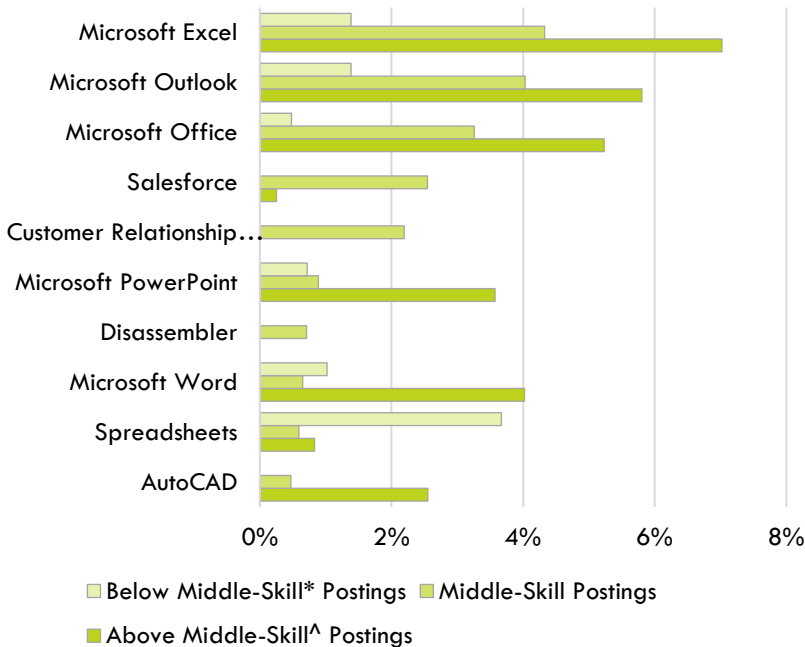


Exhibit 14: Top 10 Computer Skills in Agriculture, Water, and Environmental Technologies Occupations



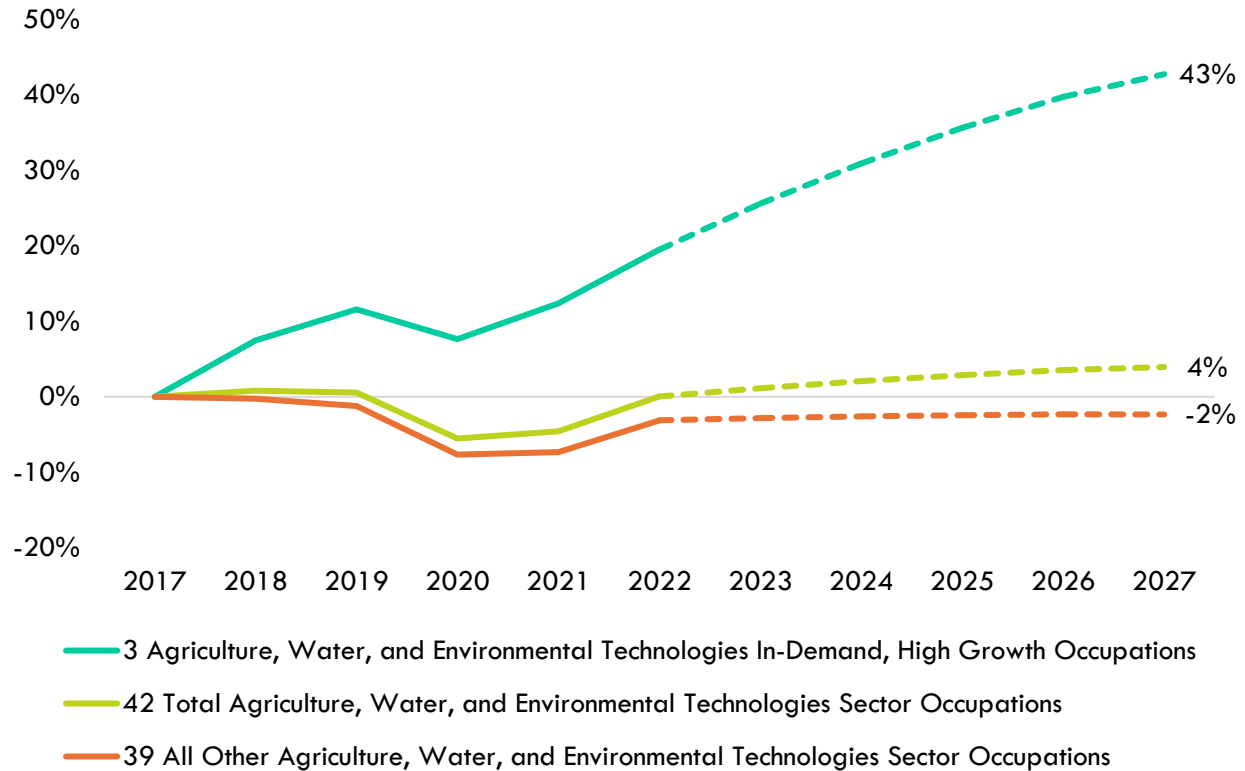
Top Computer Skills

Computer skills are not requested nearly as often as those in the other skills categories within the Agriculture, Water, and Environmental Technologies sector. However, in general, they are most frequently requested in above middle-skill and middle-skill job postings. Microsoft Excel is mentioned in 7% of above middle-skill postings and 4% of middle-skill postings. Similarly, Microsoft Excel and Outlook are the highest in middle-skill postings (4% each), compared to 1% in below middle-skill postings. Spreadsheets is higher in below middle-skill (4%), compared to 1% of middle-skill and above middle-skill postings. The top 10 computer skills are shown in Exhibit 14.

KEY OCCUPATIONS DRIVING EMPLOYMENT

There are three Agriculture, Water, and Environmental Technologies occupations, 7% of the total 42 occupations in the sector, that have a significant number of jobs and annual openings and are projected to have high growth through 2027. These three key occupations are anticipated to drive employment with a projected 43% increase from 2017 to 2027; during the same period, employment for the 39 other occupations in the Agriculture, Water, and Environmental Technologies Sector is projected to decline 2%, as shown in Exhibit 15.

Exhibit 15: Agriculture, Water, and Environmental Technologies Employment Change, 2017-2027



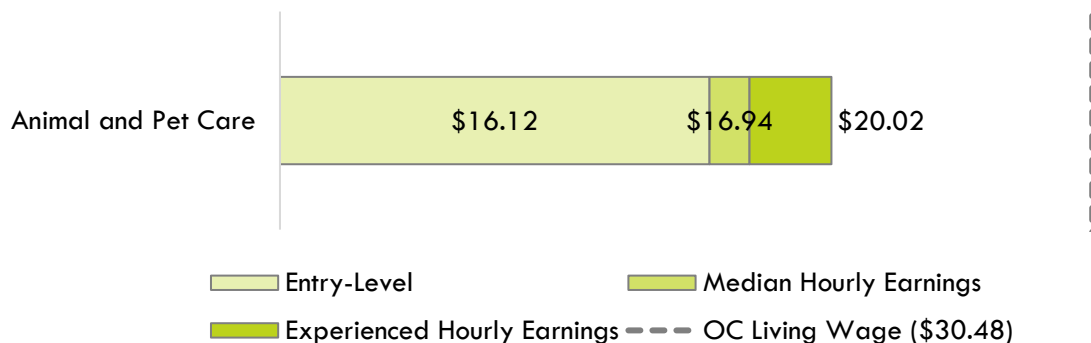
Key occupations driving employment in the Agriculture, Water, and Environmental Technologies sector can be grouped into one broad category:

Animal and Pet Care

- *Veterinary Technologists and Technicians (29-2056)#*
- *Veterinary Assistants and Laboratory Animal Caretakers (31-9096)*
- *Animal Caretakers (39-2021)**

Wages for these high-growth occupations are relatively low. Notably, entry-level (\$16.12), median (\$16.94), and experienced (\$20.02) wages are significantly below the living wage for these occupations. Exhibit 16 shows the wage range for these Animal and Pet Care occupations.

Exhibit 16: Wages by Key Agriculture, Water, and Environmental Technologies Occupation Group, Weighted by 2022 Jobs



Though these key occupations comprise 7% of the total number of occupations, they accounted for 31% of the Agriculture, Water, and Environmental Technologies Sector’s online job postings over the past 12 months, as shown in Exhibit 17.

Exhibit 17: Number of Job Postings by Key Agriculture, Water, and Environmental Technologies Occupation Group

Key Occupation Group	Number of Postings	% of Total Other Sector Postings
Animal and Pet Care	1,530	31%

The skills requested by employers in online job postings for these occupations are all related to providing medical services for animals and pets, as shown in Exhibit 18.

Exhibit 18: Agriculture, Water, and Environmental Technologies Key Occupations Skills Analysis

Animal and Pet Care

- Safe Restraining Techniques (Veterinary)
- Surgery
- Animal Care
- Anesthesia
- Medical Records
- Medication Administration
- Venipuncture
- Radiography
- Veterinary Medicine
- Radiology
- Laboratory Testing
- Vital Signs
- Treatment Planning
- Triage
- Animal Handling

The following sections highlight trends, specific occupations, and examine emerging topics and areas for this groups of key occupations driving employment in the Agriculture, Water, and Environmental Technologies Sector.

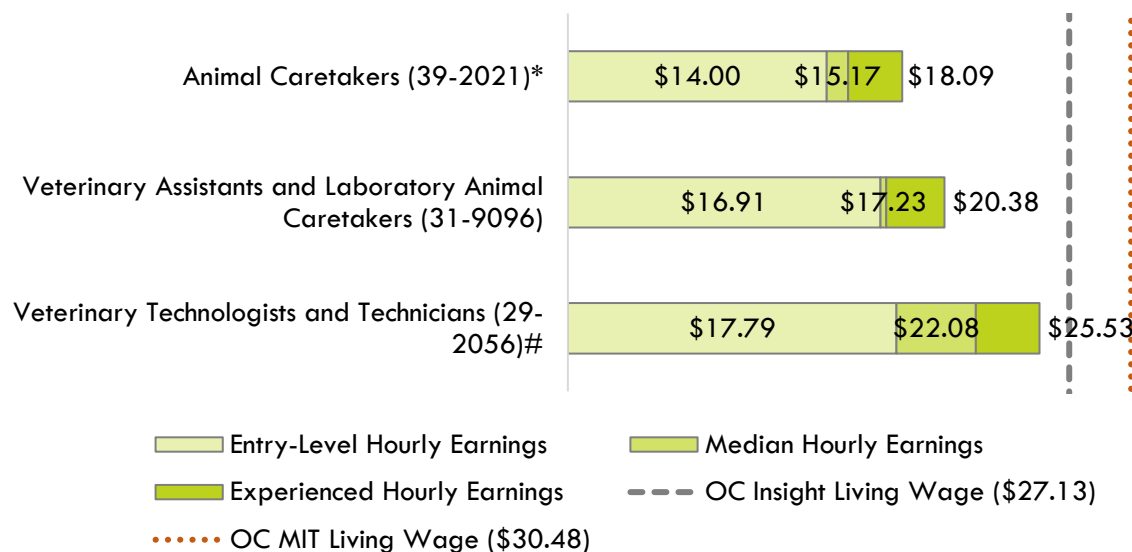
Animal and Pet Care

The three key occupations in the Agriculture, Water, and Environmental Technologies sector are all related to care for animals and pets, including medical services and grooming. One occupation, *Animal Caretakers (39-2021)**, is below middle-skill while the other two are middle-skill: *Veterinary Technologists and Technicians (29-2056)#* and *Veterinary Assistants and Laboratory Animal Caretakers (31-9096)*. Additionally, *Veterinary Technologists and Technicians (29-2056)#* is a U.S. News & World Report 2024 Best Job.

Low Pay and Student Loan Debt for Veterinary Technicians

Wages for these Animal and Pet Care occupations are low, with entry-level wages ranging from \$14.00 to \$17.79, as shown in Exhibit 19. Results from a National Association of Veterinary Technicians in America (NAVTA) survey showed that 39% of veterinary technicians cite compensation as the most challenging aspect of their job.¹² Additionally, 56% of respondents said that salary and benefits will be the biggest issue impacting veterinary technicians over the next five years.¹³ Notably, more than one-third of respondents said they had student loan debt, “averaging \$29,700 per person.”¹⁴

Exhibit 19: Wages for Animal and Pet Care Occupations



Wages for these Animal and Pet Care occupations in Orange County are significantly below the living wage, making it challenging for workers in these occupations to cover basic living expenses, let alone pay back student loans. In Orange County, there are currently at least four educational institutions that offer veterinary technician programs:

- American College of Healthcare and Technology
- OC Veterinary Assistant School
- Platt College-Anaheim
- Stanbridge University

According to data from the U.S. Department of Education, median federal student loan debt for veterinary technician program graduates is \$19,500 at Stanbridge University and \$11,999 at Platt College-Anaheim; data is unavailable for the other two institutions.¹⁵ Currently, there are no Orange County community colleges that offer veterinary assistant or technician programs. Orange County community colleges could consider developing these programs to provide a lower-cost alternative to private institutions that require significant student loan debt to cover the cost of attendance.

Veterinary Assistant and Technician Retention Efforts

In 2016, NAVTA launched the Veterinary Nurse Initiative with four main goals that were designed to provide better clarity on the roles of veterinary assistants, which typically do not require licensure, and veterinary technicians, which do require a license (though requirements vary from state-to-state). One reason for this initiative is the “underutilization” of licensed veterinary technicians, which are permitted to perform higher level tasks than unlicensed veterinary assistants but are often used interchangeably, leading to lower job satisfaction and retention challenges. The Veterinary Nurse Initiative goals are¹⁶:

Professional Standards

- Promoting a standard credential with uniform educational standards in the U.S.

Public Recognition

- Establishing professional identity through public education and title recognition to contribute to public safety and protection.

Professional Recognition

- Clarifying the value, scope of practice, and title by delineating the credentialed veterinary technician or veterinary nurse role.

Expanding Career Potential

- Defining the role of the veterinary technician or veterinary nurse in all areas of practice to maximize potential.

NAVTA also created a Title Protection Task Force to address the problem of clinics “not making a distinction between their credentialed veterinary technicians and those who learned on the job.”¹⁷ In response, Banfield, an international pet hospital company that employs over 1,500 veterinary technicians, reviewed job titles and clarified distinctions between unlicensed veterinary assistants and licensed veterinary technicians. Banfield also increased pay for licensed veterinary technicians and provided additional benefits, such as a larger continuing education allowance and the opportunity to attend national conferences.¹⁸ Finally, Banfield has provided training to veterinarians to better utilize licensed veterinary technicians, providing guidance on additional tasks that can be completed by licensed technicians, which will allow veterinarians to focus on more complex tasks.¹⁹

NAVTA is hopeful that achieving the goals of the Veterinary Nurse Initiative will lead to better pay, recruitment, retention, and job satisfaction for licensed veterinary technicians.



AGRICULTURE, WATER, AND ENVIRONMENTAL TECHNOLOGIES SUPPLY

Orange County's educational institutions provide programs tailored to equip students with skills suited for different levels of occupations within the Agriculture, Water, and Environmental Technologies sector. The following visuals outline the number of awards conferred by both community colleges and non-community colleges, program observations from COCI²⁰, as well as the regional programs and institutions that have conferred the most awards.



1,023

community college awards



1,603

non-community college awards



2,626

total awards conferred

COCI Observations

- There are 30 unique Agriculture, Water, and Environmental Technologies programs offered by Orange County community colleges.
- Most programs (60%) are for Certificates of Achievement, followed by Associate/Associate for Transfer degrees (33%) and Noncredit awards (7%).
- Saddleback offers the most Agriculture, Water, and Environmental Technologies programs (9), followed by Fullerton (7) and Orange Coast (5).
- The majority of awards are listed under the 0109.10 Landscape Design and Maintenance (27%), 0303.00 Environmental Technology (27%), or 0109.00 Horticulture (27%) TOP code.

Top Program Awards

Community College:
 Child Development/Early Care and Education: 473
 Child and Adolescent Development: 212
 Infants and Toddlers: 156
 Horticulture: 51
 Landscape Design and Maintenance: 30

Non-Community College:
 Biology/Biological Sciences, General: 1,036
 Chemistry, General: 229
 Biochemistry: 92
 Veterinary/Animal Health Technology/Technician and Veterinary Assistant: 79
 Environmental/Environmental Health Engineering: 59

Most Awards

Community College:
 Saddleback: 274
 Santa Ana: 234
 Fullerton: 164
 Irvine Valley: 97
 North Orange Adult: 75

Non-Community College:
 University of California-Irvine: 991
 California State University-Fullerton: 376
 Chapman University: 100
 Platt College-Anaheim: 41
 Stanbridge University: 38

Community College Student Outcomes

Orange County community college students account for 5% of all Agriculture, Water, and Environmental Technologies community college students in California. The visuals below show the Strong Workforce Program (SWP) metrics for the Agriculture, Water, and Environmental Technologies sector in Orange County.²¹



1,365

SWP Students
(2021-22)



41

SWP Students Who
Earned a Degree or
Certificate or Attained
Apprenticeship Journey
Status (2021-22)



209

SWP Students Who
Transferred to a Four-
Year Postsecondary
Institution (2019-20)

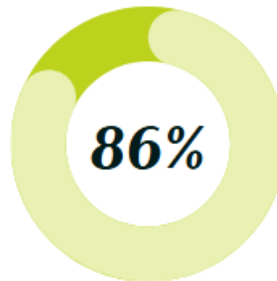


\$36,040

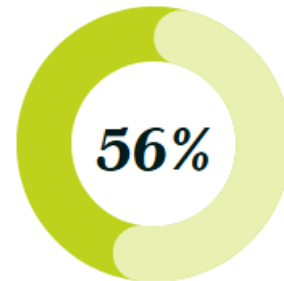
Median Annual Earnings
for SWP Exiting Students
(2020-21)



SWP Students Who Earned
9 or More Career Education
Units in the District in a single
Year (2021-22)



SWP Students Who Completed
a Noncredit CTE or Workforce
Preparation Course (2021-22)



SWP Students with a Job Closely
Related to Their Field of Study
(2019-20)



Median Change (Gain) in
Earnings for SWP Exiting
Students (2020-21)



SWP Exiting Students Who
Attained the Living Wage
(2020-21)

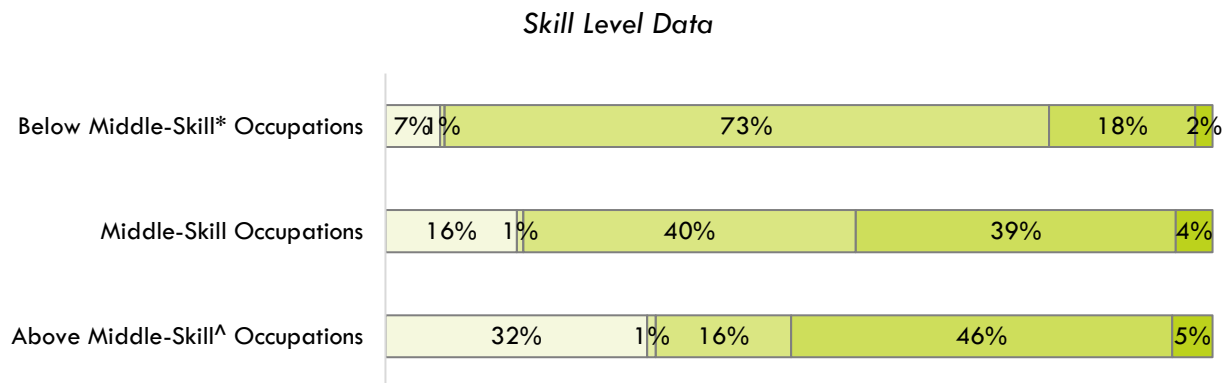
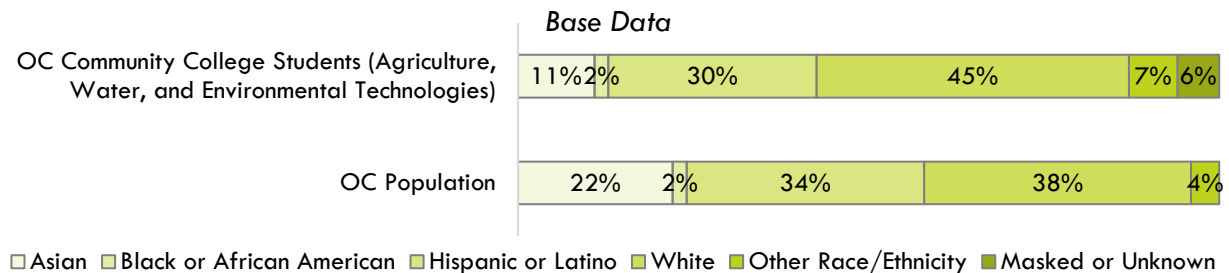
DEMOGRAPHICS

Ethnicity

Exhibit 20 shows the ethnicity of Orange County community college students enrolled in Agriculture, Water, and Environmental Technologies programs compared to the overall Orange County population and the three skill-level occupational groups.

Notably, 45% of Agriculture, Water, and Environmental Technologies students are white, which is higher than the population (38%), and higher than workers in both below middle-skill occupations (18%) and middle-skill occupations (39%). Conversely, nearly three-fourths (73%) of workers in below middle-skill occupations are Hispanic or Latino; approximately 40% of workers in middle-skill occupations are Hispanic or Latino, while 30% of Agriculture, Water, and Environmental Technologies students are Hispanic or Latino.

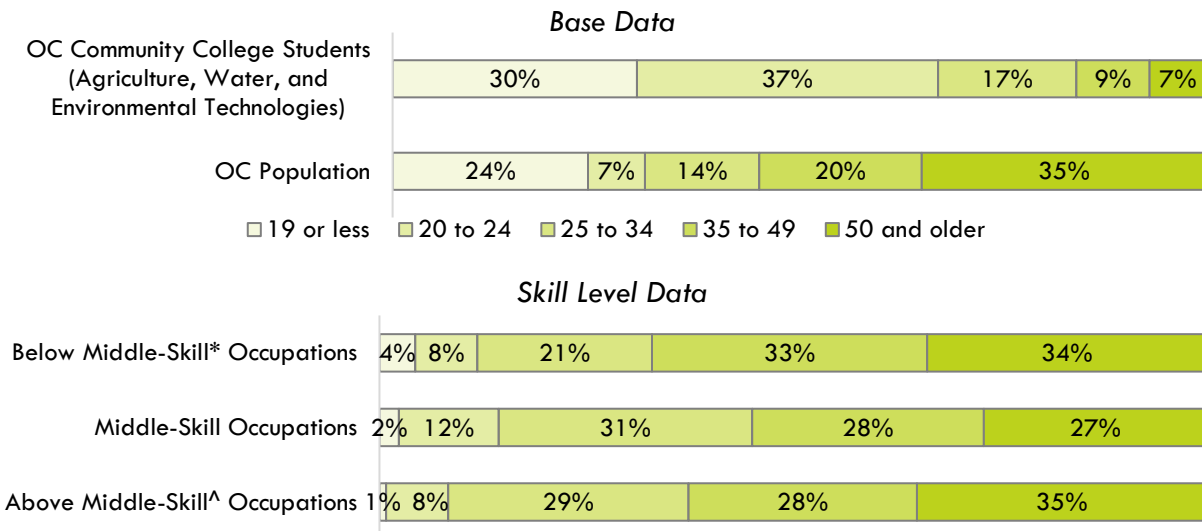
Exhibit 20: Agriculture, Water, and Environmental Technologies Sector Demographics by Ethnicity



Age Group

Exhibit 21 shows the age of Orange County community college students enrolled in Agriculture, Water, and Environmental Technologies programs compared to the overall Orange County population and the three skill-level occupational groups. At least 28% of workers in each of the three skill level occupations are 35 to 49, which is higher than the population (20%) and community college Agriculture, Water, and Environmental Technologies students (9%). In terms of majority within its skill level, 34% of below middle-skill workers and 35% of above middle-skill workers are 50 and older, while 31% of middle-skill workers are age 25 to 34. More than one-third (37%) of community college Agriculture, Water, and Environmental Technologies students are 20 to 24, which is higher than the population (7%) and each of the three skill level occupations (between 8% and 12%).

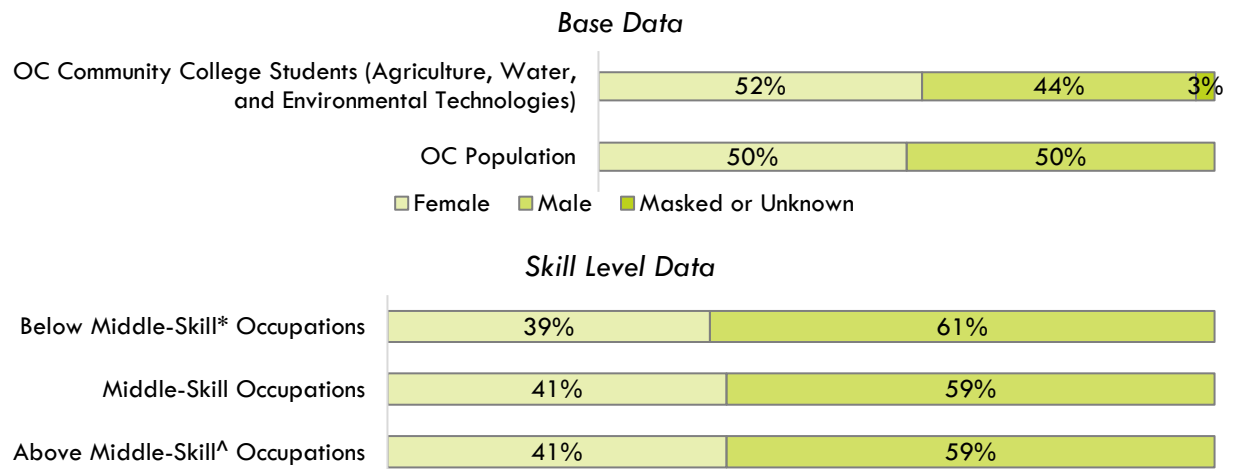
Exhibit 21: Agriculture, Water, and Environmental Technologies Sector Demographics by Age Group



Sex

Exhibit 22 shows the sex of Orange County community college students enrolled in Agriculture, Water, and Environmental Technologies programs compared to the overall Orange County population and the three skill-level occupational groups. While the overall students in the sector and population split are close to even, the occupations skew towards more men in all three skill levels.

Exhibit 22: Agriculture, Water, and Environmental Technologies Sector Demographics by Sex



PUBLIC POLICY AND FUNDING OPPORTUNITIES

Federal Policies

Federal legislation impacting the Agriculture, Water, and Environment Technologies sector covers a range of issues from environmental standards and worker protections to regulations on handling potentially harmful substances and toxins. The following legislation affects the sector by directly or indirectly influencing the training requirements workers in these industries must meet to comply with federal regulations:

- **Clean Water Act (CWA):** The CWA created the foundational structure for establishing surface water quality standards and regulating emissions of pollutants into U.S. waters.²²
- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** Enacted in response to growing environmental concerns over hazardous wastes, CERCLA, commonly referred to as Superfund, granted the federal government authority to regulate and respond to the release of hazardous substances and to develop long-term strategies to address hazardous waste problems.²³
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA):** The FIFRA establishes a framework for the federal regulation of pesticide usage, distribution, and sale.²⁴ It also provides the U.S. Environmental Protection Agency authority to issue regulations to safeguard agricultural workers from the pesticide exposure.²⁵
- **Migrant and Seasonal Agricultural Worker Protection Act (MSPA):** The MSPA sets forth employment standards protecting migrant and seasonal agricultural workers on matters including disclosures, wages, housing, and recordkeeping.²⁶

Potential legislation with significant impact on agricultural industries is currently in consideration in congress. Specifically, the senate recently released its draft text of a new multiyear farm bill just weeks prior to the expiration of crucial safety net programs, which, without the passage of new legislation within the few remaining legislative weeks of this year, would plunge back to Depression-era law, risking increased food prices and disrupting farmer operations.²⁷

The Agriculture Improvement Act of 2018, commonly regarded as the 2018 Farm Bill, was the most recent iteration of its kind and expired on September 30, 2024, following an extension through the Further Continuing Appropriations and Other Extensions Act of 2024.²⁸ The 2018 Farm Bill was a five-year omnibus bill that included areas such as commodity review supports, agricultural conservation, farm credit, and foreign and domestic food programs, and without reauthorization, some programs, including nutrition assistance programs, will expire.²⁹

State Policies

Several state agencies, including the California Air Resources Board, the California Environmental Protection Agency, and the California State Water Resources Control Board, work synchronously with state and federal legislation and federal agencies to regulate potentially harmful activities that may pose risks to the environment, the population, and workers. Below is a list of a few state laws and regulations that directly and/or indirectly impact employees in this sector, particularly with respect to workers' rights and state regulations that may require consideration while on the job:

- **Agricultural Labor Relations Act (ALRA):** The ALRA guarantees agricultural workers the right to choose whether or not to have a union to negotiate with their employer on issues such as hours, wages, and working conditions. Additionally, the ARLA protects workers from being discharged or facing retribution when two or more workers request changes to their employment, regardless of whether a union is involved. ³⁰

- **California Department of Toxic Substances Control (DTSC) Regulations:** The DTSC regulates hazardous waste and advances compliance through inspections, enforcement, and education.³¹
- **California Environmental Quality Act (CEQA):** CEQA mandates public agencies exercise consideration of the environmental implications associated with their discretionary measures. This law aims to avoid significant, preventable environmental harm and to inform the public and decisionmakers about the impacts proposed projects may have on the environment.³²

Funding Opportunities

Several federal and state financial initiatives are available for further investment into the Agriculture, Water, and Environmental Technologies sector. While not an exhaustive list, the following provides a sample of available sector-specific funding opportunities:

- **Farm Labor Stabilization and Protection Pilot Grant Program:** Grants aimed to assist employers in adopting practices to improve worker health and safety, ameliorate working conditions, and advance labor retention.³³
- **Farm Service Agency (FSA) Microloans:** FSA offers two types of microloans: Farm Ownership Loans and Farm Operating Loans. These programs provide financial assistance to a wide range of eligible expenses depending on loan type. The former offers assistance towards ownership-related expenses, such as purchasing a farm or building/improving farm buildings, and the latter may be used for operating expenses, including marketing and distribution, irrigation, initial start-up costs.³⁴
- **Farmworkers Advancement Program Grant:** Currently within Program Year 2024-25, this grant aims to research, plan, and implement initiatives to improve and offer essential training opportunities for farmworkers.³⁵



APPENDIX A: METHODOLOGY

Traditional Labor Market Data Methodology

The COE analyzed traditional labor market demand information, which includes job counts, projections, wages, typical education requirements, for the Agriculture, Water, and Environmental Technologies sector. Traditional labor market demand data was sourced from Lightcast (Datarun 2023.4), a labor market analytics firm that aggregates data from public statistical agencies including the Bureau of Labor Statistics, Census Bureau, and the California Employment Development Department. Living wage data was sourced from the Insight Center California Family Needs Calculator.³⁶ The traditional labor market demand data analyzed in this report includes:

- **2022 Jobs:** the number of jobs by industry and occupation in 2022.
- **2027 Jobs:** the projected number of jobs by industry and occupation in 2027. Projections are based on the assumption that past trends will continue into the future, including the assumption that the economy, during the projection period, will be at approximately full employment. Projections do not consider potential recessions or labor shocks, such as natural disasters or pandemics, and are intended to capture structural change in the economy over time.
- **Change:** the projected change in the number of jobs, expressed as an actual number and a percentage.
- **Average Annual Openings (Demand):** the projected number of annual job openings. This figure is the sum of job growth and replacement jobs. Job growth is the result of job creation while replacement jobs are the result of retirements and workers leaving the filled, creating the need to hire a replacement.
- **Hourly Wages:**
 - **Entry-level (25th percentile):** the typical entry-level wages for an occupation; 25% of workers earn less than this amount and 75% earn more.
 - **Median:** the median wages for an occupation; 50% of workers earn less than this amount and 50% earn more.
 - **Experienced (75th percentile):** the typical experienced-level wages for an occupation; 75% of workers earn less than this amount and 25% earn more.
- **Typical Entry-Level Education:** represents the typical education level needed to enter an occupation.
- **Educational Attainment:** the percentage of workers employed in an occupation by their highest level of education attained.

Demographic data for the Orange County population comes from the Census Bureau's American Community Survey (5-Year Estimates, 2018-2022). Demographic data for occupations was sourced via IPUMS USA and student demographic data was sourced from the LaunchBoard Community College Pipeline (2020-21 Academic Year).^{37 38}

The COE also analyzed labor market supply data that is calculated using the number of awards conferred in related training programs at community college and non-community college institutions over the past three years of available data. Community college data is sourced from the California Community College Chancellor's Office Data Mart³⁹ and includes the years 2020-2023; non-community college data is sourced from the Integrated Postsecondary Education Data System and includes the years 2019-2022.⁴⁰

Job Postings Analysis Methodology

In addition to traditional labor market information, the COE analyzed real-time labor market information using online job postings data sourced from Lightcast (Datarun 2024.3). The job postings data in this report covers the last 12 months of available data (November 2023 – October 2024). This data is derived from online job postings that are parsed and classified into industry and occupational groups using natural language processing (NLP) to determine the related company, industry, occupation, and other information for each job posting. Online job postings do not equate to labor market demand or replace traditional labor market data. They should only be considered a supplement to traditional LMI.

APPENDIX B: SECTOR OCCUPATIONS

SOC	Occupation
13-1074	Farm Labor Contractors*
37-2021	Pest Control Workers*
37-3011	Landscaping and Groundskeeping Workers*
37-3013	Tree Trimmers and Pruners*
39-2021	Animal Caretakers*
45-2021	Animal Breeders*
45-2041	Graders and Sorters, Agricultural Products*
45-2091	Agricultural Equipment Operators*
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse*
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals*
45-2099	Agricultural Workers, All Other*
45-3031	Fishing and Hunting Workers*
45-4021	Fallers*
45-4022	Logging Equipment Operators*
45-4023	Log Graders and Scalers*
45-4029	Logging Workers, All Other*
11-9013	Farmers, Ranchers, and Other Agricultural Managers
19-4012	Agricultural Technicians
19-4013	Food Science Technicians
19-4071	Forest and Conservation Technicians
27-1023	Floral Designers
29-2056	Veterinary Technologists and Technicians#
31-9096	Veterinary Assistants and Laboratory Animal Caretakers
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation
39-2011	Animal Trainers
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers
45-2011	Agricultural Inspectors
45-4011	Forest and Conservation Workers
47-4041	Hazardous Materials Removal Workers
49-3041	Farm Equipment Mechanics and Service Technicians
17-2021	Agricultural Engineers^
17-2081	Environmental Engineers^#
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors^
19-1011	Animal Scientists^
19-1012	Food Scientists and Technologists^
19-1013	Soil and Plant Scientists^
19-1023	Zoologists and Wildlife Biologists^
19-1031	Conservation Scientists^
19-1032	Foresters^
25-9021	Farm and Home Management Educators^
29-1131	Veterinarians^#

- Below Middle-Skill* Occupations
- Middle-Skill Occupations
- Above Middle-Skill^ Occupations

APPENDIX C: TOP CODES

TOP Code	Program Name	TOP Code	Program Name
0101.00	Agriculture Technology and Sciences, General	0115.20	Wildlife and Fisheries
0102.00	Animal Science	0116.00	Agricultural Power Equipment Technology
0102.10	Veterinary Technician (Licensed)	0199.00	Other Agriculture and Natural Resources
0102.20	Artificial Inseminator (Licensed)	0303.00	Environmental Technology
0102.30	Dairy Science	0947.00	Diesel Technology*
0102.40	Equine Science	0947.20	Heavy Equipment Maintenance*
0103.00	Plant Science	0947.30	Heavy Equipment Operation*
0103.10	Agricultural Pest Control Adviser and Operator (Licensed)	1301.00	Family and Consumer Sciences, General*
0104.00	Viticulture, Enology and Wine Business	1301.10	Consumer Services*
0109.00	Horticulture	1303.00	Fashion*
0109.10	Landscape Design and Maintenance	1305.00	Child Development/Early Care and Education*
0109.20	Floriculture/Floristry	1305.10	Child and Adolescent Development*
0109.30	Nursery Technology	1305.60	Parenting and Family Education*
0109.40	Turfgrass Technology	1305.70	Foster and Kinship Care*
0112.00	Agriculture Business, Sales and Service	1305.90	Infants and Toddlers*
0113.00	Food Processing and Related Technologies	1308.00	Family Studies*
0114.00	Forestry	1309.00	Gerontology*
0115.00	Natural Resources	1920.00	Ocean Technology*
0115.10	Parks and Outdoor Recreation		

Note: Fourteen (14) programs are denoted with an asterisk (*). The supply for these 14 TOP codes were added to the Agriculture, Water, and Environmental Technologies Sector Profile because they crosswalk to Agriculture, Water, and Environmental Technologies Sector occupations, even though the Chancellor's Office assigned the TOP code to a different sector.

In the last Community College Chancellor's Office [TOP code inventory](#), Diesel Technology (0947.00), Heavy Equipment Maintenance (0947.20), and Heavy Equipment Operation (0947.30) were classified as Advanced Transportation and Logistics; Family and Consumer Sciences, General (1301.00), Consumer Services (1301.10), and Fashion (1303.00) were classified as Retail, Hospitality, and Tourism; Child Development/Early Care and Education (1305.00), Child and Adolescent Development (1305.10), Parenting and Family Education (1305.60), Foster and Kinship Care (1305.70), Infants and Toddlers (1305.90), and Family Studies (1308.00) were classified as Education and Human Development; Gerontology (1309.00) was classified as Health; and Ocean Technology (1920.00) was classified as Advanced Manufacturing.

APPENDIX D: END NOTES

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- ¹⁸ Malinda Larkin, "Prime issue for veterinary technicians: Underutilization," American Veterinary Medical Association, accessed November 22, 2024, <https://www.avma.org/javma-news/2018-11-15/prime-issue-veterinary-technicians-underutilization>.
- ¹⁹ *Ibid.*
- ²⁰ California Community College Chancellor's Office, n.d. <https://coci2.ccctechcenter.org/programs>.
- ²¹ All SWP metrics are for 2021-2022 unless otherwise noted.
- ²² "Summary of the Clean Water Act," United States Environmental Protection Agency, last modified June 12, 2024, <https://www.epa.gov/laws-regulations/summary-clean-water-act>.
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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.

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