LABOR MARKET ANALYSIS

FOR PROGRAM RECOMMENDATION

C·O·E
CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

CYBERSECURITY
IN THE FAR NORTH

Far North
Center of Excellence

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SUMMARY

The Far North Center of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled careers in the Far North subregion. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - jobs that typically require education beyond a high school diploma but less than a Bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this analysis due to the lessened barriers for entry-level work, such as no formal education and few on-the-job training requirements.

Key findings include:

- The Far North held 1,206 cybersecurity jobs in 2022. Cybersecurity jobs are projected to increase by 8% over the next five years, adding 100 new jobs to the subregion by 2027.

- Over the next five years, cybersecurity jobs are projected to have 114 annual openings in the Far North subregion.

- Wage data shows that cybersecurity occupations earn $5 to $26 above the subregion's living wage of $16.24 per hour. (See Appendix B for notes about the updated living wage).

- Awards data analysis shows that Far North training providers conferred an average of 76 awards (certificates and associate degrees) in cybersecurity related programs over the last three academic years.

Recommendations include:

- The Far North Center of Excellence recommends moving forward with developing a new program in cybersecurity.

INTRODUCTION

The Far North Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- These middle-skill occupations require more education and training beyond a high school diploma but less than a four-year degree:
    - Computer Network Support Specialists (15-1231)
    - Computer User Support Specialists (15-1232)
- Students who transfer and earn a four-year degree or higher could pursue the following high-skill occupations:
    - Information Security Analysts (15-1212)
    - Network and Computer Systems Administrators (15-1244)

A review of related programs revealed the following Taxonomy of Programs (TOP) title(s) and code(s) are appropriate for inclusion in this report:

- Information Technology, General (0701.00)
- Computer Information Systems (0702.00)
- Software Applications (0702.10)
- Computer Systems Analysis (0707.30)
- Computer Infrastructure and Support (0708.00)
- Computer Networking (0708.10)
- Computer Support (0708.20)
- World Wide Web Administration (0709.00)
- Telecommunications Technology (0934.30)

The corresponding Classification of Instructional Program (CIP) title(s) and code(s) are:

- Computer and Information Sciences, General (11.0101)
- Information Technology (11.0103)
- Computer Systems Analysis/Analyst (11.0501)
- Computer Software and Media Applications, Other (11.0899)
- Network and System Administration/Administrator (11.1001)
- Computer and Information Systems Security/Information Assurance (11.1003)

- Web/Multimedia Management and Webmaster (11.1004)

- Computer Support Specialist (11.1006)

- Telecommunications Technology/Technician (15.0305)

- Computer/Computer Systems Technology/Technician (15.1202)

OCCUPATIONAL DEMAND

Exhibit 1 summarizes the five-year projected job growth for the studied occupations in the Far North[1], North/Far North, and California.

**Exhibit 1. Employment and projected demand, 2022-2027**

Occupation	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	2022-2027 Annual Openings
Computer User Support Specialists	661	714	54	8%	64
Network and Computer Systems Administrators	282	300	19	7%	23
Computer Network Support Specialists	183	197	14	8%	17
Information Security Analysts	80	94	14	17%	9
Far North	**1,206**	**1,306**	**100**	**8%**	**114**
Computer User Support Specialists	14,130	14,329	200	1%	1,174
Network and Computer Systems Administrators	2,429	2,543	114	5%	190
Computer Network Support Specialists	1,201	1,275	74	6%	110
Information Security Analysts	639	754	115	18%	73
North/Far North	**18,398**	**18,901**	**503**	**3%**	**1,547**
Computer User Support Specialists	82,472	89,680	7,208	9%	8,109

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[1] The Far North subregion cover 15 counties, including Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Plumas, Shasta, Sierra, Siskiyou, Tehama, and Trinity.

Occupation	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	2022-2027 Annual Openings
Network and Computer Systems Administrators	34,157	36,814	2,657	8%	2,915
Computer Network Support Specialists	16,076	17,808	1,732	11%	1,649
Information Security Analysts	16,543	20,453	3,910	24%	2,101
California	**149,249**	**164,755**	**15,506**	**10%**	**14,774**

Exhibit 2 compares the percent change in jobs between 2017 through 2022 and the projected changes through 2027. The rate of change is indexed to the total number of jobs in 2017.
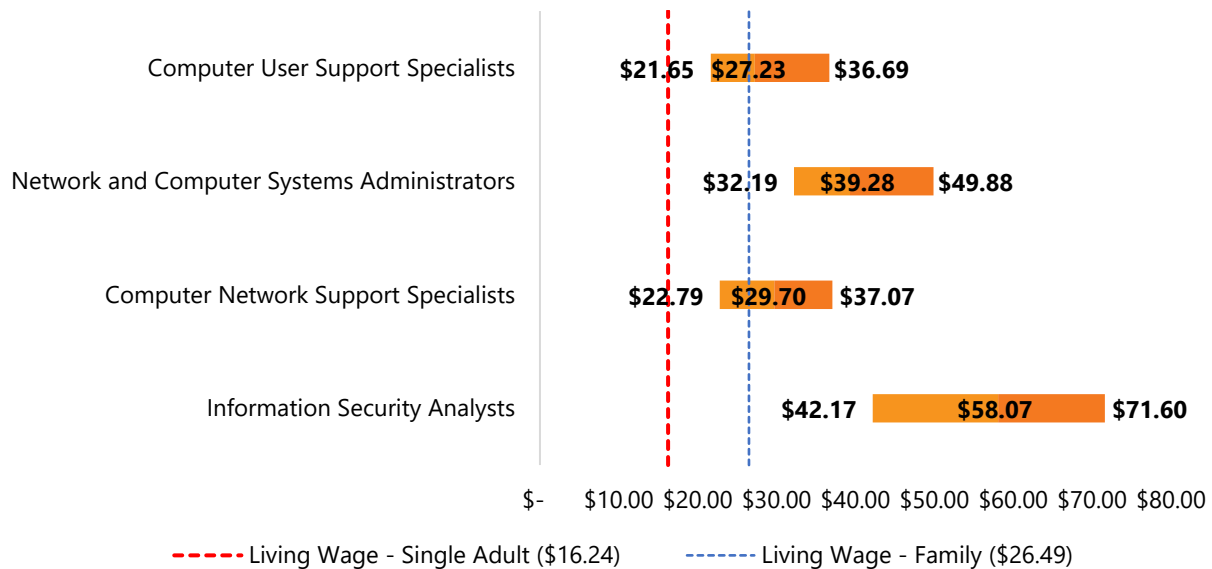
Exhibit 2. Changes in employment, 2017-2027
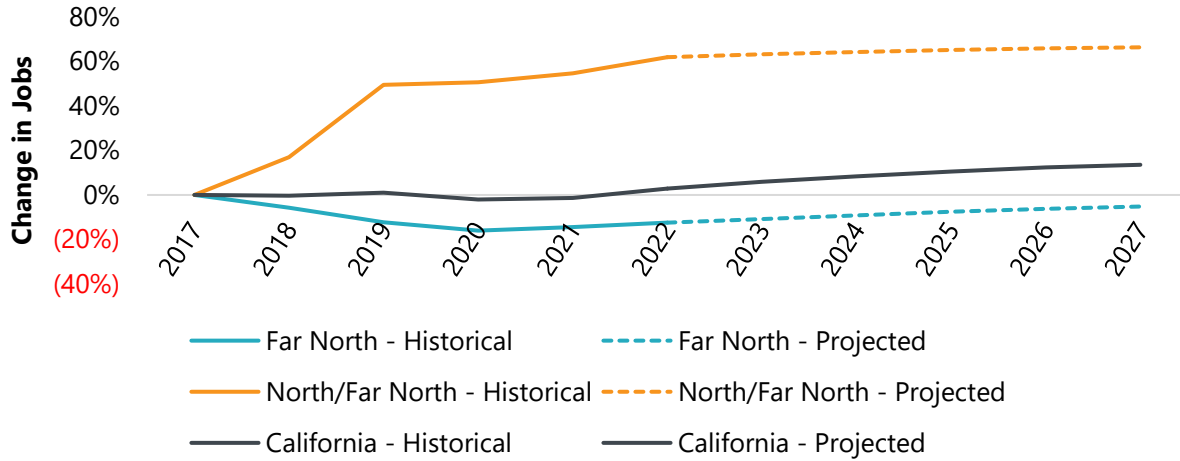
Wages

Exhibit 3 compares the entry-level, median, and experienced wages for the selected occupations to the Far North living wage for a single adult ($16.24 per hour) and a small family ($26.49 per hour).[2,3]

Exhibit 3. Comparison of wages by occupation, 2022

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[2] Living wage is defined as the level of income one working adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. Please note that the 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

[3] A small family is defined as one working adult and one school aged child (between the ages of 5 and 12 years).

JOB POSTINGS

About Job Postings Analysis

This section analyzes recent data from online job postings. Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends. However, please note that job postings are not the same as labor market demand; demand is based on projected annual openings. Job postings should be used to support inform community college curriculum development and to identify potential employers for targeted experiential learning opportunities.

Please note that there are several limitations to analyzing and interpreting online job postings. Employers may post a position multiple times to increase the number of job applicants. Job postings may remain online after a business chooses not to fill a position. Employers may advertise one posting to fill multiple vacancies. And, not all jobs are posted online.

The Far North COE identified 235 online job postings for the selected occupations in the 15-county Far North subregion. Job posting data comes from Lightcast (formerly EMSI Burning Glass Labor Insights) and represents unique listings posted online within the last year, from December 1, 2022, to November 30, 2023.

Remote and Non-Remote Work

Exhibit 4 examines remote/hybrid[4] and non-remote work opportunities.

Exhibit 4. Number of job postings by type of remote work

Occupation	Far North	California
Unknown	214	34,027
Remote/Hybrid	18	6,551
Non-remote	3	889
Total Job Postings	**235**	**41,467**

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[4] Lightcast scans all job postings for the presence of language indicating that the advertised position can be filled by a remote or partially remote worker. Many words and phrases are used to indicate a remote or hybrid position, including "remote", "position can be located anywhere", "work from home", "telecommute", "partially remote" and others. It should be noted that the definition of remote is broad enough to include postings that require that a person live in a particular region although coming into an office is not required.

Top Employers and Job Titles

Exhibit 5 details the number of online job postings for the selected occupations.

Exhibit 5. Number of job postings by occupation

Occupation	Job Postings	Share of Job Postings
Computer User Support Specialists	172	73%
Network and Computer Systems Administrators	32	14%
Information Security Analysts	27	11%
Computer Network Support Specialists	4	2%
Total Job Postings	**235**	**100%**

Exhibit 6 shows the top 10 relevant job titles with the most job postings.

Exhibit 6. Top jobs titles

Job Title	Number of Job Postings
IT Specialists	21
Information Systems Technicians	11
Software Development Engineers	10
Computer Support Technicians	7
IT Support Technicians	7
Recovery Specialists	6
Technical Support Analysts	6
Systems Administrators	6
IT Technicians	6

Exhibit 7 shows the top 10 relevant employers with the most job postings for the selected occupations.

Exhibit 7. Employers with the most job postings

Employer	Number of Job Postings
CalPortland	14
Enloe Medical Center	11
Tractor Supply	10
Best Buy	7
Avenu Insights & Analytics	6
Pinnacle Treatment Centers	6
Chico	5
City Of Ukiah	5
Mendocino College	5

Top Skills and Qualifications

Exhibit 8 shows the most relevant certifications requested by employers for the selected occupations.

Exhibit 8. Most in-demand certifications

Certification	Job Postings	Share of Job Postings
CompTIA A+	25	11%
Microsoft Certified Professional	12	5%
CDL Class C License	9	4%
Certified Information Systems Security Professional	6	3%
Cisco Certified Network Associate	5	2%

Exhibit 9 shows the top 10 skills across three categories for the studied occupations: specialized, essential, and software skills.[5]

Exhibit 9. Most in-demand skills

Top 10 Specialized Skills	Top 10 Essential Skills	Top 10 Software Skills
Operating Systems	Troubleshooting	Operating Systems
Information Systems	Communication	Microsoft Windows
Technical Support	Management	Active Directory
Computer Science	Customer Service	Firewall
Local Area Networks	Information Technology	Microsoft Outlook
Help Desk Support	Operations	Microsoft Office
Telecommunications	Writing	Windows Servers
Peripheral Devices	Problem Solving	Microsoft Excel
Wide Area Networks	Planning	Spreadsheets
Project Management	Interpersonal Communications	Microsoft Servers

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[5] Specialized skills are those primarily required to perform specific tasks in an occupation. Essential skills are typically related to employability. These are skills that are prevalent across many occupations, and include both interpersonal attributes and learned skills (aka "soft skills"). Software skills are specific to any software tool or programming component used to support a job.

Exhibit 10 shows the minimum level of education requirements for related job postings in the Far North subregion.[6]

Exhibit 10. Employer-preferred education levels

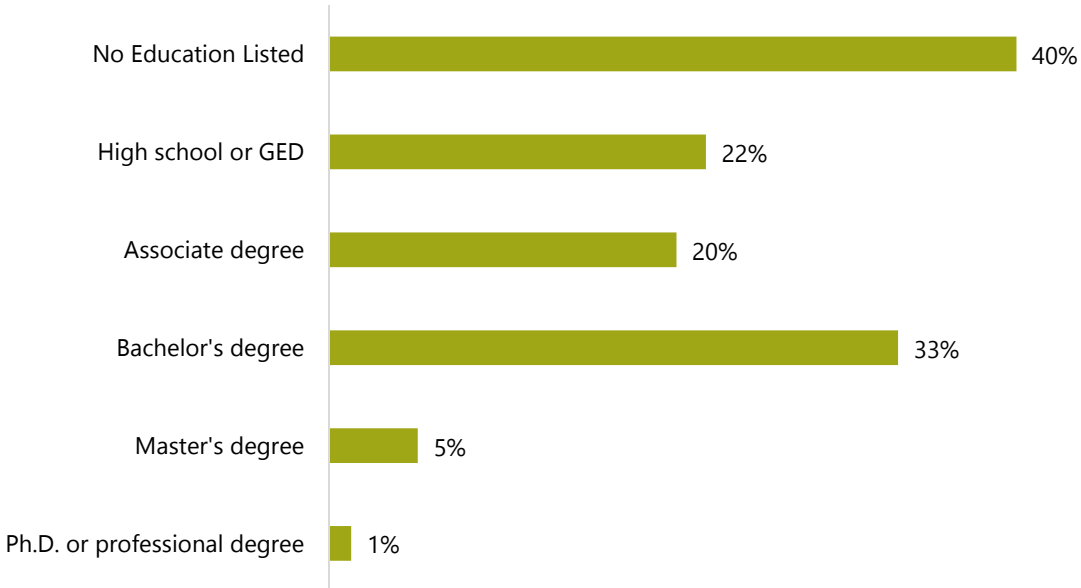| Education Level	Percentage
No Education Listed	40%
High school or GED	22%
Associate degree	20%
Bachelor's degree	33%
Master's degree	5%
Ph.D. or professional degree	1%

Exhibit 11 shows the experience levels required by employers for job postings for the selected occupations.[7]

Exhibit 11. Employer-preferred job experience

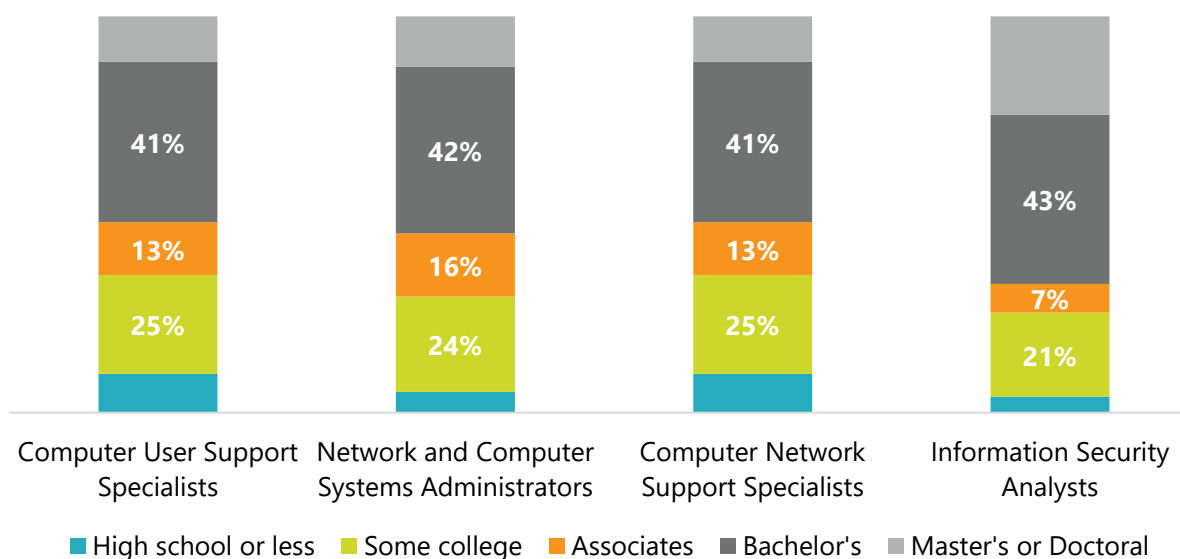| Experience	Percentage
No Experience Listed	41%
0 - 1 Years	13%
2 - 3 Years	26%
4 - 9 Years	20%

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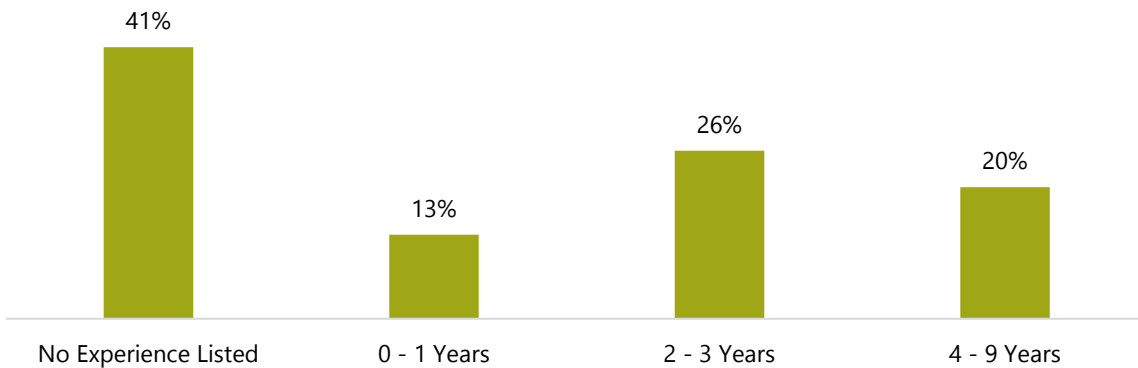
[6] Employers may include more than one level of education as a hiring requirement in a job posting. As a result, the values in exhibit 9 may sum to greater than 100%.

[7] Employers may include more than one level of experience as a hiring requirement in a job posting. As a result, the values in exhibit 10 may sum to greater than 100%.

EDUCATION AND TRAINING

The U.S. Census Bureau collects data on the highest level of education achieved by workers employed across all occupations. Exhibit 12 shows California's educational attainment of the current workforce in the selected occupations.

Exhibit 12. California's educational attainment for selected occupations, 2019

	Computer User Support Specialists	Network and Computer Systems Administrators	Computer Network Support Specialists	Information Security Analysts
Bachelor's	41%	42%	41%	43%
Associates	13%	16%	13%	7%
Some college	25%	24%	25%	21%

■ High school or less ■ Some college ■ Associates ■ Bachelor's ■ Master's or Doctoral

The U.S. Bureau of Labor Statistics (BLS) uses a categorical system to assign typical entry-level education and job requirements to each occupation for which the BLS publishes projection data. These categories include entry-level education, work experience in a related occupation, and on-the-job training. Exhibit 13 shows the selected occupations' typical entry-level education and job requirements.

Exhibit 13. Typical entry-level education and job requirements

Occupation	Typical Entry-level Education	Work Experience Required	On-the-job Training Required
Network and Computer Systems Administrators	Bachelor's degree	None	None
Information Security Analysts	Bachelor's degree	Less than 5 years	None
Computer Network Support Specialists	Associate degree	None	None
Computer User Support Specialists	Some college, no degree	None	None

EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 14 shows the TOP and CIP codes for educational programs related to the selected occupations.

Exhibit 14. TOP and CIP codes for training programs related to the selected occupations

| TOP Programs and Codes	Aligned CIP Programs and Codes
Information Technology, General (0701.00)	Information Technology (11.0103)
Computer Information Systems (0702.00)	Computer and Information Sciences, General (11.0101)
Software Applications (0702.10)	Computer Software and Media Applications, Other (11.0899)
Computer Systems Analysis (0707.30)	Computer Systems Analysis/Analyst (11.0501)
	Computer/Computer Systems Technology/Technician (15.1202)
Computer Infrastructure and Support (0708.00)	Computer and Information Systems Security/Information Assurance (11.1003)
Computer Networking (0708.10)	Network and System Administration/Administrator (11.1001)
Computer Support (0708.20)	Computer Support Specialist (11.1006)
World Wide Web Administration (0709.00)	Web/Multimedia Management and Webmaster (11.1004)
Telecommunications Technology (0934.30)	Telecommunications Technology/Technician (15.0305)

Community College Supply

Exhibits 15 and 16 compare the average number of certificates and degrees from selected Far North community college programs over the last three academic years.

Exhibit 15. Annual average community college awards by program

Program - TOP Code	College	Annual Awards 2019-20	Annual Awards 2020-21	Annual Awards 2021-22	3-Yr Annual Awards Average
Information Technology, General (0701.00)	Mendocino	3	1	2	2
Computer Information Systems (0702.00)	Butte	21	18	43	27
	Mendocino	1	0	1	1
	Shasta	4	6	1	4
Software Applications (0702.10)	Mendocino	0	1	0	0
Computer Infrastructure and Support (0708.00)	Butte	0	0	6	2
	Redwoods	0	7	13	7
Computer Networking (0708.10)	Mendocino	1	1	0	1
	Redwoods	39	17	21	26
	Shasta	9	2	6	6
Computer Support (0708.20)	Butte	0	0	3	1
World Wide Web Administration (0709.00)	Shasta	1	0	0	0
	Grand Total	**79**	**53**	**96**	**76**

Exhibit 16. Annual average community college awards by type, 2019-20 through 2021-22

Average Number of Awards Issued Per Year
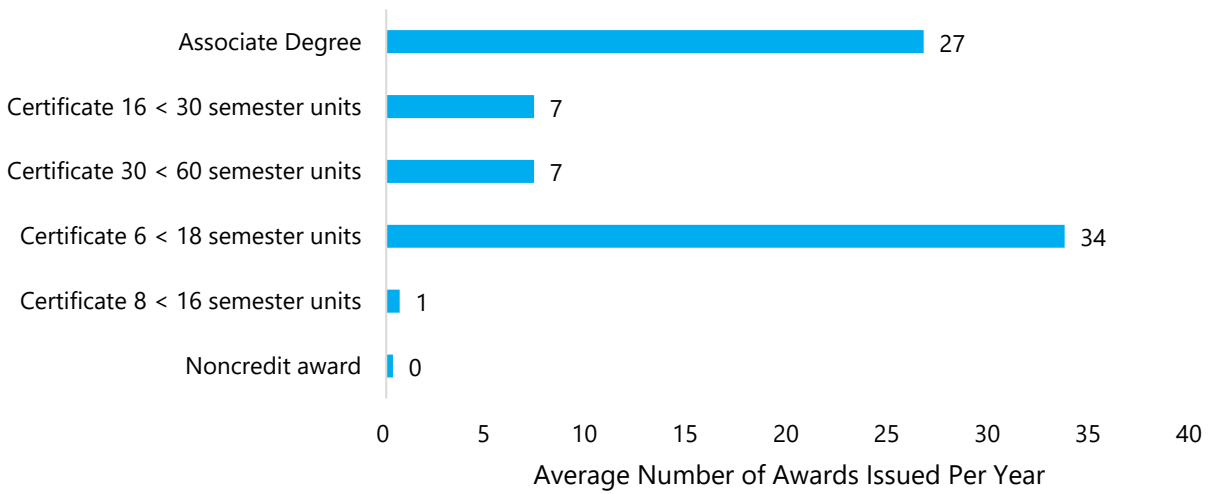
Other Postsecondary Supply

Non-community college training providers did not confer any awards in the Far North subregion. Please note that non-community college data often lags by one year and other post-secondary awards data covers a two-year average due to a taxonomy update from the 2010 to 2020 CIP codes.

FINDINGS

This report focuses on four occupations in the cybersecurity occupational pathway: computer network support specialists, computer user support specialists, information security analysts, and network and computer systems administrators.

Occupational Demand

- The Far North subregion held 1,206 cybersecurity jobs in 2022. These jobs are projected to increase by 8% over the next five years, adding 100 new jobs to the subregion by 2027.

- Jobs for cybersecurity are projected to grow at a slower rate in the Far North subregion than in California.

- Over the next five years, cybersecurity jobs are projected to have 114 annual openings across the Far North.

Wages

- Analysis of wage data shows that cybersecurity occupations earn $5 above to $26 above the single adult living wage of $16.24 per hour.

- Median wages for all occupations are approximately $1 above to $32 above the living wage for a small family ($26.49 per hour).

Job Postings

- According to real-time labor market information, there were about 235 online job postings for cybersecurity occupations between December 1, 2022, to November 30, 2023.

- Of the 235 job postings for cybersecurity occupations, 18 were considered remote/hybrid jobs in the subregion. Of 41,467 job postings in California, 6,551 were considered remote/hybrid jobs.

- The top job title was computer user support specialists, which was in 73% of job postings.

Education and Training Requirements

- Between 28% and 40% of incumbent workers in the studied occupations have educational attainment levels consistent with community college offerings (some college or associate degrees). Between 41% and 43% of incumbent workers held a bachelor's degree.

- In terms of the minimum level of education preferred by employers, 20% listed an associate degree and 33% listed a bachelor's degree.

Postsecondary Supply

- Four Far North community colleges offers degrees and certificates in programs related to cybersecurity. These programs conferred an average of 76 awards (certificates and associate degrees) in cybersecurity over the last three academic years (2019-20 through 2021-22).

- No non-community college postsecondary training providers in the subregion offer training related to the studied occupations. Please note that non-community college awards data lags by one year.

RECOMMENDATIONS

- Based on projected yearly openings and average annual awards in the Far North subregion, there seems to be an undersupply between educational supply and occupational demand.
  - Community colleges and other postsecondary training providers issued an average of 76 awards over the last three years.
  - There are 114 projected annual openings for cybersecurity jobs.

- The Far North Center of Excellence recommends moving forward with developing a new program in cybersecurity.

New Program Recommendation		
Move forward with the new program	**Proceed with caution**	**A new program is not recommended**
☒	☐	☐

APPENDIX A. METHODOLOGY AND SOURCES

This report identified Occupations using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

"The Chancellor's Office Curriculum Inventory System (COCI)." California Community Colleges Curriculum Inventory (COCI), 2023. https://coci2.ccctechcenter.org/.

Glasmeier, Amy K. "Living Wage Calculator." Living Wage Calculator, 2023. https://livingwage.mit.edu/.

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. https://nces.ed.gov/ipeds/.

Labor Market Information Division. California Employment Development Department. https://labormarketinfo.edd.ca.gov/.

Lightcast (Formerly EMSI/Burning Glass) 2023.3; QCEW Employees, Non-QCEW Employees, and Self-Employed. https://www.economicmodeling.com/. (*Note: 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)).*

Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office. https://datamart.cccco.edu/.

O*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA). https://www.onetonline.org/.

Self-Sufficiency Standard Tool for California. The University of Washington. http://www.selfsufficiencystandard.org/

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6th Edition. https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx

"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. June 2021 Edition. http://coeccc.net/

APPENDIX B. GLOSSARY

Key Terms	Definition
Occupation	Occupation refers to a category of jobs, careers, or professions that are similar regarding the work performed and the skills the workers possess. Workers who perform essentially the same tasks are in the same occupation, whether in the same industry. Some occupations are concentrated in a few industries, while others are found in many industries.
	Occupations differ from jobs in that jobs show the number of positions held in each occupation.
Jobs	A job is a specific instance of employment and includes any position where a worker provides labor for monetary compensation.
	Job numbers include employees (those who work for businesses) and proprietors (those who work for themselves). Full- and part-time jobs are included and counted equally (i.e., not adjusted to full-time equivalents). Data for jobs, or employment, are annual averages.
Employment	Employment refers to filled jobs, whether full- or part-time, temporary or permanent. The scope of "who" is counted as employed is noted in Appendix A. Methodology and Sources.
Job Change	Job change is the net increase or decrease of jobs over a given timeframe.
Job Opening	Job openings are the projected number of positions available for workers entering an occupation.
	Openings include growth and replacement job counts. Growth job counts are the positive change in the total number of workers employed. Replacement job counts are the estimates of new workers needed to replace workers permanently leaving the occupation.
Percentile Wage (or wages)	A percentile wage is the value of a wage at which a certain percentage of workers falls below. For example, a 25th percentile hourly wage of $15.00 indicates that 25% of workers earn less than $15.00, while 75% earn more. Percentile wages are specific to the geography shown in the report.
	The 25th-percentile and 75th-percentile hourly wages are used as a proxy for entry-level and experienced-level wages.
Living Wage	The living wage is the level of income a single, working adult with no children must earn to meet basic needs. The living wage is calculated using basic allowances for food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs, and assumes full-time employment (40 hours per week, 52 weeks a year).

Key Terms	Definition
	Beginning AY 2023-24, NFN COE adopted the MIT calculations for a living wage better aligned to the economic conditions following the pandemic. For additional information, please visit https://livingwage.mit.edu/.
Educational Attainment	Educational attainment is the highest level of education achieved by workers in an occupation. The data include workers aged 25 years and older.
Typical Entry-level Education	The education level most workers need to gain employment in an occupation. Categories range from "no formal educational credential" and "high school diploma or equivalent" to "doctoral or professional degree." The types most relevant to community training are "some college, no degree," "postsecondary nondegree award," and "associate degree." The typical entry-level education may differ from the actual educational levels attained by workers employed in an occupation.
Typical Work Experience	The relevant prior experience a worker needs to gain employment in an occupation. Categories include "5 years or more", "less than five years," and "none."
Typical On-The-Job (OTJ) Training	The level of on-the-job training a worker needs to obtain for competency in the skills required for an occupation. Categories include "none," "short-term (1 month or less)," "moderate-term (more than one month but less than 12 months)," "long-term (more than 12 months)," "apprenticeship," and "internship/residency."
Awards	Awards are the number of certificates and degrees conferred for a specific course of study each year. Awards count "papers" and, as a result, may be greater than the number of students who complete a program.

COVID-19 Statement: This report includes employment projection data produced by Lightcast (formerly EMSI). Employment projections are developed using models based on historical data, which in this set of projections covers the period through 2021. Most input data, therefore, precedes the pandemic. Employment projections are long-term projections intended to capture structural changes in the economy, not cyclical fluctuations. As such, projections data are not intended to capture the impacts of the recession that began in February 2020. Cyclical fluctuations, like recessions, impact projects when they become part of the historical data set.

Important Disclaimer: 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. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

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