

# The State of the San Bernardino County Economy

**Economic Trends and Forecast  
Quarter 3, 2014 – Quarter 2, 2015**

This report details the macroeconomic conditions in the nation and the state of California over the next two years. It examines the Inland Empire's economy and industries for their ability to drive job growth. It also identifies those occupations that may become a supply-constraint to future job creation as well as occupations that pay above-average wages that are expected to see strong employment growth.

**Prepared for:**

**The San Bernardino County Workforce  
Investment Board**

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# I. Executive Summary

The San Bernardino-Riverside economy's recovery has gained traction with strong employment growth in 2014 and is expected to continue this trend in 2015. In addition, the health of the regional housing market continues to improve with distressed sales declining and home prices rising.

- Employment is set to expand 3.8% in 2015; the California economy is also poised for strong employment growth.
  - Job growth is expected to be relatively strong across jobs requiring all levels of education.
  - The unemployment rate, though higher than both the United States and California jobless rates, continues to trend down.
  - The Inland Empire lags the state and the nation in terms of postsecondary education attainment in its populace.
- The local housing market recovery has gained momentum and home prices continue to increase at a healthy pace.
  - Distressed sales as a share of total sales are on a downward trend.
  - The twelve-month moving average of home sales has increased in both Riverside and San Bernardino Counties for six consecutive months beginning in March 2015.

The region has six broad sectors that are primed to create the bulk of jobs over the next three years: healthcare; transportation and warehousing; retail trade; wholesale trade; utilities; and construction.

- Within these sectors, 20 industries at the four digit North American Industry Classification System (NAICS) level were identified as having strong growth potential. Potential considers long-run growth rates, high location quotient, three-year job gains, and three-year competitiveness.
- The Inland Empire has three industry clusters that are likely to expand employment in excess of 2% per year over the next decade base on Chmura's long-run growth model.
  - These industry clusters are utilities, healthcare, and construction, which make up approximately one-fifth of the total employment in the region.

An occupation analysis identified 69 occupations requiring associate's degrees or non-degree awards as typical education for entry; these occupations were filtered to only include occupations with annual average wages close to or above the region's average wage levels.

- For occupations requiring an associate's degree, in-demand occupations with the highest annual demand are registered nurses and dental hygienists with total annual demand of 872 and 123, respectively.
  - Several of the occupations requiring an associate's degree as typical educational for entry are Science, Technology, Engineering, and Mathematics (STEM) occupations, including electrical and electronic engineering technicians and life, physical, and social science technicians, all other.
- For occupations requiring a postsecondary non-degree award, in-demand occupations with the highest annual demand are heavy and tractor-trailer truck drivers and licensed practical and licensed vocational nurses with total annual demand of 783 and 278, respectively.

## II. Background

The San Bernardino County Workforce Investment Board (WIB) is charged with addressing major workforce issues in the county; much of this work requires collaboration and coordination with neighboring Riverside County and with multiple and diverse stakeholders across the region. The WIB's role is to convene appropriate stakeholders around these issues; create dialogue among relevant parties; innovate creative solutions and build consensus; and to enlist community commitments to action in order to achieve a competitive advantage.<sup>1</sup>

This report provides an overview and forecast of the Inland Empire, state, and national economies to identify and prioritize workforce issues for the San Bernardino County WIB for 2015<sup>2</sup>. The following topics are emphasized in this analysis:

- Demographics – population characteristics of the Inland Empire;
- Economic characteristics of the population in the Inland Empire;
- Composition of the labor market;
- Commercial and residential real estate market characteristics—an update;
- Employment forecast and occupational analysis for the Inland Empire.

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<sup>1</sup> <http://cms.sbcounty.gov/wib/Home.aspx>

<sup>2</sup> The County of San Bernardino Workforce Investment Board (SBWIB) requested labor market information that applies to the Inland Empire region of California in both report and presentation formats. Chmura Economics & Analytics (Chmura) provides the economic analysis to the SBWIB in both report and PowerPoint deck formats.

## Geographic Region and Related Labor Shed

While the San Bernardino County WIB contracted this research, it is generally recognized that its economy and natural labor shed includes neighboring Riverside County. Together these two counties comprise the “Inland Empire” region (San Bernardino and Riverside Counties), which is equivalent to the Riverside-San Bernardino-Ontario, California Metropolitan Statistical Area (MSA). Throughout this report, the Riverside-San Bernardino-Ontario, California MSA is considered the primary labor shed. This report also references data at the state level, as well as for the nation as a whole.

**Figure 1: Riverside-San Bernardino-Ontario, California MSA**



## III. National & Regional Economic Outlook

The national economy continues to improve. Real gross domestic product (GDP) increased an annualized 3.9% in the second quarter of 2015 after rising at a 0.6% annual rate in the first quarter of 2015. Nonfarm employment accelerated with 692,000 non-farm jobs added over the quarter compared with 586,000 in the first quarter, while the unemployment rate declined from 5.5% in the first quarter to 5.3% in the second quarter. The unemployment rate that accounts for individuals working part time that would prefer full time work and those who are marginally attached to the workforce remains relatively high at 10.5%.<sup>3</sup> Home prices continued to climb, but the pace of appreciation has slowed; declining affordability coupled with tight inventory have been holding back the national housing market recovery. An increase in household formation, however, should help to strengthen the housing recovery.

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<sup>3</sup> According to the Bureau of Labor Statistics, marginally attached workers “are those who currently are neither working nor looking for work but indicate that they want and are available for a job and have looked for work sometime in the past 12 months.”

The economies of the Inland Empire region and state of California have also continued to improve and the recent pace of growth in both the region and the state has been faster than in the nation.

## National Outlook, 2015 - 2016

Chmura forecasts real GDP to grow at an annualized pace of 3.1% in the third quarter of 2015 and 2.4% for the entire year. Although the labor market recovery has gained momentum, wage growth remains modest and the participation rate is low. The real estate market has regained some momentum over the past year. Given the improvements in the U.S. economy, Chmura expects the Federal Reserve to increase the target range for the federal funds rate in the fourth quarter of 2015.

For the second quarter of 2015, real GDP grew an annualized 3.9%, after increasing 0.6% in the first quarter. U.S. employers added jobs at a moderate pace in the second quarter of 2015. Nonfarm private payroll growth for the second quarter expanded at a 1.7% annualized pace after advancing 2.2% in the first quarter of 2015. The national unemployment rate declined to 5.3% in June 2015, from 5.5% in March. Home sales, though above severely depressed levels, remain low by historical standards while the Federal Housing Finance Agency's House Price Index for the second quarter shows prices have increased on a year-over-year basis in every state. The housing sector was a modest contributor to GDP growth in 2014. In the second quarter of 2015, housing was a positive contributor to GDP growth, a trend which Chmura expects to continue. The U.S. stock market was flat in the second quarter of 2015 as investors sought clues from the Federal Reserve about the timing of the first interest rate increase and corporate earnings declined. Our most-likely forecast assumptions reflect an improving economy withstanding weak global growth. The results are steady but moderate GDP growth and job creation.

**Figure 2: National Macro Forecast, 2015-2016**

The forecast assumes the price of oil averages \$52 a barrel in 2015 before increasing to \$55 per barrel in 2016. The labor market is expected to continue to improve; the unemployment rate is likely to average 5.4% in 2015 and fall to 5.0% in 2016. The Federal Open Market Committee (FOMC) is expected to raise the target range for the federal funds rate in the 4<sup>th</sup> quarter of 2015.

	Forecast		
	2014	2015	2016
Real GDP	2.4%	2.4%	3.1%
Unemployment Rate	6.2%	5.4%	5.0%
Real Non-Residential Investment	6.2%	2.8%	6.0%
Real Consumer Spending	2.7%	3.0%	2.7%
<b>Financial Market</b>			
Oil Prices	\$97	\$52	\$55
Federal Funds Rate	0.1%	0.2%	1.8%
10-Year Treasury	2.5%	2.3%	4.0%

Source: Chmura Economics & Analytics

## Changes from Previous Forecast

Chmura's third quarter 2015 overall growth forecast for 2015 and 2016 is modestly changed from our estimate in the third quarter of 2014; we have revised downward our estimate of real gross domestic product for 2015 (the third quarter 2014 forecast was for a 3.1% increase), which now stands at 2.4%. We have also revised downward our estimate for real consumer spending (the third quarter 2014 forecast was 3.1% in 2015), which is now 2.4% for 2015. Our forecast for the unemployment rate in 2015 was revised lower from 5.6% in the third quarter of 2014 to 5.0%. The yield on the 10-year Treasury note has increased slower than we expected and is forecast to be 2.3% in 2015 compared with 3.5% in the third quarter 2014 estimate. Oil prices for 2015 are well below our third quarter 2014 forecast (\$99 compared with \$52) as weak global demand and strong production have driven oil prices lower.

## U.S. Labor Market Continues to Strengthen

In terms of the labor market, the recovery from the 2007-2009 recession has been the slowest of all post-World War II recoveries. In April 2014, nearly five years after the recession ended, U.S. employment surpassed its previous employment peak reached in January 2008. Although labor market conditions have improved, however, labor force participation has declined and wage growth has been modest.

This recovery, in contrast to many recoveries from previous recessions, has been very mixed in terms of the experience of individual states. In past recoveries, particularly in the early 1990s and mid-2000s, most states saw steady gains in employment and wages and sustained drops in unemployment claims and the unemployment rate; this recovery has been quite different. In California, the labor market recovery was initially much weaker than in the nation as evidenced by its unemployment rate, claims data, and overall job growth. Beginning in 2012, however, the labor market recovery in California gained momentum and job growth in the state has exceeded U.S. job growth since March 2012.

## California Outlook, 2015 - 2016

Employment declined at a faster pace in California and the state lost a larger share of its employment than the nation as a whole during and following the last recession; since the beginning in 2012, however, employment in California has increased faster on a year-over-year basis than U.S. employment. In 2014, California's employment increased 2.8%, faster than the 1.9% increase in the nation. Chmura forecasts employment in California to increase by 2.6% in 2015 and by an additional 2.4% in 2016, whereas the unemployment rate will average about 6.3% in 2015 and 5.8% in 2016.

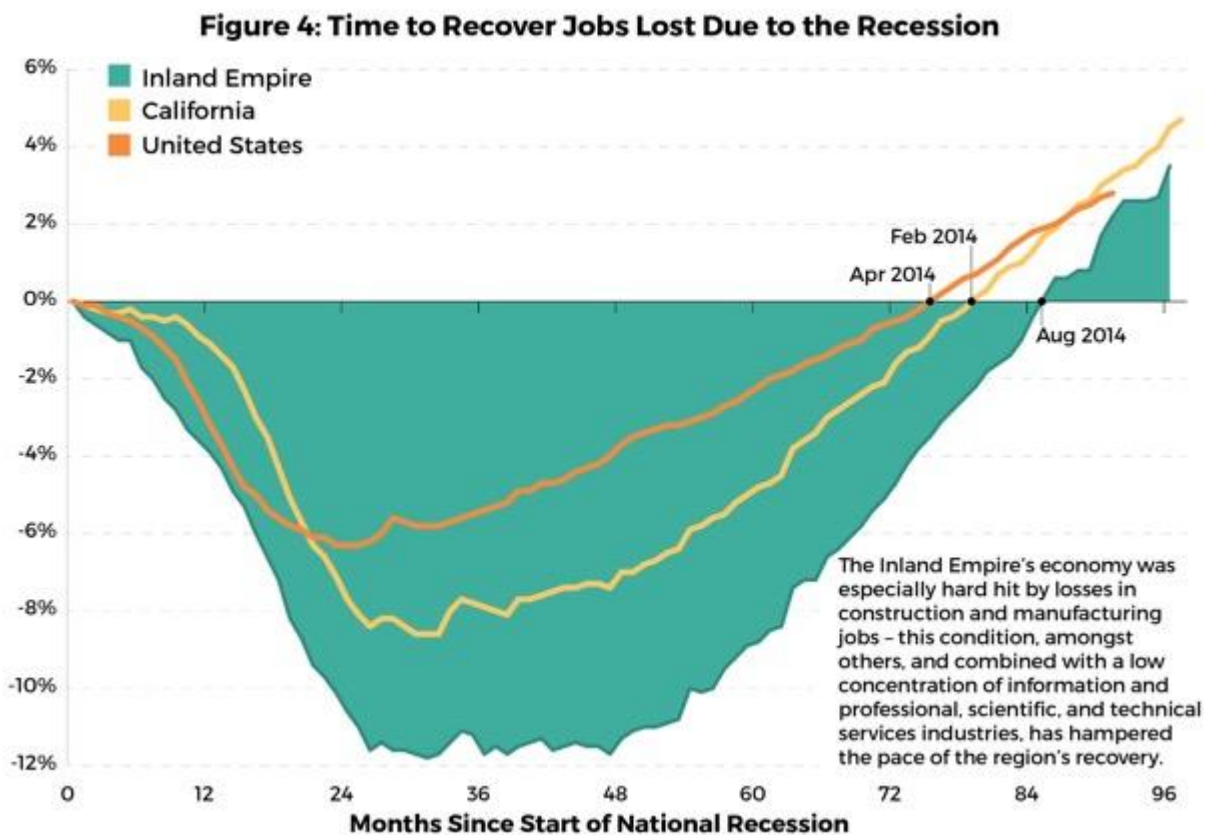


**Figure 3: California Employment Summary Forecasts**

	California Employment Growth**			California Unemployment Rate		
	2014*	2015	2016	2014*	2015	2016
Chmura Forecast	2.8%	2.6%	2.4%	7.5%	6.3%	5.8%
Forecasts as of September 2015						
*Actual						
**Employment refers to nonagricultural employment.						

Employment in California contracted by about 9% from its mid-2007 peak to its trough in early 2010. Since October 2011—at which point the California economy began to steadily add employment—the state economy has averaged approximately 31,600 new jobs per month. In February 2014, employment in California surpassed its July 2007 peak. As of August 2015, employment was 4.7% above the July 2007 employment peak.

**Figure 4: Time to Recover Jobs Lost Due to the Recession**



In the past three years, California's economy has added approximately 1,288,000 jobs. Of these new jobs, 88% were created in only five sectors: professional, scientific and technical services;

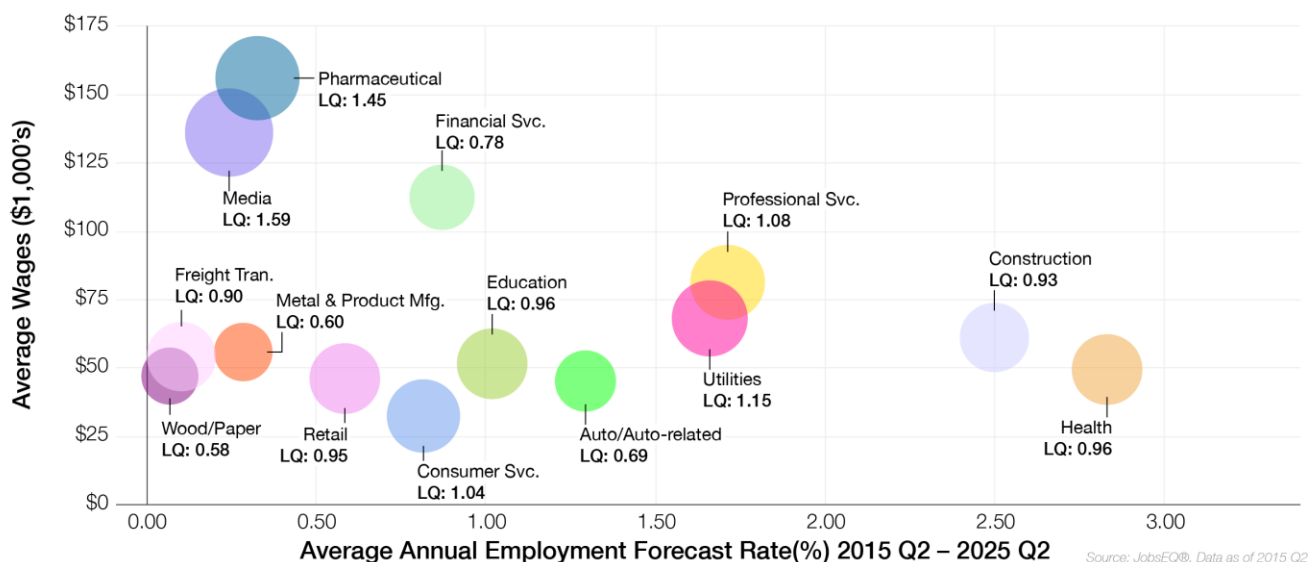


accommodation and food services; administrative and waste management and remediation services; healthcare and social assistance; and construction. Meanwhile, California's public administration sector has barely added jobs over this period and employment in the educational services sector has increased by only 3.5%; statewide employment grew 8.0% over the past three years. The Golden State's manufacturing sector has added a net 22,700 jobs (average annual growth of 0.6%) in the past three years—second quarter 2012 to second quarter 2015.

**Figure 5: California Industry Clusters with Expected Employment Declines**



**Figure 6: California Industry Clusters with Expected Employment Gains**



In terms of the location quotient (LQ)—a common measure of the relative size of an industry and traditional gauge of the presence of competitive clusters—California has competitive clusters in agriculture (LQ=2.67), pharmaceutical manufacturing (1.45), electrical/electronic

manufacturing (1.67), textiles/leather manufacturing (1.59), and media (1.59). Annual average employment growth over the next decade is expected to be slow for the pharmaceutical (+0.4%), and media (+0.3%). Moreover, the textile/leather manufacturing cluster is forecast to shrink by 6.9% annually and employment in the electrical/electronics manufacturing cluster is forecast to decline by 1.4% annually. Employment in the agricultural cluster is expected to decline by less than 0.1% annually. The state's four clusters with the fastest long-run employment growth projections are the health cluster (+2.9%), construction (+2.5%), utilities (+1.7%), and professional services (+1.7%).

## IV. Inland Empire Economic Outlook

The remainder of this report focuses on the Inland Empire region, San Bernardino and Riverside counties, which is equivalent to the Riverside-San Bernardino-Ontario, California MSA.

### Demographic Profile

The Riverside-San Bernardino-Ontario, California MSA is home to more than 4.4 million people and represents about 11.4% of California's total population. Over the past ten years, this region has grown an average 1.7% per year—much faster than the state and national average of 0.9% per year. Chmura projects the population of the Riverside-San Bernardino-Ontario, California MSA will continue to grow faster than the state over the coming decade, which in turn will help bolster the region's long-run economic prospects.

**Figure 7: Population Growth Statistics**

Region	Average Yearly Population Growth 2004-2014	Working Age Population Growth 2014- 2022	Ratio of Working Age Population to Retirees in 2022
Inland Empire	1.7%	+9%	4.07
California	0.9%	+7%	3.90

Source: Chmura Economics & Analytics

The Inland Empire region has a poverty rate 2.0 percentage points above that of the nation and 1.4 percentage points above California's poverty rate. Overall, the Inland Empire is nearly half Hispanic or Latino (of any race) according to the U.S. 2010 Census, and about 40% non-white. African Americans account for 7.6% of the population and 6.1% of the region's population is Asian-American. This demographic profile is distinct from the rest of California—with roughly a 13% Asian-American mix—and starkly different from the demographic make-up of the nation where Hispanics or Latinos account for only about 16.3% of the total population. The Inland

Empire region has approximately the same level of military personnel living in the area as state and national norms.

The average educational attainment in the Inland Empire is lower than both state and national averages. The share of population in the Inland Empire with no high school diploma is 20.5% compared with 17.9% for California and 12.2% for the nation. Similarly, the share of the Inland Empire's population with a bachelor's degree is only 13.0% compared with 20.3% in California and 19.5% in the nation. Overall postsecondary attainment—share of the population with an associate's degree or higher—is about 11.7 percentage points lower than the California average of 39.4% and 11.5 percentage points below the national norm of 39.1%.

**Figure 8: Demographic Profile Riverside-San Bernardino-Ontario, CA MSA**

Demographic Profile <sup>1</sup>						
	-----Percent-----			-----Value-----		
	Riverside-San Bernardino-Ontario, CA MSA	California	USA	Riverside-San Bernardino-Ontario, CA MSA	California	USA
<b>Demographics</b>						
Population <sup>2</sup>	—	—	—	4,441,890	38,802,500	318,857,056
Population Annual Average Growth <sup>2</sup>	1.7%	0.9%	0.9%	68,628	322,792	2,605,176
Median Age <sup>3</sup>	—	—	—	32.7	35.2	37.2
Under 18 Years	28.8%	25.0%	24.0%	1,214,696	9,295,040	74,181,467
18 to 24 Years	10.9%	10.5%	9.9%	458,633	3,922,951	30,672,088
25 to 34 Years	13.4%	14.3%	13.3%	564,520	5,317,877	41,063,948
35 to 44 Years	13.4%	13.9%	13.3%	566,254	5,182,710	41,070,606
45 to 54 Years	13.5%	14.1%	14.6%	570,032	5,252,371	45,006,716
55 to 64 Years	9.7%	10.8%	11.8%	410,782	4,036,493	36,482,729
65 to 74 Years	5.8%	6.1%	7.0%	244,093	2,275,336	21,713,429
75 Years, and Over	4.6%	5.3%	6.0%	195,841	1,971,178	18,554,555
Race: White	58.9%	57.6%	72.4%	2,488,308	21,453,934	223,553,265
Race: Black or African American	7.6%	6.2%	12.6%	322,405	2,299,072	38,929,319
Race: American Indian and Alaska Native	1.1%	1.0%	0.9%	46,399	362,801	2,932,248
Race: Asian	6.1%	13.0%	4.8%	259,071	4,861,007	14,674,252
Race: Native Hawaiian and Other Pacific Islander	0.3%	0.4%	0.2%	13,744	144,386	540,013
Race: Some Other Race	21.0%	17.0%	6.2%	887,896	6,317,372	19,107,368
Race: Two or More Races	4.9%	4.9%	2.9%	207,028	1,815,384	9,009,073
Hispanic or Latino (of any race)	47.3%	37.6%	16.3%	1,996,402	14,013,719	50,477,594
<b>Economic</b>						
Labor Force (civilian population 16 years & over) <sup>4</sup>	61.0%	63.7%	63.8%	1,968,309	18,804,519	157,113,886
Armed Forces Labor Force <sup>4</sup>	0.5%	0.5%	0.4%	17,250	141,725	1,083,691
Median Household Income <sup>3,4</sup>	—	—	—	\$55,269	\$61,094	\$53,046
Poverty Level (of all people) <sup>4</sup>	17.4%	15.9%	15.4%	730,791	5,885,417	46,663,433
Mean Commute Time (minutes) <sup>4</sup>	—	—	—	31.0	27.2	25.5
Commute via Public Transportation <sup>4</sup>	1.6%	5.2%	5.0%	26,220	841,628	7,000,722

**Figure 8: Demographic Profile (cont.) Riverside-San Bernardino-Ontario, CA MSA**

	-----Percent-----			-----Value-----		
	Riverside-San Bernardino-Ontario, CA MSA	California	USA	Riverside-San Bernardino-Ontario, CA MSA	California	USA
<b>Housing</b>						
Total Housing Units	—	—	—	1,506,474	13,726,869	132,057,804
Median House Value (of owner-occupied units) <sup>3,4</sup>	—	—	—	\$227,300	\$366,400	\$176,700
Homeowner Vacancy	3.0%	1.8%	2.2%	25,568	129,787	1,682,020
Rental Vacancy	7.2%	4.9%	7.3%	35,776	292,195	3,230,123
Renter-Occupied Housing Units (Percent of Occupied Units)	35.6%	44.7%	35.1%	458,755	5,603,356	40,534,516
Occupied Housing Units with No Vehicle Available (Percent of Occupied Units) <sup>4</sup>	5.3%	7.8%	9.1%	68,614	973,952	10,483,077
<b>Social</b>						
Educational Attainment: No High school Diploma <sup>4</sup>	20.5%	17.9%	12.2%	441,036	3,580,812	20,081,351
Educational Attainment: High School Graduate <sup>4</sup>	25.5%	20.2%	26.7%	548,257	4,037,147	43,924,394
Educational Attainment: Some College, No Degree <sup>4</sup>	26.3%	22.5%	22.0%	563,667	4,502,924	36,266,398
Educational Attainment: Associate's Degree <sup>4</sup>	8.1%	8.0%	8.6%	174,110	1,601,517	14,216,331
Educational Attainment: Bachelor's Degree <sup>4</sup>	13.0%	20.3%	19.5%	278,276	4,058,591	32,105,737
Educational Attainment: Post Graduate Degree <sup>4</sup>	6.6%	11.1%	11.0%	141,834	2,227,154	18,142,599
Disabled, Age 16 to 64 (Percent of Total Population) <sup>4</sup>	9.4%	8.0%	10.1%	241,640	1,878,329	19,403,946
Foreign Born <sup>4</sup>	21.5%	27.0%	12.9%	920,860	10,175,839	40,341,898
Speak English Less Than Very Well (population 5 yrs and over) <sup>4</sup>	16.2%	19.4%	8.6%	640,984	6,799,270	25,148,900

Source: JobsEQ®

1. Census 2010, unless noted otherwise

2. Census 2014, annual average growth rate since 2004

3. Median values for certain aggregate regions (such as MSAs) may be estimated as the weighted averages of the median values from the composing counties.

4. ACS 2009-2013

## Recent Economic Performance & Outlook 2014 - 2015

In 2013 and 2014, the Inland Empire economy outperformed the California economy in terms of both job creation and wage growth. Chmura expects employment and wage growth in the Inland Empire to continue to outperform the state in 2015 and 2016. Real retail sales should remain strong in the metro area, averaging 5.7% and 5.2%, respectively, in 2015 and 2016. Building permits, a leading indicator of economic activity, are projected to increase a modest 9.2% in 2015 followed by a 7.8% increase in 2016; in California, building permits are expected to increase 19.2% in 2015 and 9.5% further in 2016.

**Figure 9: Recent and Forecast Economic Performance**

Region/Indicators		Actual		Forecast	
San Bernardino MSA	2012	2013	2014	2015	2016
Employment*	2.6%	3.5%	4.5%	3.8%	3.5%
Wages and Salaries**	3.5%	3.7%	6.5%	6.1%	6.2%
Real Retail Sales	5.2%	4.8%	3.8%	5.7%	5.2%
Building Permits	24.1%	45.4%	17.2%	9.2%	7.8%
<b>California</b>					
Employment*	2.7%	2.8%	2.8%	2.6%	2.4%
Wages and Salaries**	5.9%	3.5%	6.2%	5.6%	5.4%
Real Retail Sales	5.3%	4.1%	2.6%	3.7%	3.6%
Building Permits	28.1%	34.8%	7.1%	19.2%	9.5%

Source: Chmura Economics & Analytics

\*Employment refers to nonagricultural employment.

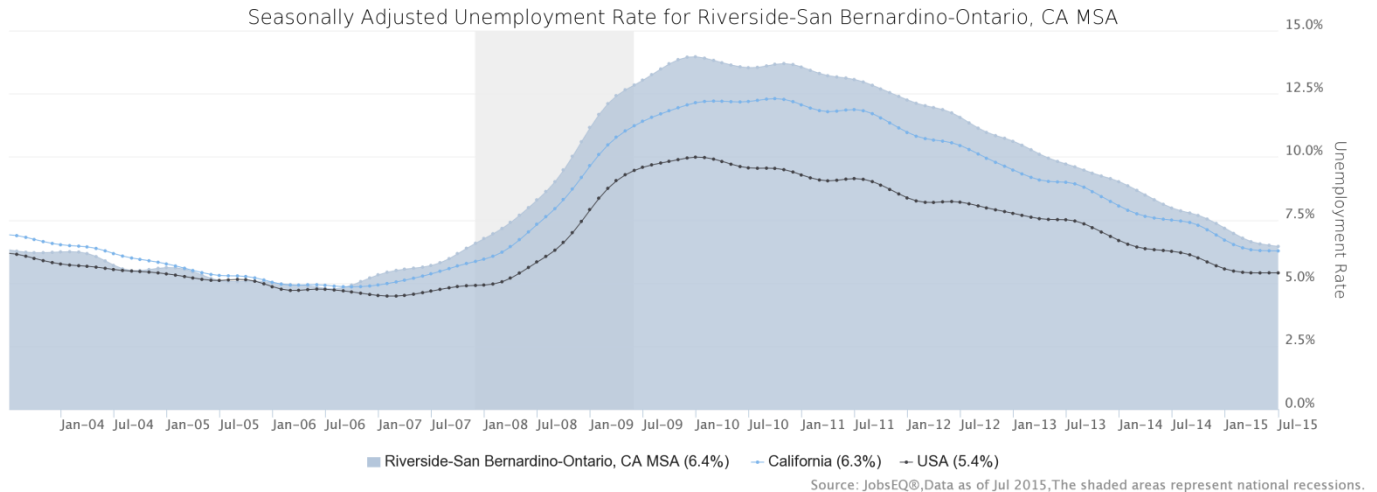
\*\*Wages and salaries include some options that were exercised.

Actual data are through the 2<sup>nd</sup> quarter of 2015.

The Inland Empire's unemployment rate has tracked steadily lower since the beginning of 2011 (seasonally adjusted),<sup>4</sup> and is currently estimated to be 6.4% as of July 2015. The region's unemployment rate peaked at 14.0% in early 2010, has dropped 7.5 percentage points since then, but remains 1.0 percentage point higher than the national unemployment rate.

<sup>4</sup> The seasonal adjustment calculation in JobsEQ is based on a proprietary algorithm designed for online applications. Thus, seasonally adjusted data in JobsEQ may not match exactly with seasonally adjusted data from other sources, such as the Bureau of Labor Statistics (BLS).

**Figure 10: Seasonally Adjusted Unemployment Trends**



## Housing Sector Analysis<sup>5</sup>

The housing sector gained some traction in Riverside and San Bernardino Counties in the first half of 2015. Home sales have increased modestly over the past year, while home prices continue to appreciate, and the number of distressed sales has fallen.<sup>6</sup> The twelve-month moving average of home sales has increased in both Riverside and San Bernardino Counties for six consecutive months beginning in March 2015. Several metrics indicate that the region's distressed housing stock (short-sales, foreclosures, and other non-traditional sales) is becoming a smaller share of overall sales. In fact, foreclosures represented less than 7% of all sales as of August 2015 in both San Bernardino and Riverside Counties after peaking in both counties at more than 60% in the first half of 2009 and housing prices have risen steadily. Additionally, employment in the residential building construction and related industries have posted strong gains during the past three years and are forecast to continue climbing through 2018.

The commercial real estate market has continued to look strong in the past year with vacancies remaining low. The region's commercial sector remains particularly strong in the industrial segment. The industrial vacancy rate for the region was forecast to be 7.2% in the 2<sup>nd</sup> quarter of 2015 compared with a projected vacancy rate of 8.4% in the United States. The Inland Empire

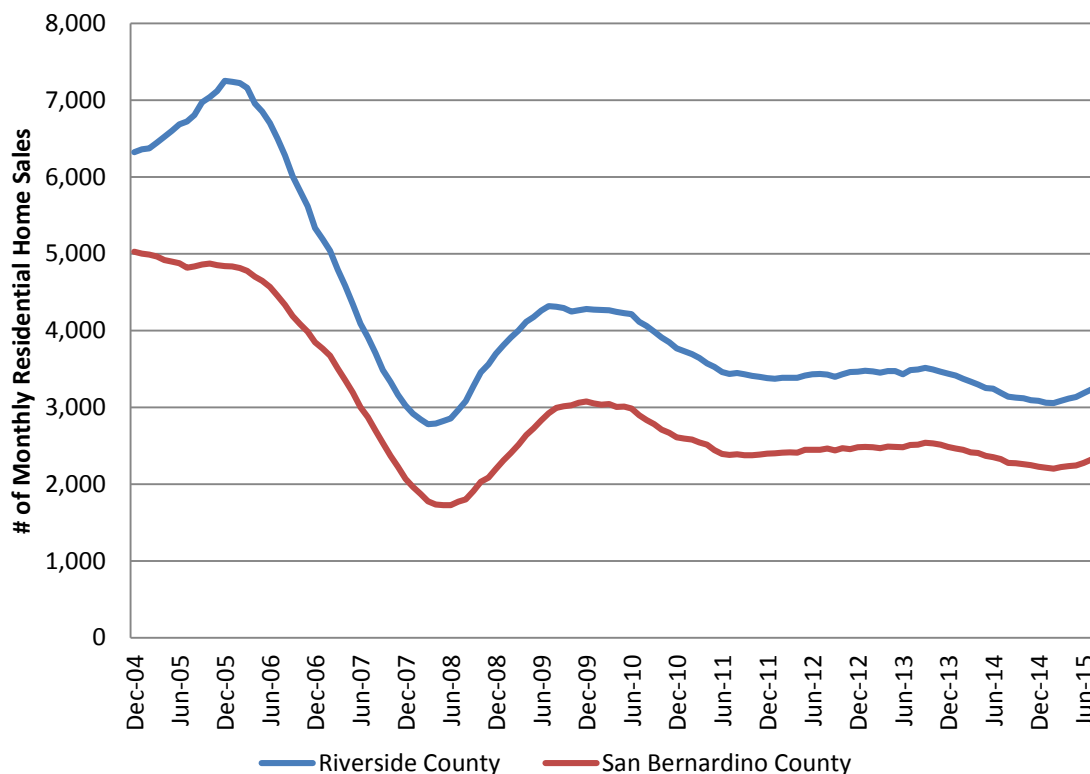
<sup>5</sup> The construction sector as a whole, and the residential building construction industries, played a major role in the Inland Empire's experience of the Great Recession. From peak employment in 2006Q3 to its trough in 2011Q1, the sector declined by more than 70,000 jobs, or approximately 55% of its workforce; the residential building construction industries' workforce contracted by approximately 65%. For this reason, Chmura believes it's critical to assess and evaluate trends in the housing sector across the Inland Empire region as an indicator of the region's continued recovery, post-recession.

<sup>6</sup> Beginning with September 2014 data, housing data, which were previously provided by Data Quick, are provided by CoreLogic. The difference between the two data feeds for recent numbers is modest (i.e., generally between 0-2% for sales).



also benefits from the ultra-low industrial space vacancy rates in Los Angeles (2<sup>nd</sup> quarter 2015 rate was forecast to be 3.6%).<sup>7</sup>

**Figure 11: 12 Month Moving Average Home Sales**



Residential sales in San Bernardino County have moderately increased since the end of 2014 as have sales in neighboring Riverside County. Housing prices (see Figure 14) have continued to increase in both counties, although the rate has slowed in the past year. Additionally, the proportion of distressed sales<sup>8</sup> as a share of overall residential sales in San Bernardino County has fallen to 11.0% as of August 2015, and San Bernardino's current foreclosure rate of 6.8% is the second-lowest monthly rate since 2007. The share of short sales<sup>9</sup> has declined to 4.2% as of August 2015, the second-lowest rate since the beginning of 2008. Chmura expects the

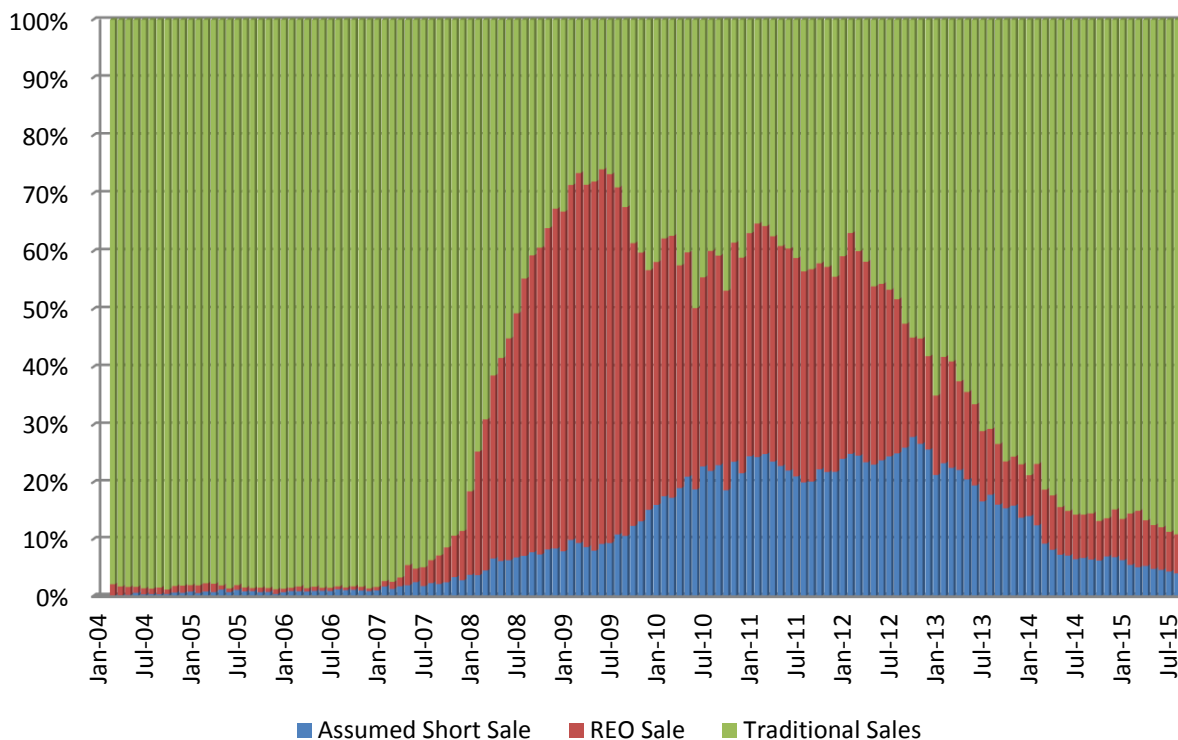
<sup>7</sup> <http://www.realtor.org/sites/default/files/reports/2015/2015-05-commercial-real-estate-outlook-2015-05-29.pdf>

<sup>8</sup> Distressed sales in this analysis include Real Estate Owned property (REO sales) and short sales. REO properties describe homes where the bank has foreclosed on a home with an unpaid mortgage, but failed to sell the property at foreclosure auctions.

<sup>9</sup> Short sales in real estate occur when the sale of real estate falls short of the loans against the property, and the property owner cannot afford to repay the loan amount(s).

twelve-month moving average of home sales in San Bernardino County will be in the range of 2,100 to 2,500 sales per month for the remainder of 2015—which is a level of sales consistent with the region’s household formation fundamentals. While July saw the highest monthly home sales since 2010, a decline from July to August could be the result of tightening inventory of homes for sale or of the impact rising prices have had on affordability.<sup>10</sup> If inventory increases or prices level out, home sales would likely be closer to the high end of the aforementioned range.

**Figure 12: San Bernardino County: Residential Home Sales by Type**

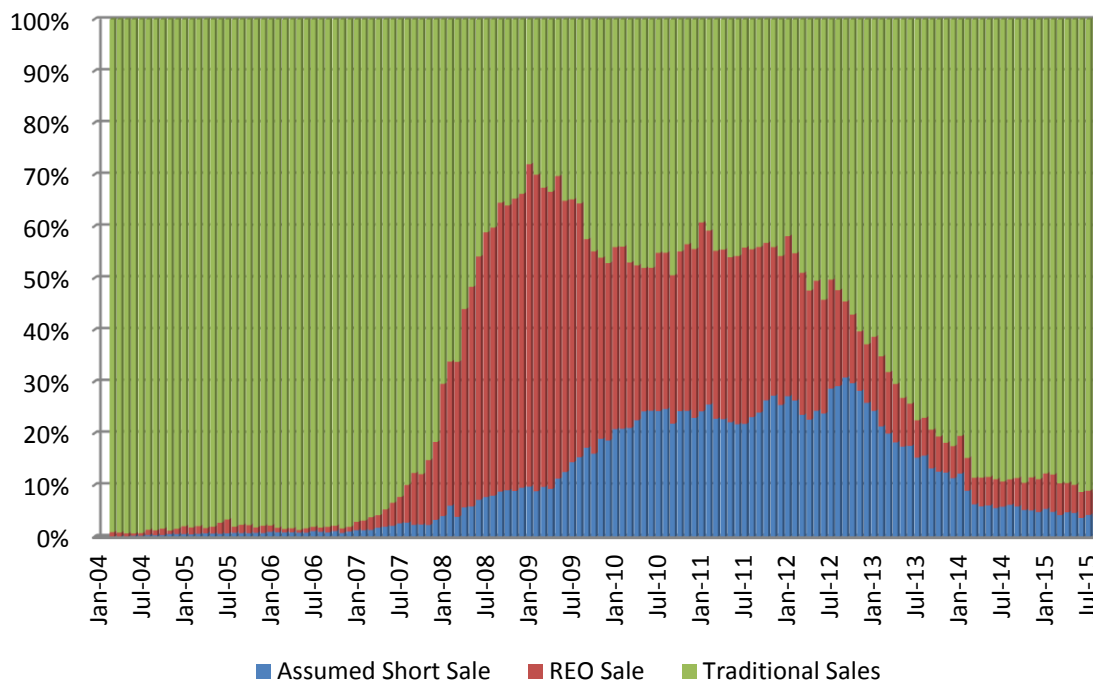


The housing market is slightly stronger in Riverside County than in San Bernardino County. In June 2015, the proportion of distressed sales as a share of overall residential sales declined to single digits in Riverside County for the first time since 2007. The number of foreclosure-based sales has fluctuated between 4% and 8% for the past two years, and currently sits at 4.6%, the lowest rate since June 2007. Short sales made up 4.0% of all sales in August 2015, and have consistently remained under 5% since February 2007. Based on these trends, the share of total distressed sales will likely remain below 10% of all sales in 2016. Chmura expects that the twelve-month moving average of home sales—a simple way to remove the strong seasonality associated with home sales—will hover in the range of 3,000 to 3,300 sales per month for the

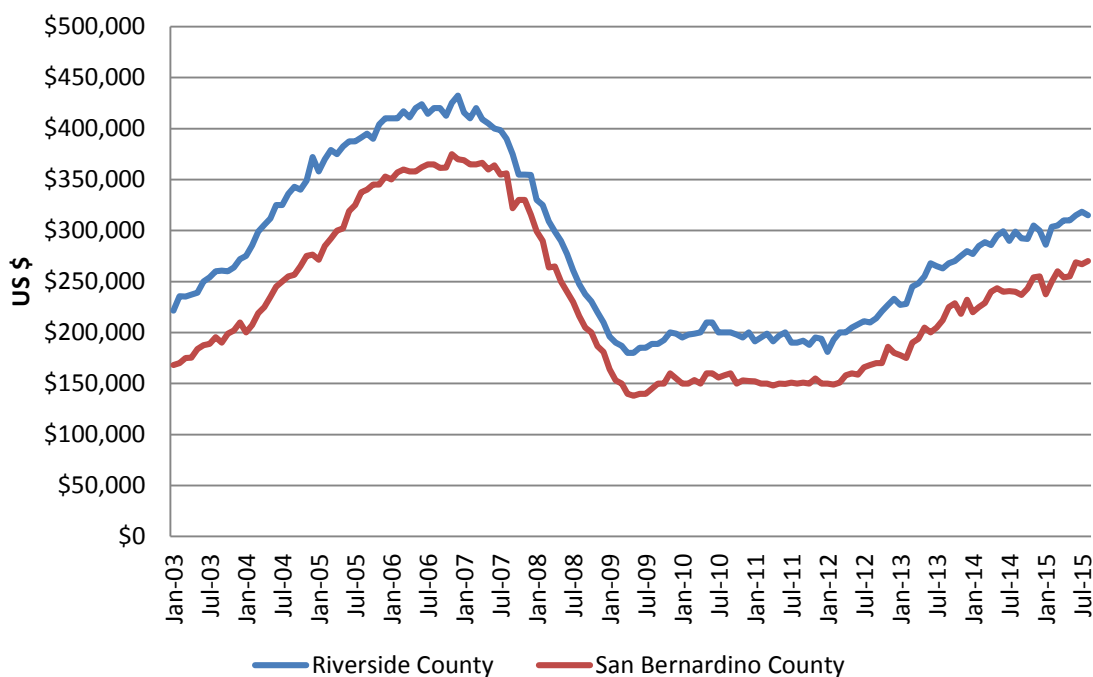
<sup>10</sup> <http://www.sbsun.com/business/20150916/regions-housing-market-maintains-summer-momentum>

remainder of 2015. Home sales may be at the top end of this range if the inventory of homes for sale in Riverside County increases, or if home prices in the county level off.

**Figure 13: Riverside County: Residential Home Sales by Type**



**Figure 14: Median Single Family Home Prices**



## Industry Clusters and Job Creation Potential

A sector scorecard brings together several metrics to assess the relative ability of an industry to drive long-run employment gains. This analysis synthesizes several different employment-related trends to identify those industries that are thriving and likely to continue to thrive in the local economy; thus driving job gains. In particular, this analysis examines the location quotient, the three-year employment growth projection, and the three-year competitiveness score—which indicates if employment (not output) has increased after accounting for national employment trends and the local mix of industries.

Figure 15: Sector Scorecard

	Current			Historical				Forecast	
	Four Quarters Ending with 2015q2			Total Change over the Last 3 Years	Average Annual % Change in Employment 2012q2-2015q2			Next 3-Years	3-Year Analytic
Sector	Employment	Average Annual Wages	LQ	Employment	Riverside-San Bernardino-Ontario, CA MSA	CA	USA	Average Annual Growth Percent	Local Competitiveness
Health Care and Social Assistance	191,716	\$44,996	1.01	51,760	11.1%	10.0%	2.7%	2.9%	✓
Transportation and Warehousing	93,117	\$42,259	1.81	26,610	11.3%	3.4%	2.3%	1.1%	✓
Retail Trade	172,298	\$29,443	1.17	10,332	2.1%	1.9%	1.5%	0.9%	✓
Wholesale Trade	59,950	\$54,498	1.07	10,148	6.4%	2.4%	1.5%	0.6%	✓
Arts, Entertainment, and Recreation	26,118	\$29,481	1.09	-2,309	-2.8%	2.6%	2.3%	1.1%	
Manufacturing	90,727	\$50,223	0.78	5,447	2.1%	0.6%	1.1%	0.0%	
Construction	79,965	\$51,349	1.31	19,890	10.0%	6.2%	4.0%	2.6%	✓
Utilities	9,546	\$76,715	1.24	-335	-1.1%	-0.3%	0.1%	0.2%	✓
<b>Total All Industries</b>	<b>1,312,921</b>	<b>\$41,682</b>	<b>1.00</b>	<b>145,837</b>	<b>4.0%</b>	<b>2.8%</b>	<b>1.9%</b>	<b>1.4%</b>	
Source: JobsEQ®									

Based on this analysis, six sectors—health care and social assistance, transportation and warehousing, retail trade, construction, wholesale trade, and utilities—have particularly good prospects for driving future job growth in the Inland Empire.<sup>11</sup> While this analysis is a quantitative way to assess a sector’s employment “health” as well as potential to drive future job growth, it is not a suitable methodology for assessing the long-run output (economic value measured in gross domestic product calculations) of a firm or sector, nor is it a reliable proxy for the underlying profitability of individual firms operating within the sector. Within these six sectors are 20 separate industries (4-digit NAICS) that have strong growth potential after factoring in the same criteria—long-run growth rates, high location quotient, three-year job gains, and three-year competitiveness.

**Figure 16: Industries with High Job-Creating Potential**

		Current			Historical				Forecast		
		Four Quarters Ending with 2015q2			Total Change	Average Annual % Change in Employment 2012q2-2015q2			Over the Next 3 Years		
NAICS	Industry	Employment	Average Annual Wages	LQ	3-Year Employment	Riverside-San Bernardino-Ontario, CA MSA	CA	USA	Total Approx. Replacement Demand	Total Employment Change	Average Annual Growth Percent
4931	Warehousing and Storage	39,266	\$36,968	5.32	18,505	23.7%	7.6%	5.1%	3,061	2,011	1.7%
6241	Individual and Family Services	45,170	\$12,512	2.07	38,360	87.9%	67.7%	15.7%	2,350	6,427	4.5%
6211	Offices of Physicians	29,499	\$79,346	1.22	3,373	4.1%	2.2%	1.9%	1,775	2,382	2.6%
2382	Building Equipment Contractors	18,140	\$53,502	1.02	4,737	10.6%	7.3%	4.1%	1,071	1,517	2.7%
2381	Foundation, Structure, and Building Exterior Contractors	15,672	\$41,758	2.14	4,855	13.2%	7.6%	4.6%	945	1,229	2.5%
2383	Building Finishing Contractors	14,315	\$37,934	2.10	4,817	14.7%	7.9%	4.7%	817	758	1.7%
6212	Offices of Dentists	10,013	\$42,116	1.18	753	2.6%	2.1%	1.9%	630	812	2.6%
4244	Grocery and Related Product Merchant Wholesalers	9,192	\$55,518	1.31	2,052	8.8%	2.3%	1.1%	629	335	1.2%
2361	Residential Building Construction	8,323	\$44,178	1.30	2,648	13.6%	6.7%	5.6%	509	1,072	4.1%
2389	Other Specialty Trade Contractors	7,713	\$53,298	1.36	1,872	9.7%	5.7%	4.2%	485	715	3.0%

<sup>11</sup> In the retail sector, only 4-digit industries with above-average wages were included. The five industries in this sector with wages which exceeded the average annual wage for the MSA are: automobile dealers (4411), other motor vehicle dealers (4412), electronics and appliance stores (4431), electronic shopping and mail-order houses (4541), and direct selling establishments (4543).

2371	Utility System Construction	5,674	\$78,876	1.26	1,576	11.5%	4.1%	4.7%	379	491	2.8%
2213	Water, Sewage and Other Systems	4,317	\$62,317	2.17	101	0.8%	0.4%	0.4%	328	214	1.6%

4239	Miscellaneous Durable Goods Merchant Wholesalers	4,153	\$40,039	1.47	446	3.9%	-0.8%	-0.2%	299	266	2.1%
4881	Support Activities for Air Transportation	2,720	\$46,232	1.26	663	9.8%	4.8%	2.5%	215	208	2.5%
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	3,005	\$57,263	1.32	624	8.1%	1.0%	2.4%	202	107	1.2%
4854	School and Employee Bus Transportation	2,695	\$28,857	1.15	88	1.1%	2.0%	1.4%	182	146	1.8%
6239	Other Residential Care Facilities	1,998	\$30,401	1.22	93	1.6%	-0.5%	0.0%	145	139	2.3%
4235	Metal and Mineral (except Petroleum)	1,748	\$60,499	1.44	393	8.9%	1.0%	2.5%	118	62	1.2%
2372	Land Subdivision	968	\$97,530	2.42	48	1.7%	0.1%	-1.3%	63	34	1.2%
4889	Other Support Activities for	767	\$32,579	2.48	442	33.1%	10.5%	3.1%	57	43	1.8%

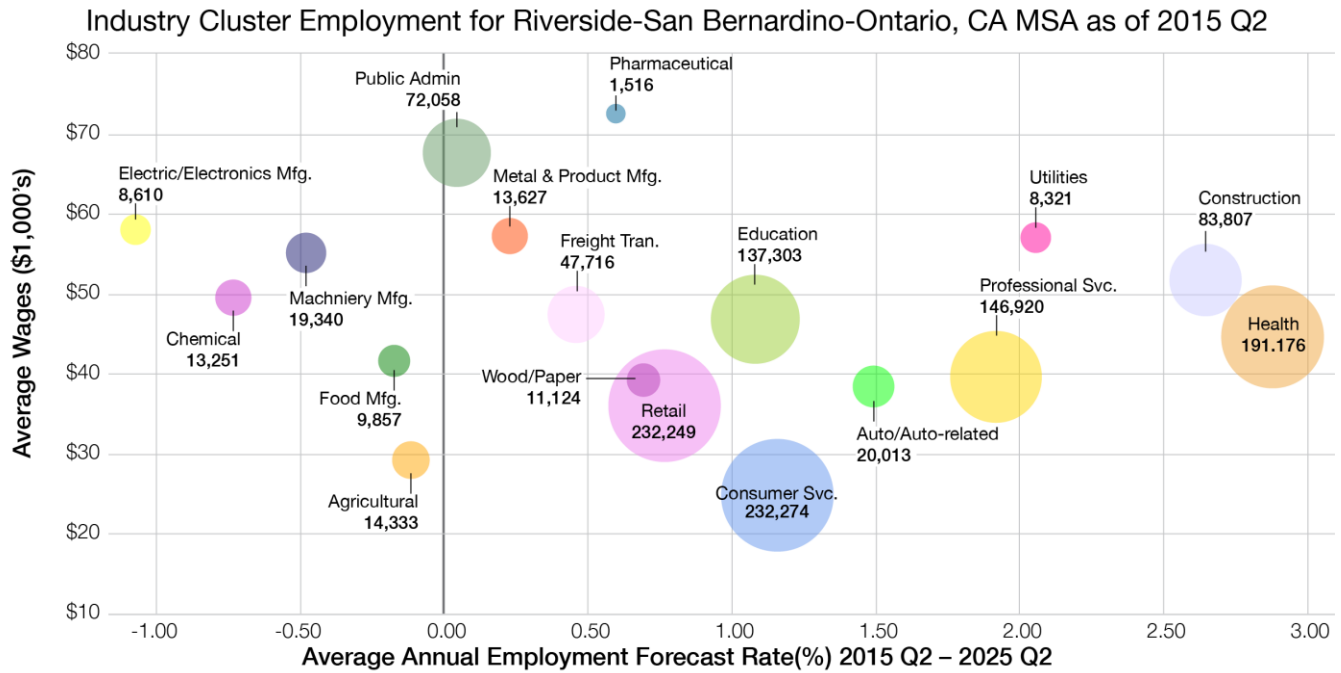
Source: JobsEQ®

In Chmura's long-run growth model, the Inland Empire has three industry clusters that are likely to expand employment in excess of 2.0% per year over the next decade.<sup>12</sup> These industries—utilities, healthcare, and construction<sup>13</sup>—represent approximately one-fifth of the total employment in the region and are likely to expand faster than the overall pace of job growth in California.

<sup>12</sup> Last year's report showed four clusters with projected average annual employment growth exceeding 2.5% from 2014 to 2024. Ten-year average annual projected employment growth has been revised downward for all four of these clusters based on revised population projections.

<sup>13</sup> It should be noted that while construction activity in the region has been increasing and is forecasted to grow at a relatively rapid rate, employment in the construction sector as of 2015Q2 was approximately 62% of its peak levels in 2006Q3 (79,965 workers vs. 130,509).

**Figure 17: Riverside-San Bernardino-Ontario, CA MSA Industrial Clusters (scaled by employment)**



## Workforce Alignment Analysis and Outlook

Over the next ten years, job growth in the Inland Empire is expected to be reasonably balanced with greater than 1% annual expansions across job cohorts, regardless of educational requirements. The fastest growth is expected for jobs requiring a postgraduate degree followed by jobs requiring a 2-year degree or certificate and jobs requiring long-term training, no experience, no award. While the relatively strong growth rates for jobs requiring a high school diploma or less is at odds with state trends—which is seeing more of a skill-bias in job creation—the region’s average annual wages and unemployment rates by education level mirror the norms of the state and the nation.

**Figure 18: Employment Growth by Education Level**

	Regional Employment Q2 2015	Average Annual Salary Q2 2015	Average Annual Growth Rate Next 10 Years
Postgraduate	47,764	\$100,700	1.9%
Bachelor's degree	198,525	\$ 77,800	1.5%
2-Year degree or certificate	128,220	\$ 53,900	1.8%
Previous work experience, no award	94,040	\$ 50,900	1.3%



Long-term training, no exp, no award	73,454	\$ 48,000	1.7%
Moderate-term OJT, no exp, no award	157,930	\$ 43,900	1.1%
Short-term OJT, no exp, no award	612,989	\$28,100	1.3%

Source: JobsEQ®

## High-Level Workforce Alignment Metrics

While estimated occupational deficits over the next ten years vary somewhat across the Inland Empire in terms of the level of education required, the majority of the occupations (at the 6-digit SOC code level) with the highest projected gaps over this period do not require postsecondary education.<sup>14</sup> In the case of gaps related to positions that require only short-term on-the-job training, it is likely that the Inland Empire economy will not suffer from widespread skill-shortages. These gaps will likely be filled by transitioning workers from some of the region's declining industries—such as low-value-added food service industries—into the higher-level service sector jobs that are likely to be growing rapidly over the next decade—such as home-health aides as shown in the chart below.

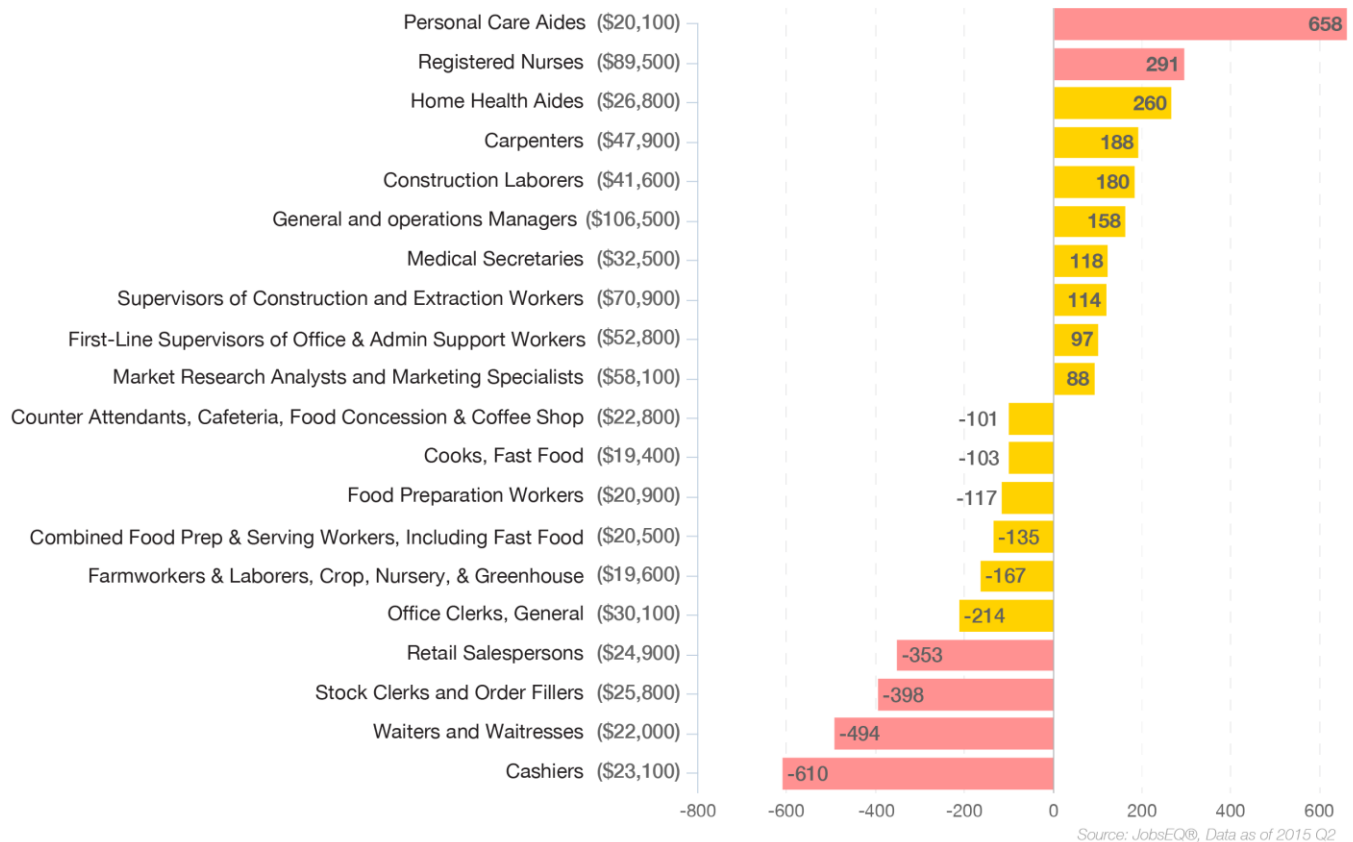
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<sup>14</sup> This is a change from last year's report in which the majority of occupations at the 6-digit SOC code level with the highest projected gaps over this period required postsecondary education. Several of the occupations with the largest projected gaps identified in last year's report were elementary and secondary teaching occupations. A change in the employment forecast for NAICS 6111, elementary and secondary schools, likely explains why there is no longer expected to be gaps for these positions over the next decade.

**Figure 19: Inland Empire Long-Run Potential Occupational Gap**

### Occupation Gaps

Potential Occupation Gaps over 10 Years in Riverside-San Bernardino-Ontario, CA MSA



At the major occupation group level (2-digit SOC), the Inland Empire has a shortfall in the number of awards (graduates) by the region's postsecondary schools. This is not uncommon but can be particularly challenging, especially for areas with below-average postsecondary educational attainment. Taking into account the size of the regional economy and the industry mix of the area, the Inland Empire region falls short in the number of recent postsecondary awards across several major occupational groups. For example, in the 2013-2014 academic year, 712 awards were produced by postsecondary schools in the Inland Empire region related to occupations in the business and financial operations field. Given the region's current employment in these occupations, however, this award production fell short of the national norm relative to the number employed in the region by 1,059 awards. Likewise, award production in the Inland Empire region fell short by 408 awards related to architectural and engineering occupations and was short by 3,123 awards for education, training, and library occupations. In other words, for the region to maintain a properly trained employment base, new workers for these occupations would need to be "imported" from schools outside the region. This "import" of trained individuals includes residents of the area who may move outside the region to be educated and then choose to move back for employment once their studies are completed.

**Figure 20: Broad-Level Educational Alignment Analysis**

Occupation	2015Q2 Employment	Awards (2013- 2014)	Training Concentration <sup>1</sup>	Short-Run Supply & Demand Analysis	Max Annual Shortfall
Management	50,468	6,271	122%	↔ Equilibrium	-
Business and Financial Operations	45,661	712	40%	↓ Under-Supply	1,059
Computer and Mathematical	20,239	1,030	110%	↔ Equilibrium	-
Architecture and Engineering	11,907	510	56%	↓ Under-Supply	408
Life, Physical, and Social Science	6,962	944	90%	↓ Under-Supply	109
Community and Social Service	22,443	1,914	66%	↓ Under-Supply	966
Legal	5,704	202	55%	↓ Under-Supply	167
Education, Training, and Library	76,623	4,878	61%	↓ Under-Supply	3,123
Arts, Design, Entertainment, Sports, and Media	11,541	1,628	98%	↓ Under-Supply	29
Healthcare Practitioners and Technical	61,613	4,000	92%	↓ Under-Supply	336

Source: JobsEQ®

<sup>1</sup> Training concentration is the comparison of the local rate of degree production to the national average. 100% is equal to the average rate of degree production in the nation for a particular occupation. For example, 110% is 10% above average, 50% is half the national average, and so on.

## Key Occupations

Chmura identified key occupations that generally require an associate's degree or postsecondary non-degree award as typical education for entry. Only occupations with average annual wages near or above the Inland Empire's average are included in this analysis. The occupations were ordered by total annual demand. In addition, the average annual growth rate over the next three years is included to help identify occupations that are expected to have the fastest employment growth over this period in the Inland Empire. Finally, Science, Technology, Engineering, and Mathematics (STEM) occupations were identified; these jobs typically pay relatively high wages and many do not require a bachelor's degree.

### Relevant factors:<sup>15</sup>

<sup>15</sup> A complete definition of the data utilized in this section is in the appendix.

**Average Annual Wages:** This factor identifies occupations with wages near or above the region's average annual wage of \$41,682. The average annual wage for the Inland Empire is close to the living wage for San Bernardino County.<sup>16</sup>

**STEM:** This factor identifies jobs classified as STEM occupations based on a definition from the U.S. Department of Commerce.

This analysis yielded 68 occupations (44 occupations typically requiring an associate's degree for entry and 24 occupations typically requiring a postsecondary non-degree award) that pay wages near or above average (see Figures 21a and 21b).

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<sup>16</sup> Based on Massachusetts Institute of Technology's Living Wage Calculator, the living wage for the county varies from \$11.59/hour (roughly \$24,000 per year) for a one adult household to \$34.63/hour (about \$72,000 per year) for a household with one adult and three children. The living wage for a two adult (one working), two child household is \$24.25/hour (approximately \$50,000 per year). <http://livingwage.mit.edu/counties/06071>

**Figure 21a and 21b: Occupations with Above Average Wages**

The table below includes occupations with associate's degrees as a typical entry-level education requirement; it is rank-ordered based on the "Total Annual Demand" column.

SOC	Title	Current Employment	Average Annual Wages	Annual Replacement Demand	Total Annual Demand	Baseline Annual Supply Gap (or Surplus)	Previous Work Experience	Typical On-the-Job Training	Average Annual Growth Percent Over the Next Three Years	Unemployed	Unemployment Rate	STEM
29-1141	Registered Nurses	23,018	\$89,500	420	872	291	None	None	1.9%	702	2.7%	
29-2021	Dental Hygienists	2,227	\$90,500	51	123	52	None	None	3.1%	84	3.1%	
29-2012	Medical and Clinical Laboratory Technicians	1,380	\$40,800	33	73	25	None	None	2.9%	100	5.9%	
29-2034	Radiologic Technologists	1,751	\$63,200	23	61	20	None	None	2.1%	73	3.5%	
23-2011	Paralegals and Legal Assistants	1,287	\$50,300	20	44	-11	None	None	1.8%	128	6.1%	
31-2021	Physical Therapist Assistants	557	\$62,200	11	31	15	None	None	3.5%	36	4.9%	
29-1126	Respiratory Therapists	969	\$66,900	13	31	8	None	None	1.8%	42	3.6%	
29-2032	Diagnostic Medical Sonographers	548	\$70,800	7	30	21	None	None	4.1%	23	3.4%	
15-1134	Web Developers	604	\$63,800	11	24	9	None	None	2.1%	34	3.8%	
15-1152	Computer Network Support Specialists	1,019	\$65,700	16	24	-2	None	None	0.8%	106	7.4%	
19-4099	Life, Physical, and Social Science Technicians, All Other	444	\$52,500	17	23	1	None	None	1.2%	46	7.7%	✓
49-9062	Medical Equipment Repairers	352	\$54,900	10	22	9	None	Moderate-term on-the-job	3.2%	17	3.8%	
17-3023	Electrical and Electronic Engineering Technicians	822	\$61,600	17	19	-6	None	None	0.3%	75	5.8%	✓
29-2031	Cardiovascular Technologists and Technicians	448	\$52,600	6	19	10	None	None	2.9%	17	3.2%	

SOC	Title	Current Employment	Average Annual Wages	Annual Replacement Demand	Total Annual Demand	Baseline Annual Supply Gap (or Surplus)	Previous Work Experience	Typical On-the-Job Training	Average Annual Growth Percent Over the Next Three Years	Unemployed	Unemployment Rate	STEM
19-4091	Environmental Science and Protection Technicians, Including Health	258	\$50,800	10	15	3	None	None	2.0%	26	7.6%	✓
31-2011	Occupational Therapy Assistants	242	\$64,500	5	14	7	None	None	3.7%	9	2.9%	
19-4093	Forest and Conservation Technicians	310	\$42,600	14	13	-6	None	None	-0.2%	47	12.4%	✓
19-4031	Chemical Technicians	361	\$42,800	9	13	1	None	Moderate-term on-the-job	1.1%	30	5.7%	✓
53-2021	Air Traffic Controllers	239	\$126,900	11	12	-1	None	Long-term on-the-job training	0.5%	18	6.5%	
17-3022	Civil Engineering Technicians	534	\$61,500	11	11	-6	None	None	0.0%	57	7.6%	✓
17-3029	Engineering Technicians, Except Drafters, All Other	469	\$66,100	10	11	-3	None	None	0.4%	46	6.9%	✓
17-3026	Industrial Engineering Technicians	428	\$51,700	10	11	-4	None	None	0.1%	35	5.4%	✓
29-2035	Magnetic Resonance Imaging Technologists	292	\$77,000	4	11	4	Less than 5 years	None	2.3%	13	3.5%	
17-3011	Architectural and Civil Drafters	624	\$56,700	9	10	-5	None	None	0.3%	54	6.0%	✓
17-3013	Mechanical Drafters	455	\$53,600	9	9	-5	None	None	-0.1%	35	5.6%	✓
17-3027	Mechanical Engineering Technicians	269	\$53,300	6	8	-1	None	None	0.8%	24	5.8%	✓
29-1124	Radiation Therapists	147	\$102,000	3	6	2	None	None	2.2%	8	4.8%	
19-4061	Social Science Research Assistants	110	\$47,800	4	6	0	None	None	1.8%	12	6.9%	
29-2033	Nuclear Medicine	183	\$96,600	2	6	2	None	None	2.0%	7	3.3%	

SOC	Title	Current Employment	Average Annual Wages	Annual Replacement Demand	Total Annual Demand	Baseline Annual Supply Gap (or Surplus)	Previous Work Experience	Typical On-the-Job Training	Average Annual Growth Percent Over the Next Three Years	Unemployed	Unemployment Rate	STEM
39-4031	Morticians, Undertakers, and Funeral Directors	171	\$74,500	4	6	1	None	Long-term on-the-job training	1.4%	13	6.0%	
17-3012	Electrical and Electronics Drafters	199	\$60,200	3	5	1	None	None	1.3%	17	6.1%	✓
17-3025	Environmental Engineering Technicians	132	\$51,300	3	5	1	None	None	1.9%	12	6.3%	✓
49-2091	Avionics Technicians	133	\$66,400	3	4	0	None	None	1.3%	12	5.7%	
27-4012	Broadcast Technicians	124	\$51,500	3	4	-1	None	Short-term on-the-job training	0.8%	19	7.8%	
17-3019	Drafters, All Other	121	\$51,800	2	3	1	None	None	1.5%	11	6.5%	✓
49-2021	Radio, Cellular, and Tower Equipment Installers and Repairers	115	\$47,700	2	3	0	None	Moderate-term on-the-job training	1.1%	12	7.7%	
11-9061	Funeral Service Managers	56	\$56,200	1	2	1	Less than 5 years	None	1.5%	2	2.3%	
19-4051	Nuclear Technicians	48	\$82,500	2	2	0	None	Moderate-term on-the-job	1.6%	2	2.7%	✓
29-2054	Respiratory Therapy Technicians	88	\$60,600	1	2	1	None	Moderate-term on-the-job	1.7%	4	3.9%	
17-3024	Electro-Mechanical Technicians	79	\$57,600	2	2	0	None	None	0.6%	8	6.3%	✓
19-4041	Geological and Petroleum Technicians	43	\$59,900	1	2	0	None	Moderate-term on-the-job	1.6%	7	9.4%	✓
43-9031	Desktop Publishers	70	\$43,900	2	2	-1	None	Short-term on-the-job training	0.1%	11	9.9%	
17-3021	Aerospace Engineering and Operations Technicians	50	\$64,800	1	1	-2	None	None	0.5%	6	5.5%	✓
49-9061	Camera and Photographic Equipment Repairers	27	\$42,300	1	1	0	None	Long-term on-the-job training	1.0%	2	4.3%	



Source: JobsEQ®  
Data as of 2015Q2

The table below includes occupations with Postsecondary non-degree awards as a typical entry-level education requirement; it is rank-ordered based on the “Total Annual Demand” column.

SOC	Title	Current Employment	Average Annual Wages	Annual Replacement Demand	Total Annual Demand	Baseline Annual Supply Gap (or Surplus)	Previous Work Experience	Typical On-the-Job Training	Average Annual Growth Percent Over the Next Three Years	Unemployed	Unemployment Rate	STEM
53-3032	Heavy and Tractor-Trailer Truck Drivers	26,039	\$47,500	431	783	62	None	Short-term on-the-job training	1.3%	2,388	8.0%	
29-2061	Licensed Practical and Licensed Vocational	5,913	\$48,000	133	278	48	None	None	2.4%	482	6.3%	
33-2011	Firefighters	3,795	\$58,800	101	130	-21	None	Long-term on-the-job training	0.7%	469	9.7%	
49-9021	Heating, Air Conditioning, and	2,583	\$50,100	66	128	18	None	Long-term on-the-job training	2.3%	306	8.9%	
51-1011	First-Line Supervisors of Production and Operating Workers	5,036	\$53,900	81	99	-27	Less than 5 years	None	0.4%	360	5.4%	
29-2071	Medical Records and Health Information Technicians	1,645	\$45,100	40	78	12	None	None	2.2%	198	9.0%	
31-9011	Massage Therapists	752	\$41,400	13	38	17	None	None	3.3%	60	6.1%	
33-1021	First-Line Supervisors of Fire Fighting and Prevention Workers	757	\$103,200	32	38	-4	Less than 5 years	Moderate-term on-the-job training	0.8%	26	2.9%	
49-3011	Aircraft Mechanics and Service Technicians	897	\$59,300	24	36	1	None	None	1.3%	39	3.0%	

SOC	Title	Current Employment	Average Annual Wages	Annual Replacement Demand	Total Annual Demand	Baseline Annual Supply Gap (or Surplus)	Previous Work Experience	Typical On-the-Job Training	Average Annual Growth Percent Over the Next Three Years	Unemployed	Unemployment Rate	STEM
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	1,481	\$59,500	21	35	-2	None	Moderate-term on-the-job training	0.9%	138	6.6%	
29-2055	Surgical Technologists	868	\$48,800	8	33	13	None	None	2.8%	49	4.5%	
27-4011	Audio and Video Equipment Technicians	399	\$42,100	8	16	3	None	Short-term on-the-job training	2.0%	67	8.8%	
31-9094	Medical Transcriptionists	515	\$48,000	11	15	-5	None	None	0.9%	25	3.8%	
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	506	\$58,700	10	14	-2	None	Long-term on-the-job training	0.8%	47	6.6%	
49-2097	Electronic Home Entertainment Equipment Installers and	238	\$45,100	10	11	-4	None	None	0.4%	31	9.2%	
29-2053	Psychiatric Technicians	781	\$57,400	8	9	-13	None	Short-term on-the-job training	0.2%	48	5.4%	
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	179	\$81,800	4	4	-2	None	Long-term on-the-job training	0.3%	8	3.7%	
49-2092	Electric Motor, Power Tool, and Related Repairers	170	\$49,500	4	4	-3	None	Long-term on-the-job training	-0.1%	17	7.4%	
23-2091	Court Reporters	139	\$82,900	2	3	0	None	Short-term on-the-job training	0.8%	10	5.8%	
49-2093	Electrical and Electronics Installers and Repairers,	78	\$57,300	2	2	0	None	Long-term on-the-job training	0.8%	6	6.3%	
13-1032	Insurance Appraisers, Auto Damage	62	\$53,300	2	2	-1	None	Moderate-term on-the-job training	-0.2%	0	n/a	

SOC	Title	Current Employment	Average Annual Wages	Annual Replacement Demand	Total Annual Demand	Baseline Annual Supply Gap (or Surplus)	Previous Work Experience	Typical On-the-Job Training	Average Annual Growth Percent Over the Next Three Years	Unemployed	Unemployment Rate	STEM
27-4014	Sound Engineering Technicians	57	\$55,500	1	2	0	None	Short-term on-the-job training	0.7%	13	6.6%	
49-9092	Commercial Divers	29	\$53,200	1	2	-4	None	Moderate-term on-the-job training	3.1%	5	12.8%	
39-4011	Embalmers	25	\$45,300	1	1	-1	None	Short-term on-the-job training	-1.3%	5	14.6%	

Source: JobsEQ®  
Data as of 2015Q2

## 22a and 22b: Skills, Attributes, and Certifications Required for Occupations with Above Average Wages

The table below includes skill, attribute, and certification requirements for occupations with associate's degrees as a typical entry-level education requirement; it is rank-ordered based on the "Total Annual Demand" column.

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
29-1141	Registered Nurses	872	Active Listening; Social Perceptiveness; Speaking; Service Orientation; Reading Comprehension	Oral Comprehension; Oral Expression; Problem Sensitivity; Written Comprehension; Deductive Reasoning	172 including Acute Care Nurse Practitioner; Nurse Manager and Leader; and Certified Registered Nurse First Assistant.
29-2021	Dental Hygienists	123	Speaking; Active Listening; Critical Thinking; Writing; Monitoring	Problem Sensitivity; Near Vision; Oral Comprehension; Oral Expression; Finger Dexterity	Certified Dental Technician; Board Certified in Biofeedback
29-2012	Medical and Clinical Laboratory Technicians	73	Active Listening; Reading Comprehension; Speaking; Critical Thinking; Science	Near Vision; Oral Expression; Problem Sensitivity; Information Ordering; Oral Comprehension	27 including Medical Laboratory Technician; Physician Office Laboratory Technician; and Medical Lab Assistant

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
29-2034	Radiologic Technologists	61	Active Listening; Speaking; Reading Comprehension; Writing; Social Perceptiveness	Oral Comprehension; Oral Expression; Problem Sensitivity; Written Comprehension; Written Expression	33 including Critical Care Ultrasonography; Certified Electroencephalographic Technologists; and Radiological Technologist
23-2011	Paralegals and Legal Assistants	44	Reading Comprehension; Active Listening; Writing; Speaking; Critical Thinking	Oral Comprehension; Written Comprehension; Oral Expression; Written Expression; Near Vision	13 including GIAC Legal Issues; Professional Paralegal; and Certified Paralegal
31-2021	Physical Therapist Assistants	31	Active Listening; Speaking; Monitoring; Social Perceptiveness; Service Orientation	Oral Comprehension; Oral Expression; Written Comprehension; Problem Sensitivity; Speech Clarity	7 including Occupational Therapist Registered; Functional Training Specialty Certification; and Wound Care Certified
29-1126	Respiratory Therapists	31	Active Listening; Critical Thinking; Monitoring; Speaking; Reading Comprehension	Oral Expression; Problem Sensitivity; Inductive Reasoning; Oral Comprehension; Deductive Reasoning	9 including Certified Respiratory Therapist; Registered Respiratory Therapist; and Certificate of Completion: Bronchoscopy
29-2032	Diagnostic Medical Sonographers	30	Active Listening; Reading Comprehension; Speaking; Social Perceptiveness; Critical Thinking	Oral Comprehension; Written Comprehension; Oral Expression; Problem Sensitivity; Near Vision	27 including Sonography Principles and Instrumentation; Registered Technologist - Radiography; and Registered Technologist - Sonography
15-1134	Web Developers	24	Programming; Critical Thinking; Operations Analysis; Reading Comprehension; Active Listening	Deductive Reasoning; Problem Sensitivity; Oral Comprehension; Written Comprehension; Information Ordering	137 including Web Application Developer Associate and Certified Usability Analyst
15-1152	Computer Network Support Specialists	24	Critical Thinking; Active Listening; Reading Comprehension; Judgment and Decision Making; Speaking	Oral Comprehension; Problem Sensitivity; Deductive Reasoning; Oral Expression; Inductive Reasoning	233 including Administering and Deploying System Center Configuration Manager and Network Technology Associate
19-4099	Life, Physical, and Social Science Technicians, All Other	23	Quality Control Analysis; Reading Comprehension; Active Listening; Monitoring; Complex Problem Solving	Oral Comprehension; Near Vision; Written Comprehension; Oral Expression; Written Expression	N/A

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
49-9062	Medical Equipment Repairers	22	Equipment Maintenance; Troubleshooting; Repairing; Operation Monitoring; Quality Control Analysis	Problem Sensitivity; Finger Dexterity; Deductive Reasoning; Near Vision; Inductive Reasoning	6 including Biomedical Imaging Electronics Technician and Certified Radiology Equipment Specialist
17-3023	Electrical and Electronic Engineering Technicians	19	Reading Comprehension; Critical Thinking; Complex Problem Solving; Active Listening; Speaking	Problem Sensitivity; Oral Comprehension; Written Comprehension; Deductive Reasoning; Inductive Reasoning	29 including Certified Quality Technician; Industrial Electronics; and Certified Technology Manager
29-2031	Cardiovascular Technologists and Technicians	19	Active Listening; Speaking; Critical Thinking; Monitoring; Operation Monitoring	Problem Sensitivity; Oral Comprehension; Oral Expression; Near Vision; Deductive Reasoning	21 including Clinical Research Assistant; EKG Technician; and Registered Pulmonary Function Technologist
19-4091	Environmental Science and Protection Technicians, Including	15	Reading Comprehension; Active Listening; Writing; Speaking; Critical Thinking	Written Comprehension; Oral Comprehension; Oral Expression; Written Expression; Problem Sensitivity	75 including Wastewater Lab Analyst and Certified Safety Professional
31-2011	Occupational Therapy Assistants	14	Active Listening; Speaking; Reading Comprehension; Writing; Social Perceptiveness	Oral Expression; Oral Comprehension; Problem Sensitivity; Written Comprehension; Written Expression	11 including Certified Occupational Therapy Assistant and Occupational Therapist Registered
19-4093	Forest and Conservation Technicians	13	Critical Thinking; Active Listening; Reading Comprehension; Speaking; Judgment and Decision Making	Oral Comprehension; Deductive Reasoning; Near Vision; Written Comprehension; Oral Expression	Certified Forester and Forest Certification Auditor
19-4031	Chemical Technicians	13	Science; Reading Comprehension; Critical Thinking; Monitoring; Active Listening	Oral Comprehension; Written Comprehension; Information Ordering; Deductive Reasoning; Inductive Reasoning	21 including Concrete Field Testing and Wastewater Lab Analyst
53-2021	Air Traffic Controllers	12	Active Listening; Speaking; Critical Thinking; Judgment and Decision Making; Monitoring	Problem Sensitivity; Oral Comprehension; Oral Expression; Selective Attention; Deductive Reasoning	Professional Traffic Operations Engineer
17-3022	Civil Engineering Technicians	11	Reading Comprehension; Active Listening; Critical Thinking; Writing; Speaking	Near Vision; Oral Comprehension; Oral Expression; Written Comprehension; Written Expression	45 including Adhesive Anchor Installer; Certified Technology Manager; and Corrosion Technician

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
17-3029	Engineering Technicians, Except Drafters, All Other	11	Reading Comprehension; Critical Thinking; Monitoring; Quality Control Analysis; Active Listening	Problem Sensitivity; Near Vision; Oral Comprehension; Deductive Reasoning; Information Ordering	N/A
17-3026	Industrial Engineering Technicians	11	Reading Comprehension; Active Listening; Critical Thinking; Complex Problem Solving; Monitoring	Oral Comprehension; Problem Sensitivity; Deductive Reasoning; Inductive Reasoning; Written Comprehension	29 including Certified Quality Process Technician and Certified Technical Professional
29-2035	Magnetic Resonance Imaging Technologists	11	Active Listening; Reading Comprehension; Operation Monitoring; Speaking; Monitoring	Oral Comprehension; Oral Expression; Near Vision; Written Comprehension; Problem Sensitivity	17 including Certification in Magnetic Resonance Imaging Physics and Registered Radiologist Assistant
17-3011	Architectural and Civil Drafters	10	Active Listening; Critical Thinking; Reading Comprehension; Speaking; Judgment and Decision Making	Visualization; Near Vision; Problem Sensitivity; Oral Comprehension; Deductive Reasoning	7 including Architectural Apprentice Drafter; Data Center Design Consultant; and High-Performance Building Design
17-3013	Mechanical Drafters	9	Active Learning; Active Listening; Speaking; Mathematics; Critical Thinking	Mathematical Reasoning; Near Vision; Oral Comprehension; Written Expression; Deductive Reasoning	5 including Mechanical Certified Drafter and LEED Green Associate
17-3027	Mechanical Engineering Technicians	8	Reading Comprehension; Active Listening; Critical Thinking; Operation Monitoring; Speaking	Oral Comprehension; Problem Sensitivity; Deductive Reasoning; Written Comprehension; Oral Expression	17 including Certified Technology Manager and Certified Systems Engineering Professional
29-1124	Radiation Therapists	6	Reading Comprehension; Active Listening; Critical Thinking; Social Perceptiveness; Operation Monitoring	Oral Comprehension; Oral Expression; Problem Sensitivity; Written Comprehension; Written Expression	11 including Registered Technologist - Radiography and Certified Medical Dosimetrist
19-4061	Social Science Research Assistants	6	Reading Comprehension; Active Listening; Writing; Critical Thinking; Complex Problem Solving	Written Comprehension; Oral Comprehension; Oral Expression; Written Expression; Information Ordering	N/A
29-2033	Nuclear Medicine Technologists	6	Critical Thinking; Active Listening; Speaking; Reading Comprehension; Writing	Oral Comprehension; Oral Expression; Problem Sensitivity; Near Vision; Written Comprehension	20 including Registered Technologist - Sonography and Certified Nuclear Medicine Technologist

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
39-4031	Morticians, Undertakers, and Funeral Directors	6	Social Perceptiveness; Service Orientation; Speaking; Active Listening; Coordination	Oral Comprehension; Oral Expression; Speech Clarity; Speech Recognition; Problem Sensitivity	Certified Funeral Service Practitioner
17-3012	Electrical and Electronics Drafters	5	Speaking; Active Listening; Reading Comprehension; Critical Thinking; Judgment and Decision Making	Written Comprehension; Near Vision; Oral Comprehension; Oral Expression; Written Expression	Certified Interconnect Designer; IPC-A-600 Acceptability of Printed Circuit Boards; Advanced Certified Interconnect Designer
17-3025	Environmental Engineering Technicians	5	Reading Comprehension; Active Listening; Critical Thinking; Active Learning; Speaking	Written Comprehension; Deductive Reasoning; Inductive Reasoning; Oral Comprehension; Oral Expression	42 including Board Certified Environmental Engineer - Environmental Sustainability and Registered Environmental Technician
49-2091	Avionics Technicians	4	Equipment Maintenance; Troubleshooting; Repairing; Critical Thinking; Operation Monitoring	Written Comprehension; Oral Comprehension; Problem Sensitivity; Information Ordering; Near Vision	5 including Avionics Electronics Technician and Certified Aerospace Technician
27-4012	Broadcast Technicians	4	Critical Thinking; Active Listening; Monitoring; Operation Monitoring; Speaking	Problem Sensitivity; Near Vision; Oral Comprehension; Written Comprehension; Oral Expression	15 including Certified Broadcast Networking Technologist and Certified Audio Engineer
17-3019	Drafters, All Other	3	N/A	N/A	N/A
49-2021	Radio, Cellular, and Tower Equipment Installers and Repairers	3	Equipment Maintenance; Repairing; Active Listening; Critical Thinking; Installation	Problem Sensitivity; Near Vision; Deductive Reasoning; Finger Dexterity; Oral Comprehension	Wireless Communications and Junior Telecommunications Engineer
11-9061	Funeral Service Managers	2	Service Orientation; Active Listening; Speaking; Social Perceptiveness; Reading Comprehension	Oral Comprehension; Oral Expression; Written Comprehension; Written Expression; Problem Sensitivity	4 including Certified Preplanning Consultant and Certified in Thanatology
19-4051	Nuclear Technicians	2	Operation Monitoring; Active Listening; Monitoring; Operation and Control; Critical Thinking	Problem Sensitivity; Near Vision; Perceptual Speed; Selective Attention; Oral Comprehension	5 including Registered Radiation Protection Technologist and NDE/QC Personnel Certification
29-2054	Respiratory Therapy Technicians	2	Active Listening; Critical Thinking; Monitoring; Service Orientation; Reading Comprehension	Oral Comprehension; Problem Sensitivity; Oral Expression; Inductive Reasoning; Deductive Reasoning	3 including Certificate of Completion - Mechanical Ventilation



SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
17-3024	Electro-Mechanical Technicians	2	Operation Monitoring; Monitoring; Troubleshooting; Quality Control Analysis; Critical Thinking	Control Precision; Arm-Hand Steadiness; Finger Dexterity; Near Vision; Problem Sensitivity	12 including Certified Robotic Arc Welding Operator and Certified Quality Technician
19-4041	Geological and Petroleum Technicians	2	Reading Comprehension; Active Listening; Critical Thinking; Speaking; Writing	Written Comprehension; Oral Comprehension; Oral Expression; Written Expression; Information Ordering	5 including Registered Landman and Certified Petroleum Geophysicist
43-9031	Desktop Publishers	2	Critical Thinking; Reading Comprehension; Active Listening; Speaking; Judgment and Decision Making	Near Vision; Information Ordering; Visualization; Written Comprehension; Fluency of Ideas	16 including Adobe Acrobat XI Pro and Certified Medical Publication Professional
17-3021	Aerospace Engineering and Operations Technicians	1	Active Listening; Critical Thinking; Speaking; Operation Monitoring; Reading Comprehension	Written Comprehension; Problem Sensitivity; Oral Comprehension; Oral Expression; Deductive Reasoning	19 including Certified Calibration Technician and RADAR Electronics Technician
49-9061	Camera and Photographic Equipment Repairers	1	Troubleshooting; Repairing; Critical Thinking; Equipment Maintenance; Quality Control Analysis	Near Vision; Visualization; Finger Dexterity; Problem Sensitivity; Arm-Hand Steadiness	N/A

Source: JobsEQ® and O\*NET  
Data as of 2015Q2

The table below includes skill, attribute, and certification requirements for occupations with Postsecondary non-degree awards as a typical entry-level education requirement; it is rank-ordered based on the “Total Annual Demand” column.

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
53-3032	Heavy and Tractor-Trailer Truck Drivers	783	Operation and Control; Operation Monitoring; Time Management; Reading Comprehension; Speaking	Control Precision; Far Vision; Multilimb Coordination; Response Orientation; Reaction Time	Certified Equipment Manager
29-2061	Licensed Practical and Licensed Vocational Nurses	278	Service Orientation; Reading Comprehension; Active Listening; Speaking; Monitoring	Oral Comprehension; Written Comprehension; Oral Expression; Problem Sensitivity; Speech Clarity	31 including Pont-of-Care Technician and LPN in Long Term Care Certification
33-2011	Firefighters	130	Active Listening; Critical Thinking; Coordination; Operation Monitoring; Monitoring	Problem Sensitivity; Reaction Time; Arm-Hand Steadiness; Manual Dexterity; Multilimb Coordination	9 including Health & Safety Officer Certification and First Responder
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	128	Installation; Equipment Maintenance; Troubleshooting; Quality Control Analysis; Operation Monitoring	Problem Sensitivity; Visualization; Finger Dexterity; Near Vision; Manual Dexterity	33 including Combustion Analysis Certification and Solar Thermal Installer Certification
51-1011	First-Line Supervisors of Production and Operating Workers	99	Active Listening; Speaking; Reading Comprehension; Critical Thinking; Coordination	Oral Comprehension; Oral Expression; Problem Sensitivity; Deductive Reasoning; Written Comprehension	24 including Certified Welder and Oil Monitoring Analyst I
29-2071	Medical Records and Health Information Technicians	78	Reading Comprehension; Active Listening; Writing; Speaking; Critical Thinking	Near Vision; Oral Comprehension; Written Comprehension; Oral Expression; Deductive Reasoning	67 including Certified Professional Coder and Certified Coding Specialist
31-9011	Massage Therapists	38	Active Listening; Speaking; Social Perceptiveness; Service Orientation; Writing	Oral Comprehension; Oral Expression; Manual Dexterity; Dynamic Strength; Trunk Strength	6 including Massage Therapy Certification and Zero Balancing Certification
33-1021	First-Line Supervisors of Fire Fighting and Prevention Workers	38	Active Listening; Speaking; Management of Personnel Resources; Writing; Critical Thinking	Problem Sensitivity; Oral Comprehension; Oral Expression; Information Ordering; Far Vision	Fire Plans Examiner and Certified Fire Protection Specialist

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
49-3011	Aircraft Mechanics and Service Technicians	36	Equipment Maintenance; Repairing; Operation Monitoring; Troubleshooting; Critical Thinking	Written Comprehension; Problem Sensitivity; Information Ordering; Finger Dexterity; Control Precision	12 including Aircraft Electronics Technician and Fluid Power Master Mechanic
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	35	Operation Monitoring; Troubleshooting; Quality Control Analysis; Active Listening; Critical Thinking	Problem Sensitivity; Manual Dexterity; Finger Dexterity; Visual Color Discrimination; Near Vision	27 including Mobile Product Specialist and Cable Splicing Certification
29-2055	Surgical Technologists	33	Monitoring; Active Listening; Operation Monitoring; Speaking; Critical Thinking	Oral Comprehension; Problem Sensitivity; Near Vision; Speech Recognition; Arm-Hand Steadiness	13 including Certified Surgical Assistant and Tech in Surgery - Certified
27-4011	Audio and Video Equipment Technicians	16	Reading Comprehension; Critical Thinking; Monitoring; Operation Monitoring; Active Listening	Oral Comprehension; Problem Sensitivity; Information Ordering; Near Vision; Written Comprehension	22 including Commercial Audio Technician and Certified Technology Specialist
31-9094	Medical Transcriptionists	15	Active Listening; Reading Comprehension; Writing; Time Management; Speaking	Oral Comprehension; Written Comprehension; Written Expression; Speech Recognition; Near Vision	4 including Medical Administrative Specialist and Registered Medical Assistant
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	14	Operation Monitoring; Repairing; Quality Control Analysis; Troubleshooting; Critical Thinking	Problem Sensitivity; Near Vision; Deductive Reasoning; Arm-Hand Steadiness; Manual Dexterity	29 including Certified Calibration Technician and ISA Certified Control Systems Technician
49-2097	Electronic Home Entertainment Equipment Installers and Repairers	11	Troubleshooting; Repairing; Quality Control Analysis; Reading Comprehension; Complex Problem Solving	Finger Dexterity; Visualization; Problem Sensitivity; Near Vision; Deductive Reasoning	10 including ITS Design Fundamentals and Certified Satellite Installer
29-2053	Psychiatric Technicians	9	Social Perceptiveness; Speaking; Active Listening; Monitoring; Reading Comprehension	Oral Comprehension; Oral Expression; Problem Sensitivity; Deductive Reasoning; Inductive Reasoning	10 including Nationally Certified Psychiatric Technician and Technician Certification in Biofeedback
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	4	Critical Thinking; Reading Comprehension; Equipment Maintenance; Repairing; Active Listening	Oral Comprehension; Oral Expression; Problem Sensitivity; Information Ordering; Near Vision	Cable Splicing Certification; Instrumentation Certification; OCAT Technician; and System Operator Certification

SOC	Title	Total Annual Demand	Skills	Attributes	Certifications
49-2092	Electric Motor, Power Tool, and Related Repairers	4	Repairing; Troubleshooting; Quality Control Analysis; Critical Thinking; Complex Problem Solving	Finger Dexterity; Manual Dexterity; Problem Sensitivity; Information Ordering; Arm-Hand Steadiness	N/A
23-2091	Court Reporters	3	Active Listening; Writing; Reading Comprehension; Time Management; Speaking	Oral Comprehension; Written Expression; Speech Recognition; Selective Attention; Near Vision	15 including Certified Realtime Report and Registered Professional Report
49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	2	Critical Thinking; Active Listening; Social Perceptiveness; Complex Problem Solving; Operation Monitoring	Arm-Hand Steadiness; Problem Sensitivity; Near Vision; Manual Dexterity; Oral Comprehension	4 including Mobile Product Specialist and Traffic Signal Senior Field Technician Level III
13-1032	Insurance Appraisers, Auto Damage	2	Active Listening; Reading Comprehension; Writing; Speaking; Critical Thinking	Oral Expression; Oral Comprehension; Written Comprehension; Written Expression; Problem Sensitivity	Collision Repair and Refinish: Damage Analysis and Estimating; Associate in Claims - Management
27-4014	Sound Engineering Technicians	2	Active Listening; Speaking; Reading Comprehension; Critical Thinking; Monitoring	Oral Expression; Near Vision; Oral Comprehension; Written Expression; Written Comprehension	15 including Audio Systems and Certified Broadcast Networking Technologist
49-9092	Commercial Divers	2	Critical Thinking; Active Listening; Operation Monitoring; Speaking; Quality Control Analysis	Oral Comprehension; Oral Expression; Problem Sensitivity; Arm-Hand Steadiness; Control Precision	5 including Diving Supervisor and Divemaster
39-4011	Embalmers	1	Speaking; Active Listening; Critical Thinking; Monitoring; Social Perceptiveness	Problem Sensitivity; Near Vision; Oral Comprehension; Oral Expression; Deductive Reasoning	N/A
39-5091	Makeup Artists, Theatrical and Performance	0	Speaking; Active Listening; Judgement and Decision Making; Coordination; Critical Thinking	Arm-Hand Steadiness; Finger Dexterity; Manual Dexterity; Near Vision; Oral Comprehension	N/A

Source: JobsEQ® and O\*NET  
Data as of 2015Q2

## V. Key Findings and Recommendations

The combination of a rapidly growing population (especially the working age segment), strong demand from target sectors, and a relatively low educational attainment rate across the Inland Empire region present major opportunities for workforce development. In the section that follows are several recommendations to consider for purposes of guiding these efforts.

As suggested in the previous report, focus groups and interviews with some of the area's larger employers, education providers, and WIB professionals should provide the basis for validating target occupations and industries and identifying specific occupations where the supply of qualified candidates is the most constrained. These opportunities to interact with industry stakeholders and education providers should also be utilized to gain insights into regionally relevant credentials and emerging trends in the workplace that are not informed by the data, e.g. project-specific welding certifications or consolidation of multiple occupational tasks into a single job title.

The types of intervention needed to strengthen the talent pipeline should be informed through discussions with both secondary and postsecondary education providers, workforce development practitioners, and regional businesses. Such discussions will yield insight as to whether supply constraints are more likely a function of insufficient enrollment in key programs, a failure to complete programs, including applying (e.g. sitting for an exam) for final credentialing, and/or a lack of sufficient infrastructure for training and education. It is likely that marketing efforts to increase enrollment in programs designed to feed select occupations may require outreach to neighborhoods with historically low-educational attainment populations. Specific and targeted support may be required to overcome social barriers that have thus far inhibited some individuals from seeking postsecondary educational opportunities. In addition, there may be opportunities to leverage the skill-sets of some unemployed workers with prior work experience into potential opportunities to earn stackable credentials within several fields.

Other key occupations will inevitably require increasing the enrollment and subsequent graduation of individuals with at least an associate's degree in STEM fields. Providing more resources toward high school STEM programs is one necessary step. One local example of a program designed to promote STEM learning is San Bernardino County's Alliance for Education; the Alliance for Education is a partnership between business and education communities which serves students in kindergarten through college. The goal of the program is to prepare the county's youth for STEM careers with employers in San Bernardino County.<sup>17</sup> In addition, outreach and marketing efforts designed to convey to students the value of a STEM

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<sup>17</sup> <http://www.sbcalliance.org/overview>. In addition, San Bernardino County's Education Element Group has adopted a roadmap to support the success of every child in the county from cradle to career. <http://wp.sbcounty.gov/cao/visionwire/?p=58>

degree will help students make educated decisions about which field of study to pursue. A potential opportunity to expand enrollment in associate's degree programs in STEM fields is to create public-private partnerships which feature a grades 9 through 14 model, like IBM's Pathways in Technology Early College High Schools (P-Tech) wherein students graduate with an associate's degree in Applied Science after six years.<sup>18</sup> At the very least, opportunities for high school students to earn postsecondary credits and/or industry recognized credentials while still at the secondary education level should be explored and expanded. Such experiences and opportunities may increase interest in future careers through exposure to industry, improve resumes and competitiveness for internships, and accelerate preparedness for next steps beyond high school. There are several relevant certifications and credentials that can be attained at little to no-cost and harbor potential to be woven into secondary curriculums or extended learning opportunities.

Below is a list of specific recommendations to consider. Each of these recommendations are intended to support target sectors, capitalize on unique features of the Inland Empire's economy, and advance regional prosperity for all persons.

### **Establish a Career One-Stop for Young Adults**

For young adults, having to access and coordinate workforce and supportive services across multiple locations becomes a barrier, especially in a region with relatively low utilization of public transportation. Key programs like YouthBuild and JobCorps should be co-located with GED preparation programming, career exploration resources, and social service providers to minimize transportation barriers, encourage peer-to-peer networking and support, and promote efficiencies through streamlining the delivery of services. The region's rapidly growing segment of young adults, its disproportionately low rate of participation in the labor force, and historically low rates of educational attainment elevate the importance of this type of intervention.

### **Develop and Implement an Industry-Themed Cohort Model to Serve Young Adults**

The Inland Empire should consider developing a short-term training and education intervention that aims to discover an individual's career interest and skills and provides an actionable blueprint for next steps; individual profiles should be used to inform enrollment into small cohorts (10-15 individuals) that align with target sectors (e.g. construction, utilities, healthcare, manufacturing, etc.). Each cohort would remain together for the duration of the intervention (up to four weeks on a part-time basis) and participate in work-based learning experiences designed to deepen their awareness of career opportunities and to get a feel for the work environment. This effort would lean heavily on the participation of regional businesses and should include industry tours, project-based learning that mirrors the real world of work, and group access to an industry professional throughout the course of the intervention. The intervention could be a

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<sup>18</sup> <https://www-03.ibm.com/press/us/en/presskit/42300.wss>

blend of classroom time, field trips, and virtual modules. This short-term intervention may lead to paid work experiences for some participants and/or increase motivation to enroll in relevant training programs that prepare participants to compete for key occupations in target sectors.

### **Develop a Career “Mapping” Tool for Public Consumption**

Ideally, this tool would be web-based, multi-lingual, and dynamic to maximize accessibility and ensure regional relevancy of the information being provided. Essential elements to be included in the tool should include, at least:

1. In-demand occupations by title;
2. Occupation descriptions;
3. Industry profiles of those industries that employ the occupations;
4. Credentials for entry;
5. Regional training providers;
6. Duration of training programs;
7. Typical costs associated with training programs;
8. Entry-level, average, and experienced wages by occupation;
9. Current job announcements for occupations.

Executing this project would require a significant degree of collaboration and coordination with workforce partners, especially industry and education providers (secondary and postsecondary). The approach to and intent of this recommendation is very similar to the WAM project. As it's understood that previous attempts to develop and sustain this type of tool were hampered by ongoing maintenance requirements, it's imperative that another attempt to develop and implement this type of tool has broad-based financial support and a clear plan for sustainability.

The occupation and credential tables included as part of this report provide a starting point. Industry must be engaged to validate credentials and inform the expansion of the list to include regionally relevant certifications and other requirements, as well as to regularly review and update the list. Postsecondary providers should be engaged to close training gaps by developing new and/or refining current training program offerings to respond to industry demand. The WIB should be responsible for updating the eligible training providers list to ensure that relevant programs can receive support through workforce resources. Secondary providers should be engaged to modify curriculum as appropriate and to support the design and dissemination of the tool.

### **Advocate for Improved Public Transportation**

Residents of the Inland Empire are more than three times less likely to utilize public transit systems for purposes of commuting than their peers in California and the United States (1.6%



vs. 5.2% vs. 5.0%, respectively). This implies that there may be a lack of sufficient infrastructure to support public transit users; if so, this condition can be especially detrimental for young adults, persons with disabilities, and older persons trying to access gainful training and employment opportunities. Improved connectivity between places of residence, places of work, and places of training may contribute to increased participation in the labor force, which is also relatively low compared to California and the United States (61.0% vs. 63.7% vs. 63.8%, respectively).

### **Develop the Talent Pipeline to Support the Manufacturing Sector**

The economic impact of manufacturing activities across the region is arguably more widespread than those of any other sector. Furthermore, average wages in the manufacturing sector are 20% higher than averages wages of all industries in the region and there are multiple occupations that are attainable with an associate's degree or less and/or on-the-job training. Despite a forecasted decline in employment growth for most industries in this sector and a long run growth forecast of 0% for the sector as a whole, replacement demand is substantial. With more than 20,000 workers forecasted to be replaced in the sector through 2025, manufacturing's replacement demand alone is higher than the total demand forecast for 13 of 20 other sectors in the region.

**Figure 23: Sector Snapshot of Manufacturing**

NAICS	Industry	Current			Historical				Forecast		
		Four Quarters Ending with 2015q2			Total Change over the Last 3 Years	Average Annual % Change in Employment 2012q2-2015q2			Over the Next 10 Years		
		Employment	Avg. Annual Wages	Location Quotient	Employment	Riverside-San Bernardino-Ontario, CA MSA	California	USA	Total Approx Repl Demand	Total Employment Change	Avg. Annual Growth Percent
31	Manufacturing	90,727	\$50,223	0.78	5,447	2.1%	0.6%	1.1%	20,990	20,573	0.0%
	Total - All Industries	1,312,921	\$41,682	1.00	145,837	4.0%	2.8%	1.9%	340,032	532,700	1.4%

Source: JobsEQ®

Data as of 2015Q2

Below is a sample of 20 key occupations to support the sector, sorted by demand volume through 2025. As technology to support increased productivity in the sector continues to evolve, manufacturing workers must be flexible and adept at developing new skills and knowledge in an increasingly sophisticated production environment. Aside from being attainable through relatively shorter-term training programs, several of these occupations include multiple opportunities for stacking credentials, continuous learning, and wage and career progression.



**Figure 24: Key Occupations for Manufacturing**

SOC	Title	Current Employment	Regional Average Wage <sup>1</sup>	10-Year Replacement Demand	10-Year Growth Demand	10-Year Total Demand
51-2092	Team Assemblers	6,300	\$26,600	1,001	126	1,127
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,737	\$47,500	322	444	766
51-4041	Machinists	2,347	\$36,100	542	185	727
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	2,232	\$27,500	671	45	716
51-4121	Welders, Cutters, Solderers, and Brazers	1,826	\$36,400	479	132	612
49-9041	Industrial Machinery Mechanics	1,284	\$54,300	378	210	588
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2,284	\$36,300	501	29	530
51-1011	First-Line Supervisors of Production and Operating Workers	3,277	\$53,900	528	-10	518
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	1,109	\$36,300	315	187	502
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,908	\$64,800	370	22	392
51-9198	Helpers--Production Workers	2,028	\$23,100	343	42	385
51-9111	Packaging and Filling Machine Operators and Tenders	1,894	\$27,700	438	-77	361
17-2112	Industrial Engineers	1,074	\$78,300	314	28	342
51-2041	Structural Metal Fabricators and Fitters	624	\$33,800	258	71	329
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	867	\$31,200	288	33	322
11-1021	General and Operations Managers	1,726	\$106,500	308	-3	305
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	432	\$32,500	209	90	299
43-5071	Shipping, Receiving, and Traffic Clerks	1,474	\$31,700	374	-100	274
43-4051	Customer Service Representatives	1,120	\$36,700	285	-29	256
49-9071	Maintenance and Repair Workers, General	1,487	\$39,000	275	-20	255
53-7064	Packers and Packers, Hand	1,338	\$24,100	333	-78	255

Source: JobsEQ®

Data as of 2015Q2

Note: Figures may not sum due to rounding.

1. Occupation wages are as of 2014

The table below presents a sample of 20 industries within the sector, sorted by replacement demand. Two of these industries – architectural and structural metals manufacturing (NAICS 3323), and cement and concrete product manufacturing (3273) – have a particularly strong growth forecast, too.

**Figure 25: Replacement Demand for Select Manufacturing Industries**

		Current			Total Change over the Last 3 Years	Historical			Forecast		
		Four Quarters Ending with 2015q2				Average Annual % Change in Employment 2012q2-2015q2			Over the Next 10 Years		
NAICS	Industry	Employment	Avg. Annual Wages	Location Quotient	Employment	Riverside- San Bernardino- Ontario, CA MSA	California	USA	Total Approx Repl Demand	Total Employ- ment Change	Avg. Annual Growth Percent
3261	Plastics Product Manufacturing	8,309	\$48,081	1.60	1,174	5.2%	0.7%	2.3%	1,952	1,436	-0.6%
3323	Architectural and Structural Metals Manufacturing	4,811	\$50,219	1.39	991	8.0%	4.1%	2.8%	1,217	2,270	2.0%
3273	Cement and Concrete Product Manufacturing	3,842	\$55,270	2.27	273	2.5%	5.2%	2.6%	990	2,404	3.2%
3118	Bakeries and Tortilla Manufacturing	3,168	\$34,385	1.14	366	4.2%	-0.1%	1.1%	835	730	-0.3%
3399	Other Miscellaneous Manufacturing	3,930	\$50,510	1.48	425	3.9%	0.8%	1.1%	811	39	-2.2%
3121	Beverage Manufacturing	3,144	\$38,490	1.64	705	8.8%	5.7%	5.2%	790	808	0.1%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	3,243	\$46,755	0.91	686	8.2%	2.2%	2.0%	771	912	0.4%
3391	Medical Equipment and Supplies Manufacturing	2,929	\$80,262	1.00	-1,586	-13.4%	1.9%	0.1%	701	753	0.2%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	3,045	\$34,005	1.36	583	7.3%	3.4%	2.7%	599	714	0.4%
3231	Printing and Related Support Activities	2,435	\$41,206	0.57	68	0.9%	-0.6%	-1.2%	564	453	-0.5%
3219	Other Wood Product Manufacturing	2,806	\$34,750	1.39	559	7.7%	4.4%	3.6%	551	914	1.2%
3363	Motor Vehicle Parts Manufacturing	2,341	\$39,538	0.45	212	3.2%	2.6%	5.8%	520	697	0.7%
3329	Other Fabricated Metal Product Manufacturing	1,964	\$55,270	0.73	-72	-1.2%	2.0%	1.8%	468	633	0.8%
3344	Semiconductor and Other Electronic Component Manufacturing	1,825	\$65,697	0.52	-202	-3.4%	-1.4%	-1.5%	404	293	-0.6%
3321	Forging and Stamping	1,784	\$69,102	1.86	328	7.0%	2.9%	1.2%	394	341	-0.3%
3119	Other Food Manufacturing	1,554	\$61,297	0.86	103	2.3%	4.9%	3.6%	390	433	0.3%
3222	Converted Paper Product Manufacturing	1,836	\$56,013	0.72	65	1.2%	-1.4%	-1.0%	388	327	-0.3%
3254	Pharmaceutical and Medicine Manufacturing	1,516	\$72,528	0.57	-257	-5.1%	2.9%	1.5%	380	478	0.6%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	1,840	\$78,544	0.50	-219	-3.7%	-3.4%	-1.1%	370	254	-0.7%
3339	Other General Purpose Machinery Manufacturing	1,695	\$60,214	0.67	206	4.4%	-1.2%	2.5%	369	295	-0.4%

[Source: JobsEQ®](#)

Data as of 2015Q2

As of 2013Q1, 50.9% of the manufacturing workforce was 45 years or older and 24% was 55 years or older. Less than 10% of this workforce was under 25 years of age. The region should capitalize on the knowledge of its current workers to prepare the next generation of workers given the moderate- to long-term on-the-job training required. This may be achieved through utilizing work experience resources, such as on-the-job training and internships, along with enrollment in existing training programs and development of customized short-term training programs tailored to meet the needs of industries.

The recent TAACCCT grant that was awarded to Chaffey College provides an excellent opportunity to bolster this talent pipeline and provides multiple opportunities to dovetail with other recommendations outlined above, including the career mapping tool and cohort training model. The findings from the grant's "skills gaps" analysis should be particularly relevant for workforce recruitment when combined with wage data and employment forecasts, and the

opportunities to engage industry partners should prove invaluable to exploring opportunities for deeper industry partnerships.

**Figure 26: Workforce Characteristics for the Manufacturing Sector**

NAICS	Industry	Age	Employment	Employment as %
31	Manufacturing	14-99	92,828	
31	Manufacturing	14-18	571	0.6%
31	Manufacturing	19-21	2,489	2.7%
31	Manufacturing	22-24	4,439	4.8%
31	Manufacturing	25-34	17,902	19.3%
31	Manufacturing	35-44	20,206	21.8%
31	Manufacturing	45-54	24,967	26.9%
31	Manufacturing	55-64	16,961	18.3%
31	Manufacturing	65-99	5,293	5.7%
31	Manufacturing	45-99	47,221	50.9%
	Total - All Industries <sup>1</sup>	45-99	498,800	41.8%

Source: JobsEQ®

Age and employment data are as of 2014Q3 and were directly retrieved from Quarterly Workforce Indicators (QWI) Explorer.

Exported on 10/26/2015 from: <http://qwiexplorer.ces.census.gov/#x=0&g=0>

1. Total industry figures don't reflect employment in unclassified industries (NAICS 9999).

### **Consider Adding Professional, Scientific and Technical Services as a Target Sector**

While the Inland Empire has a relatively low concentration of industries in this sector, some recent trends and the growth forecast warrant a deeper look into diversifying the allocation of workforce resources to support this sector's growth. The sector's average wages are more than 30% higher than the average of all industries and the inclusion of this sector may serve to increase participation in the workforce system. Furthermore, over the longer term, such a move may potentially help to attract expanding businesses to the region given a more prepared workforce.

**Figure 27: Sector/Industry Snapshot of Professional, Scientific, and Technical Services**

		Current			Historical				Forecast		
		Four Quarters Ending with 2014q4			Total Change over the Last 3 Years	Average Annual % Change in Employment 2011q4-2014q4			Over the Next 3 Years		
NAICS	Industry	Employment	Avg. Annual Wages	Location Quotient	Employment	Riverside-San Bernardino-Ontario, CA MSA	California	USA	Total Approx Repl Demand	Total Growth Demand	Avg. Annual Growth Percent
	Total - All Industries	1,281,387	\$41,091	1.00	126,324	3.5%	2.8%	1.8%	95,421	53,734	1.4%
54	Professional, Scientific, and Technical Services	40,216	\$54,670	0.51	4,303	3.8%	3.5%	2.8%	2,567	2,964	2.4%
5416	Management, Scientific, and Technical Consulting Services	10,796	\$45,437	0.93	1,497	5.1%	4.4%	4.7%	695	1,203	3.6%
5415	Computer Systems Design and Related Services	5,189	\$80,575	0.31	368	2.5%	6.8%	5.1%	286	538	3.3%
5419	Other Professional, Scientific, and Technical Services	3,945	\$34,199	0.66	318	2.8%	2.8%	2.4%	245	289	2.4%
5413	Architectural, Engineering, and Related Services	7,424	\$73,518	0.55	847	4.1%	2.4%	1.8%	505	457	2.0%
5414	Specialized Design Services	701	\$42,278	0.59	112	6.0%	3.8%	3.3%	61	42	2.0%
5417	Scientific Research and Development Services	579	\$66,272	0.09	43	2.6%	2.4%	0.3%	39	25	1.4%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	5,655	\$38,077	0.63	780	5.1%	3.1%	2.4%	398	216	1.3%
5411	Legal Services	4,345	\$58,817	0.41	262	2.1%	0.4%	0.2%	240	120	0.9%
5418	Advertising, Public Relations, and Related Services	1,581	\$44,464	0.35	76	1.7%	2.2%	3.8%	123	41	0.9%
Source: JobsEQ®											
Data as of 2014Q4											

The Inland Empire currently has a postsecondary infrastructure that delivers relevant programs but is underperforming in terms of educational output for key occupation groups – specifically business and financial operations and architectural and engineering occupations – both of which include occupations that predominantly require a bachelor’s degree but also include support occupations that are attainable with an associate’s degree or less. For those occupations that do require a bachelor’s degree there may be opportunities to compete for supporting jobs with an associate’s degree that’s transferable, and subsequently earn a position with a firm that provides the flexibility to advance one’s education on a part-time basis while working full-time. Some of these occupations may also present career pathway opportunities, for example moving from a customer service job into a sales job, or advancing from a bookkeeper to an accountant with additional training and education. The table of occupations below present a sample of key

occupations to support this sector that are either attainable with an associate's degree or less and/or currently have programs being delivered through regional community colleges.

Figure 28: Industry/Occupation Mix for Professional, Scientific, and Technical Services

<b>SOC</b>	<b>Title</b>	<b>Current Employment</b>	<b>Regional Average Wage<sup>1</sup></b>	<b>3-Year Replacement Demand</b>	<b>3-Year Growth Demand</b>	<b>3-Year Total Demand</b>
13-2011	Accountants and Auditors	2,677	\$69,900	241	145	386
13-1111	Management Analysts	1,811	\$82,800	101	175	276
11-1021	General and Operations Managers	1,068	\$106,500	58	92	149
43-4051	Customer Service Representatives	855	\$36,700	67	80	147
15-1132	Software Developers, Applications	977	\$99,900	35	107	142
41-3099	Sales Representatives, Services, All Other	778	\$56,500	62	74	136
15-1121	Computer Systems Analysts	734	\$76,900	32	89	121
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1,128	\$39,700	31	66	97
15-1133	Software Developers, Systems Software	601	\$103,400	22	67	88
13-1199	Business Operations Specialists, All Other	693	\$65,500	28	59	87
23-2011	Paralegals and Legal Assistants	821	\$50,300	38	48	85
15-1151	Computer User Support Specialists	563	\$52,900	25	59	84
43-1011	First-Line Supervisors of Office and Administrative Support Workers	521	\$52,800	36	37	72

Source: [JobsEQ®](#)

Data as of 2015Q2

Note: Figures may not sum due to rounding.

The inclusion of this sector as an additional target would be a natural extension of current and future initiatives focused on STEM and provide a broader continuum of talent pipeline development that serves all persons.

## VI. Appendix

The following section contains supplementary information relevant to this report.

### Terms & Definitions

**Demographics:** All data are from the U.S. Census Bureau per the dates shown in the profile table footnotes included in the accompanying spreadsheets.

**Current Employment & Historical (3-Year) Job Growth:** Measures the current employment and past performance of an industry sector and identifies whether industries have been growing/declining/emerging and the rate of change. Employment and wages data are derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and updated through 2014Q4 with preliminary estimates by Chmura updated to 2015Q2. Forecast employment growth uses national projections from the Bureau of Labor Statistics, forecasts for 2012-2022, adapted for regional growth patterns by Chmura.

**Projected Job Growth (3-Year):** Incorporates historical growth and performance with additional factors and expectations of growth/decline of the region's working-age population, industry mix, educational attainment, and regional growth expectations. The JobsEQ® Baseline Forecast comprises industry and occupation projections based, in part, upon the Bureau of Labor Statistics (BLS) national forecasts or state forecasts provided by state employment agencies.

**Location Quotient & Location Quotient Trend:** The location quotient variable is a comparative statistic used to calculate relative employment concentration of a given industry against the average employment of the industry in the nation. Industries with a higher location quotient (usually greater than 1.25) indicate that the region has a comparative advantage or specialization in the production of that good or service.

**Industry Competitiveness 3-Year (Shift-Share Analysis):** A standard method of regional economic analysis that attempts to separate regional job growth into its component causes. The three main causes identified are the "national growth effect," which is regional growth that can be attributed to the overall growth of the entire U.S. economy; the "industrial mix effect," which is regional growth that can be attributed to positive trends in the specific industry or occupation at a national level; and the "regional competitiveness effect," which is growth that cannot be explained by either overall or industry-specific trends. This measure can be measured in terms of economic output or employment, and the examples found in this report utilize employment levels. A positive value indicates that an industry has a regional competitive advantage compared to the nation in terms of generating employment. Positive shift share values do not explain why an industry has a competitive advantage, only that there are potential factors that contribute to the industry's ability to outperform the national average rate of growth/decline.

**Average Annual (Industry) Wage & Wage Trend:** This statistic is based on an industry staffing pattern and the average occupational wage associated with that staffing pattern for a given region and industry. Employment and wages data are derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and updated through 2014Q4 with preliminary estimates by Chmura updated to 2015Q2.

**Wages & Unemployment Rate by Occupation:** Occupation average wage data are derived from national occupation/industry wage data provided by the Bureau of Labor Statistics modified where necessary. Wages by occupation are as of 2014 provided by the BLS and imputed by Chmura where necessary. All occupation data are presented in terms of at-place employment except for occupation unemployment and unemployment rate which are calculated by place of residence. Occupation unemployment figures are imputed by Chmura. Employment forecasts are developed by Chmura using occupation forecasts from the BLS.

**Long-run (3-Year) Occupational Forecast: Average Annual Growth Rate:** Forecast employment growth uses national projections from the Bureau of Labor Statistics, forecasts for 2012-2022, adapted for regional growth patterns by Chmura. Occupation employment data are derived from the most recent industry employment (from the Bureau of Labor Statistics, updated quarterly) and the industry/occupation matrix available for the region. Although JobsEQ baseline forecast may use national forecasts (by industry or occupation), these forecasts are adjusted to be more reflective of the region rather than the nation by taking into account the unique industry/occupation mix of the region as well as the region's general overall growth expectations. Regional employment growth expectations are modeled to be consistent with US Census population forecasts, labor market commuting patterns, and expected changes in participation rates over time by education level.

**Training Concentration:** This analysis provides an estimate of supply and demand alignment between local postsecondary training output and the demands of local area industries.

A training concentration of 100% means that a region is producing a number of awards per occupation employment that matches the national norm. A training concentration of 200% means the region is producing twice the number of awards than the national norm and a training concentration of 50% means the region is at half the norm. For example, if postsecondary schools in the nation grant awards for registered nurses at the rate of one award for every ten nurses employed, and if a region grants awards at the rate of one award for every twenty employed nurses, that region will have a training concentration of 50% for registered nurses.

Awards data are estimates, produced via a Chmura algorithm that distributes degrees conferred for the academic year 2013-2014, data for which are provided by the National Center for Education Statistics. Occupation employment data are estimated via industry employment data and the Chmura industry/occupation matrix. Industry employment data are derived from the



Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and currently updated through 2014Q4 with preliminary estimates by Chmura updated to 2015Q2.

The education program to occupation crosswalk methodology description refers to the training concentration analysis. Training programs are classified according to the Classification of Instructional Programs (CIP codes). For relating training programs, this report uses a modified version of the CIP to SOC crosswalk from the National Center for Education Statistics (NCES). While this is a very helpful crosswalk for estimating occupation production from training program awards data, the crosswalk is neither perfect nor comprehensive. Indeed, it is hard to imagine such a crosswalk being perfect since many training program graduates for one reason or another do not end up employed in occupations that are most related to the training program from which they graduated. Therefore, the education program analyses should be considered in this light.

As an example of the many scenarios that may unfold, consider a journalism degree that crosswalks into three occupations: editors, writers, and postsecondary communications teachers. Graduates with a journalism degree may get a job in one of these occupations—and that may be the most-likely scenario—but a good number of these graduates may get a job in a different occupation altogether (the job may be somewhat related, such as a reporter, or the job may be totally unrelated, such as a real estate agent). Furthermore, a graduate may stay in school or go back to school for a degree that will lead to other occupation possibilities. Still another possibility includes the graduate not entering the labor market (maybe being unemployed, being a non-participant, or moving to another region).

Given this background, training concentration gaps that are close to the average value of 100% (such as within 20 percentage points) should largely be viewed as having supply and demand for those occupations to be roughly in equilibrium. However, in areas where the training concentration is significantly lower (such as below 80%), one can infer a substantial deficit of training for this occupation exists that corresponds to a market opportunity. The threshold where a shortage can be clearly identified varies based on the size of the region, with larger regions allowing a finer estimate of the shortfall.

**Occupational Replacement Demand:** Replacement demand is the minimum demand due to separations such as retirements and moves into different occupations. Said differently, it is an estimate of the minimum number of workers that would need to be hired to replace those incumbent workers that due to retirement, death, incarceration or a permanent move into an alternate occupation will need to be back-filled by their employer.

The methodology for this estimate is based upon BLS-derived techniques. To develop estimates of replacements, the BLS used occupational employment data from the Current Population Survey (CPS), a household survey that collects demographic and employment information

about individuals. BLS analysts measured the net change in occupational employment for 13 different age cohorts over a 5-year period.

**Long-Run (10-Year) Expected Occupational Gap:** Gaps projection data are developed by Chmura and updated quarterly. Employment supply and demand projections are based on a starting date of 2014Q4. Technical Notes: Occupation gaps are developed by Chmura and use a multitude of data sources. This analytic is updated quarterly along with ES-202 updates. Gaps are forecast based upon the educational make-up of the region's first-time workers and include changes due to replacements. For example, consider the case in which a retail salesperson gets a degree, leaves their occupation, and becomes a financial analyst. This turnover dictates that a new retail salesperson is needed. Even though the total number of retail salespersons in the region is unchanged, the analysis counts this situation as an increase of one in demand for retail salesperson. The forecasts that are provided are long-run (over a period of three, five, or ten years) and do not fully account for short-run imbalances in the workforce. The short-run deficit is not accounted for in the forecast gap because of the long-term perspective of the gap. From a practical perspective, Chmura created the gaps to have a long-term view because it is highly relevant for strategic planning.

- **Annual Supply Gap (or Surplus)** - The annual average difference between projected supply and demand. A positive number represents a deficit in workers and a negative (parenthetical) number represents a surplus of workers.
- **Annual Growth Demand** - The demand due to overall growth in that occupation.
- **Annual Replacement Demand** - The minimum demand due to separations such as retirements and moves into different occupations (based on an annual average over the next ten years).
- **Total Annual Demand** - The sum of growth and replacement demand (if growth is positive, otherwise, this is simply replacement demand).