

# An Economic Impact Assessment of the Cannabis Cultivation Industry in Calaveras County

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FINAL DRAFT

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UNIVERSITY OF THE PACIFIC

**Center for Business  
& Policy Research**

*An Economic Impact Assessment of the Cannabis Cultivation Industry in Calaveras County*

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## Executive Summary

Calaveras County has a large cannabis cultivation industry. In 2016, the County established a temporary urgency ordinance regulating cultivation, and is currently evaluating future options. In addition, a special election has been scheduled for May 2017 that gives Calaveras County voters the opportunity to ban cannabis cultivation. This study contributes to that discussion by providing an estimate of the scale and economic impacts of the County's cannabis cultivation industry.

The analysis utilizes commercial growers who registered under the urgency ordinance in 2016, removed growers who had been denied, and adjusted mixed light applications to lower-yielding outdoor grows based on cultivations. It does not include growing for personal use, caregiver growers, illegal growers who did not register with the county, nor does it consider the impact of millions of dollars in registration fees and future taxes that would be paid by the sector. Thus, it is a conservative estimate of the scale of the industry. We used the IMPLAN economic impact model, customized to incorporate a cannabis cultivation industry and calibrated to the Calaveras County economy, to estimate the industry's economic impact. Key findings from the analysis include:

- **Direct Impact of Cannabis Cultivation in 2016**
  - Sales value (output): \$251.5 million
  - Direct employment: 2,605
  - Direct labor income: \$148.4 million
- **Total Impacts of Cannabis Cultivation in 2016**
  - Total output effect: \$339.2 million
  - Total employment effect: 3,404
  - Total labor income: \$172.2 million

These are large economic impacts for a small rural county such as Calaveras. Our analysis finds cannabis cultivation was likely the largest industry in the County in 2016. Some comparative data illustrates the scale and importance of the sector to the County's economic activity:

- **The County Economy (2015)**
  - Total employment: 16,308
  - Total establishments: 1,261
- **Direct Impact of the County's Hospitality Industry (2015)**
  - Total sales value (output): \$167.5 million
  - Total employment: 1,955
- **Average Direct Impact of the County's Agriculture Industry (2011-2015)**
  - Total sales value (output): \$28 million

Cannabis cultivation equates to about 15% of the County's Gross Regional Product (GRP) and when its indirect and induced impacts are included the total impacts are about 19% of GRP. Cultivation's direct job impacts are about 16% of the County's employment and its total impacts are 21% of the County's total employment. Thus, regulatory decisions surrounding cannabis cultivation, including a ban on cannabis enterprises, are of significant consequence to the Calaveras County economy.

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## Glossary

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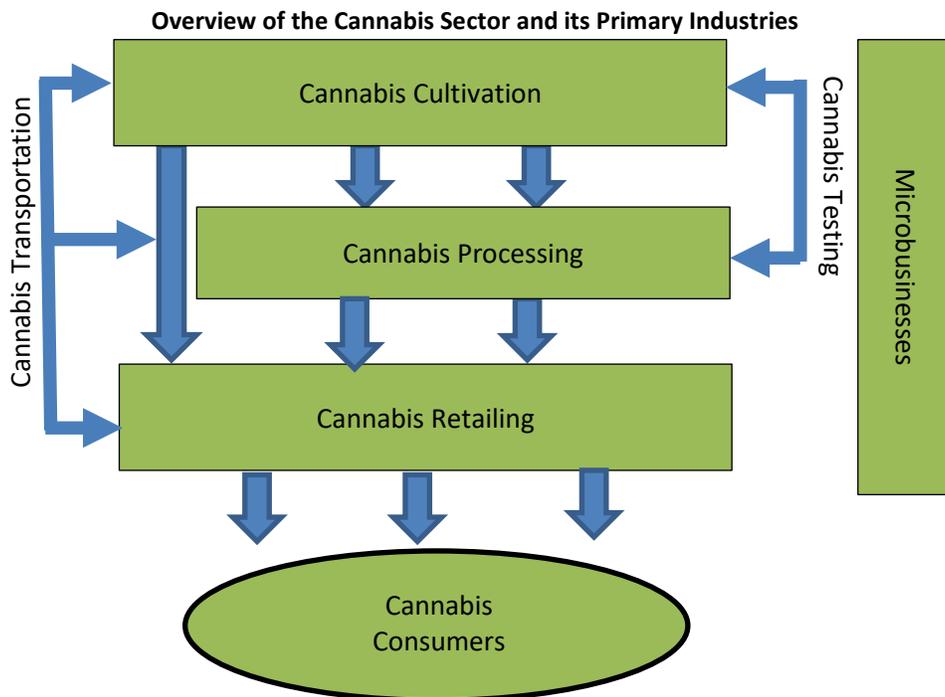
<b>AUMA</b>	Adult Use of Marijuana Act – also known as Proposition 64. Passage of this state-wide initiative in November 2016 legalized the recreational use of cannabis in California.
<b>Direct Effects</b>	These are the changes in jobs, sales, and income related exclusively to initial expenditures.
<b>Employment</b>	This is the number of full- and part-time jobs based on an annual average of monthly jobs. That is, one job lasting 12 months is equal to two jobs lasting six months each and is equal to three jobs lasting four months each.
<b>Gram</b>	A metric unit of mass equal to 1/1,000 <sup>th</sup> of a kilogram. There are approximately 453.592 grams in a pound and 28.3495 grams in an ounce.
<b>GRP</b>	Gross Regional Product – is conceptually equivalent to gross domestic product (GDP); while GDP measures newly created value through production by residents in the domestic economy, GRP measures newly created value through production by residents in the regional economy, be it a state, county, or district.
<b>Indirect Effects</b>	These represent the iterative impacts of inter-industry transactions as supplying industries respond to demand from the sector(s) where the initial expenditures occurred.
<b>Induced Effects</b>	These reflect the contribution benefit payments make to household expenditures by direct and indirect sector employees.
<b>Kilogram</b>	A metric unit of mass equivalent to 2.20462 pounds or 35.274 ounces.
<b>Labor Income</b>	This is the sum of employee compensation and proprietor income. Employee compensation includes wages, salaries, benefits, and all other employer contributions, while proprietor income consists of payments received by self-employed individuals and unincorporated business owners.
<b>Measure B</b>	A Calaveras County ballot initiative for a special election on May 2, 2017. Approval of the measure will prohibit all cannabis activities in the County, so far as is allowed.
<b>Measure C</b>	A Calaveras County initiative from the November 8, 2016 ballot that was approved by voters and thereby established local taxes on the cannabis sector in the County.
<b>Measure D</b>	A Calaveras County initiative from the November 8, 2016 ballot that was not approved by voters, but would have established permanent regulations over the cannabis sector in the County.
<b>Metric Tonne</b>	See Tonne below for a definition.
<b>MMRSA</b>	Medical Marijuana Regulatory and Safety Act consists of three bills (Assembly Bills 243 and 266, and Senate Bill 643) that were passed by the State Legislature and signed by the Governor in 2015. It creates a licensing and regulatory framework for medical cannabis in California.
<b>Output</b>	This represents the value of industry production. It accounts for the total change in the value of production in an industry for a given time period. Output varies as a measure across industries. For manufacturers, the value of production is sales plus or minus any change in inventories. For service sectors, the value of production equals their sales. While for retail and wholesale trade, the value of production equals their gross margin and not their gross sales.
<b>Tonne</b>	A metric unit of mass equal to 1,000 kilograms or approximately 2,204.6 pounds.
<b>Total Effects</b>	These are the combined impacts of the Direct, Indirect, and Induced Effects.

# 1 Introduction

This is an initial analysis of the economic impacts from a part of the cannabis sector on the Calaveras County economy. It endeavors to provide a credible estimate of the cannabis cultivation industry in the County. In October 2015, passage of the Medical Marijuana Regulatory and Safety Act (MMRSA) by the State Legislation initiated a process of developing local regulatory control of medical cultivation under the Act by Calaveras County. An Urgency Ordinance adopted in May 2016 by the Board of Supervisors has thus far been the culmination of those efforts in the County, but that temporary regulatory framework will expire in February 2018 and cannot be renewed beyond that date.

In November 2016, recreational use of cannabis was legalized state-wide through passage of Proposition 64, also known as the Adult Use of Marijuana Act (AUMA). However, in the November 2016 election voters defeated Measure D that would have established permanent regulations over the cannabis sector in the County. In that election, local voters also approved Measure C, which established local taxes on the cannabis sector in Calaveras. The County is now scheduled to hold a special election on May 2, 2017 where they will vote on Measure B, which is an ordinance prohibiting all cannabis activities in the County so far as allowed given state-wide rules under the MMRSA and AUMA.

While many industries, as the figure below illustrates, make-up the cannabis sector our focus in this analysis is on the County’s cannabis cultivation industry. This is done out of necessity, but also in recognition of cannabis cultivation’s large share of the sector in the County.<sup>1</sup>



<sup>1</sup> A survey of potential licenses conducted by the California Department of Food and Agriculture in August 2016 indicates that cultivation represents about two-thirds (67%) of prospective licensees in the County. For details see: <https://www.cdfa.ca.gov/is/mccp/>

The remainder of the report is set out as follows: In Section Two, we estimate the scale and direct impacts of the County’s registered cannabis cultivation industry in 2016. The economic impacts of those direct effects are then analyzed in Section Three in terms of the indirect, induced and total impacts on Calaveras’ economy. The scale and economic context of the cultivation industry in the County’s economy is then reviewed in Section Four. We hope that this report, and others like it, informs discussions about the costs and benefits of various regulatory actions currently being proposed for the cannabis sector in the Calaveras County. However, we recognize that these economic impacts are only part of a range of impacts associated with the sector.

## **2 The Size of the Cannabis Cultivation Industry in Calaveras County**

In order to estimate the size of the cannabis cultivation industry, we analyzed the area under cultivation, or “canopy area”, from commercial applications that were submitted to the Calaveras County Government under the May 2016 Urgency Ordinance. Using the most recently available list of applications,<sup>2</sup> the canopy area of commercial growers was estimated after removing the applicants whose status was listed as denied.<sup>3</sup> Based on that calculation initial sales and employment in the cultivation industry was estimated from the authors’ previous review of the industry entitled: *Economic Impact Study of the Cannabis Sector in the Greater Sacramento area*.<sup>4</sup> However, several local issues needed to be considered. These issues included:

- Removal of speculative applications and applications that were likely to be denied
- Adjustments for the type of grower (indoor, greenhouse (mixed-light), and outdoor) and their associated yields
- Adjustments for local growing conditions and practices

Therefore, the estimates were refined in consultation with County growers and a sample of their annual direct expenditures to finalize the estimated direct impacts of cultivation operations. In the end, the estimated area under cultivation was adjusted to yield around half of what would be expected from a well-designed and outdoor grow operation. This conservative yield estimate was used despite many applicants specifying that their facilities were greenhouse (mixed-light) operations and some applicants with indoor operations. Nonetheless, owing to lingering uncertainties around application approvals and regulatory risks constraining investment in facilities this conservative estimate of yields from the local industry seemed warranted.

As Table 1 indicates, even with these reductions, the County’s cultivation industry is large and significant. Using a market value of \$1,020 per pound, the 112 tonnes of cannabis cultivated in the county was estimated to have a sales (output) value of \$251 million. After including proprietors and

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<sup>2</sup> The application data used for this analysis was downloaded from the County website on 3 January 2017.

<sup>3</sup> As the canopy area specified on the application actually corresponds to the facility size the area under cultivation was taken to be 70% of the area specified on the application to account for space needed to access the plants.

<sup>4</sup> For details see: [http://www.pacific.edu/Documents/school-business/BFC/CannabisStudy/Sacramento%20Area%20Legal%20Cannabis%20Sector%20Impact%20Study\\_2016\\_10\\_12.pdf](http://www.pacific.edu/Documents/school-business/BFC/CannabisStudy/Sacramento%20Area%20Legal%20Cannabis%20Sector%20Impact%20Study_2016_10_12.pdf)

seasonal workers the industry’s employment, or direct jobs, was estimated to be 2,605.<sup>5</sup> Direct labor income, which is the sum of proprietor income and employee compensation, equaled \$148 million.

**Table 1 Direct impacts of Calaveras County cannabis cultivation in 2016**

Total facility area:	<b>10,983,141</b>
Total number of facilities:	<b>713</b>
Supply (grams):	<b>111,828,345</b>
<b>Value Added</b>	<b>\$184,263,558</b>
<b>Output</b>	<b>\$251,470,085</b>
<b>Labor Income</b>	<b>\$148,385,894</b>
<b>Direct Jobs</b>	<b>2,605</b>

### 3 Economic Impact Analysis

To analyze the economic impacts of the sector and its industries, we utilize economic modelling software called IMPLAN, which allows us to develop a model of the Calaveras County economy.<sup>6</sup> This model is in a sense a general accounting system of transactions between industries, businesses, and consumers that estimates the range of economic impacts. We thereby create a complete, extremely detailed Social Accounting Matrices and Multiplier Models of the Calaveras County economy that enables in-depth examination of the impacts of the County’s cannabis cultivation industry.

IMPLAN was developed in the late-1970s by the United States Forest Service and researchers at the University of Minnesota. The software was initially based on input-output accounts whose analysis was pioneered in the Nobel Prize winning work of Wassily Leontief. As the software evolved, it began using Social Accounting Matrices to incorporate transactions among institutional agents in its analysis. Currently, IMPLAN is among the most widely used economic impact modeling systems. It provides a transparent and detailed approximation of economic impacts that is widely utilized by businesses and government agencies.

The full range of economic impacts that result from the sector’s employment, known as the Total Effect, is the sum of the direct, indirect, and induced effects:

- **Direct Effects** are the jobs and income directly supported by the industry such as the jobs held by cannabis farms’ employees.
- **Indirect Effects** represent the iterative impacts of inter-industry transactions as supplying industries respond to demand from the sector(s) where the initial expenditures occurred. An example of an indirect impact would be employees of a hardware store supplying cannabis cultivators.

<sup>5</sup> Each direct job is defined as a full year of employment, for example 3 people employed for 4 months is one job.

<sup>6</sup> Specifically, in this analysis we use IMPLAN Version 3.1 with calendar year 2013 data and results adjusted to 2016 values.

- **Induced Effects** reflect the expenditures made by recipients of wages in the direct and indirect industries. Examples of induced impacts include employees’ expenditures on items such as retail purchases, housing, food, medical services, banking, and insurance.

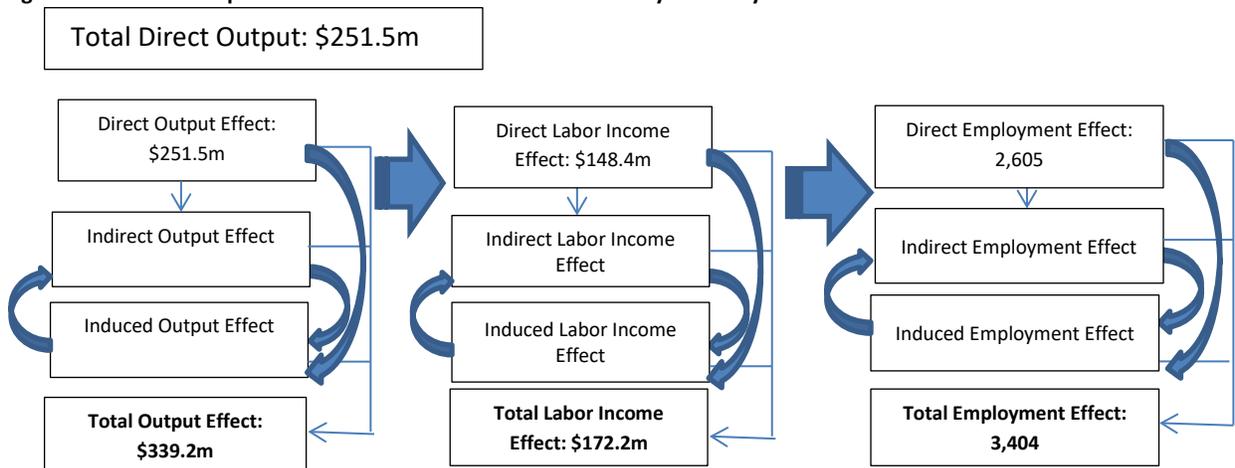
In these analyses, the total, direct, indirect, and induced effects are reported by employment, output, and labor income:

- **Employment** is the number of full- and part-time jobs based on an annual average of monthly jobs. In other words, employment is measured as a full year of employment. Thus, 3 temporary jobs that lasted for 4 months are reported as 1 job.
- **Output** represents the value of industry production. It accounts for the total change in the value of production in an industry for a given time. Output varies as a measure across industries. For cannabis cultivators and service sectors, the value of production equals their sales. For manufacturers, the value of production is sales plus or minus any change in inventories. While for retail and wholesale trade, the value of production equals their gross margin and not their gross sales.
- **Labor Income** is the sum of employee compensation and proprietor income. Employee compensation includes wages, salaries, benefits, and all other employer contributions, while proprietor income consists of payments received by self-employed individuals, and unincorporated business owners.

The economic model is defined for a specific geographic area, and economic impacts are calculated for that area. Indirect and induced effects are calculated using regional purchasing coefficients calculated by IMPLAN, and thus economic impacts do not include spending outside the region of analysis even if the purchases are made by individuals or businesses located within that region.

Calaveras County’s estimated 2016 total direct output impacts from cannabis cultivation were reported in Table 1 in Section 2. Those showed that cultivation operations’ direct output impacts equaled \$251.5 million. That level of output equated to a direct effect on labor income of \$148.4 million. Similarly, the direct employment effect is estimated to be 2,605 jobs.

**Figure 1 Illustrative Impacts of Cultivation on the Calaveras County Economy**



Estimating the industry’s total effects requires indirect and induced impacts to be estimated and combined with the direct effects. Figure 1 illustrates the generation of these total effects. Therefore, we see how the \$251.5 million in cannabis cultivation output generates a total of \$339.2 million of output in the Calaveras County economy. Likewise, the figure shows how the direct labor income of \$148.4 million leads to a total labor income effect of \$172.2 million and the 2,605 direct jobs leads to 3,404 in total employment. Each of these calculations were made within our impact analysis model and the results for each supply/demand scenario are reported in Table 2 below.

**Table 2 Calaveras County Cannabis Cultivation Economic Impacts**

Employment	Direct Effect	2,605
	Indirect Effect	307
	Induced Effect	492
	Total Effect	3,404
Labor Income	Direct Effect	\$148,386,000
	Indirect Effect	\$9,988,000
	Induced Effect	\$13,865,000
	Total Effect	\$172,239,000
Output	Direct Effect	\$251,470,000
	Indirect Effect	\$28,134,000
	Induced Effect	\$59,628,000
	Total Effect	\$339,232,000

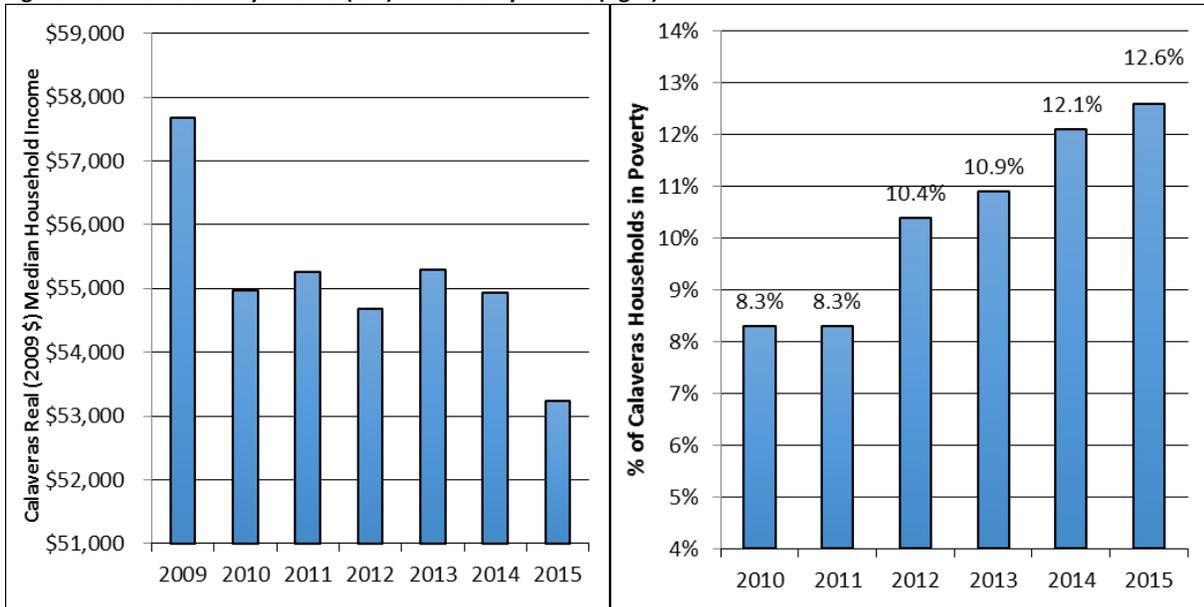
#### **4 Cultivation Impacts in Context**

In assessing cannabis cultivation’s impacts on the County’s economy it’s useful to review a few general characteristics of the economy. Calaveras County’s employment recovered to its 2007 levels of over 19,000 by 2015 after declining nearly 10% during the Great Recession.<sup>7</sup> However, it’s important to recognize that 43% of these employed residents worked outside of the County.<sup>8</sup> In addition, despite this recovery in employment the County has seen continual increases in its incidence of poverty and sustained declines in its real (inflation adjusted) median household income levels as we see in Figure 2.

<sup>7</sup> For further details see the California Employment Development Department’s Labor Market Information Division: <http://www.labormarketinfo.edd.ca.gov/>

<sup>8</sup> Source: US Census Bureau’s American Community Survey (ACS) 2011-2015 Employment by Place of Work (B08130).

**Figure 2 Calaveras County Income (left) and Poverty Trends (right)**



Source: Census ACS 2009 to 2015 5-year average estimates. Series (B19013), left, and Series (S1701), right.

Further indications of some of challenges facing the County are found in recent population trends where the County has seen annual declines in population from 2009 through 2015.<sup>9</sup> Therefore, the estimated activity associated with the cannabis cultivation industry is a significant feature in the County’s economy. As Table 3 reports, there are not any other agricultural commodities in the County with sales near the scale of cannabis. Given the fluctuation in annual agricultural values, because of market and environmental variability, it is useful to examine several years of data. If we take Calaveras’ agriculture industry’s sales value over the five-year period from 2011 to 2015 and adjust it for inflation, the average sales value of the industry is \$28 million in 2016 prices.<sup>10</sup> Hence, the \$250 million in sales value associated with cannabis cultivation is nearly nine times the size of all other Calaveras agriculture combined.

**Table 3 Calaveras County 2015 Crop Report**

Calaveras County - 2015			
Livestock & Poultry (incl. products)	\$14,913,000	Vegetable crops	\$215,000
Field Crops	\$3,740,000	Apiary Products	\$210,000
Fruit & Nut Crops (incl. wine grapes)	\$4,572,000	Nursery Products	\$165,000
Timber	\$1,719,000	<b>Total</b>	<b>\$25,534,000</b>

The hospitality industry is another important part of the County’s economy, but even that industry does not appear to be as large as cannabis cultivation. According to the 2015 Visit California report for Calaveras County produced by Dean Runyan Associates,<sup>11</sup> the hospitality industry was estimated to have

<sup>9</sup> For further details see the California Department of Finance’s Demographic Research Unit: <http://www.dof.ca.gov/Forecasting/Demographics/>

<sup>10</sup> County agriculture sales data are taken from the annual Calaveras County Crop Reports published by the County Agricultural Commissioner’s office and those values were converted into inflation adjusted dollars (real\$) using the BLS Consumer Price Index.

<sup>11</sup> For further details see: [travelstats.com](http://travelstats.com)

a total County-wide sales value of \$167.5 Million, which is nearly a third smaller than cannabis cultivation. Similarly, when we look at employment in the hospitality industry, the 1,955 direct jobs in hospitality are nearly a quarter smaller than the 2,605 jobs estimated in the cannabis cultivation industry.<sup>12</sup> In terms of the number of business, the difference between the two industries is even more striking with 104 establishments in the County's hospitality industry compared with the 713 registered commercial cannabis applicants.<sup>13</sup>

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<sup>12</sup> The scale of the hospitality industry's estimated employment is based on the U.S. Department of Commerce's Bureau of Economic Analysis Regional Economic data for Calaveras County in 2015. It is the sum of all County-wide employment in two sectors: 1) Arts, entertainment, and recreation and 2) Accommodation and food services. For further details see:

<http://www.bea.gov/iTable/iTableHtml.cfm?reqid=70&step=30&isuri=1&7022=11&7023=7&7024=naics&7033=-1&7025=4&7026=06009&7027=2015&7001=711&7028=-1&7031=06000&7040=-1&7083=levels&7029=33&7090=70>

<sup>13</sup> The number of establishments in the hospitality industry is estimated from U.S. Department of Labor's Bureau of Labor Statistics for Calaveras County in 2015. It is the sum of all County-wide establishments in three sectors: 1) Amusements, gambling, and recreation 2) Accommodation and 3) Food services and drinking places. For further details see: <https://data.bls.gov/cew/data/api/2015/a/area/06009.csv>