

Cannabis Appellations Program Regulations

Economic and Fiscal Impact Analysis

Prepared by:
ERA Economics, LLC

Prepared for:
California Department of Food and Agriculture
CalCannabis Cultivation Licensing
Richard Parrott, Director
Keir Furey, Environmental Projects Unit

December 16, 2019

- 1. Introduction..... 3**
 - 1.1 CAP Regulation Overview3**
 - 1.2 Public Outreach and Input 5**
 - 1.3 Major Regulation Determination.....5**
 - 1.4 EFIA Organization 5**
- 2. Analytic Approach and Data 5**
 - 2.1 Data Sources..... 6**
 - 2.2 Overview of the Analytic Approach.....6**
- 3. Cannabis Industry Overview 7**
 - 3.1 Cannabis Market Supply7**
 - 3.2 Cannabis Market Demand..... 8**
 - 3.3 Existing Cannabis Market Labeling 9**
- 4. Conceptual Effect of Appellations on Cannabis Market Structure 10**
- 5. Economic and Fiscal Impact Analysis..... 13**
 - 5.1 Regulation Baseline Alternative 13**
 - 5.2 CAP Regulation Alternative 13**
 - 5.2.1 Economic Benefits 14
 - 5.2.2 Economic Costs..... 21
 - 5.2.3 Employment (Job) Estimated Effects..... 26
 - 5.2.4 Estimated Effects on Small Businesses..... 27
 - 5.2.5 Estimated Effects on Housing Costs 27
 - 5.2.6 Other Economic Impacts to Businesses or Individuals 27
 - 5.2.7 CalCannabis Fiscal Costs 28
 - 5.2.8 Other State and Local Public Agencies Fiscal Costs 28
 - 5.3 Regulation Alternative 1 28**
 - 5.3.1 Economic Benefits 29
 - 5.3.2 Economic Costs..... 29
 - 5.3.3 Employment (Job) Estimated Effects..... 31
 - 5.3.4 Estimated Effects on Small Businesses..... 31
 - 5.3.5 Estimated Effects on Housing Costs 32
 - 5.3.6 Other Economic Impacts to Businesses or Individuals 32
 - 5.3.7 CalCannabis Fiscal Costs 32
 - 5.3.8 Other State and Local Public Agencies Fiscal Costs 32
- 6. Summary..... 32**
- 7. References 33**

List of Tables

Table 1. CalCannabis License Summary 8
Table 2. Cannabis Appellation Establishment by Year without CAP 10
Table 3. Estimated Cannabis Appellation Establishment by Year 16
Table 4. Estimated Cannabis Appellation Production by Year 17
Table 5. Estimated Cannabis Appellation Price Premium by Appellation/Quality 19
Table 6. Production Method Share and Price Summary (\$/lb) 19
Table 7. Direct Benefits of the CAP (in millions of dollars) 20
Table 8. Indirect and Induced Benefits of the CAP 20
Table 9. CAP Regulation Costs per Appellation 24
Table 10. CAP Regulation Total Direct Cost Summary 25
Table 11. CAP Regulation Total Indirect Cost Summary 26
Table 12. CAP Effect on Small Businesses 27
Table 13. CAP Fiscal Costs Summary 28
Table 14. Alternative 1 CalCannabis Costs Summary 30
Table 15. Alternative 1 Direct Economic Cost Summary (\$ in millions) 30
Table 16. Alternative 1 Indirect and Induced Economic Cost Summary 31
Table 17. Alternative 1 CalCannabis Costs Summary 32

List of Figures

Figure 1. California Cannabis Price Summary (2019 May – December) 9
Figure 2. California Wine AVA Development 15
Figure 3. Wine Grape Prices (2018) by Crush District 18

1. Introduction

The CalCannabis Cultivation Licensing Division (CalCannabis), a division of the California Department of Food and Agriculture (Department) is proposing amendments to existing regulations and adoption of additional regulations in California Code of Regulations, Title 3, Food and Agriculture Division 8, Cannabis Cultivation. These regulations specify requirements for cultivators and other cannabis businesses to establish cannabis appellations and label cannabis produced in those appellations. State of California (State) law requires that a rulemaking agency provide an assessment of the fiscal impacts its regulation would have on State and local governments and assess the potential economic impact on State businesses and individuals. The rulemaking agency must summarize the results using Standard Form 399, Economic and Fiscal Impact Statement (STD 399). This Economic and Fiscal Impact Assessment (EFIA) describes the data, methods, and results of the analysis developed to evaluate the required economic and fiscal impacts of the proposed Cannabis Appellations Program (CAP) regulations.

The data, methods, and analytic approach applied in this EFIA are based on and consistent with the economic and fiscal impact analysis conducted to support Department rulemaking for the cultivation licensing program, starting in 2016. In particular, the Department prepared an initial draft Standardized Regulatory Impact Assessment (SRIA) for its medicinal cannabis cultivation licensing regulations in summer 2016. These regulations were developed under its authority from the Medical Cannabis Regulation and Safety Act (MCRSA) (Assembly Bill 243, Assembly Bill 266, and Senate Bill 643). In November 2016, Proposition 64, the Adult Use of Marijuana Act (AUMA), was passed by voters. Subsequently, Senate Bill 94, the Medicinal and Adult-Use Cannabis Regulation and Safety Act (MAUCRSA), and associated trailer bills, were passed and remain the most current laws governing cannabis cultivation in California. Under MAUCRSA, the Department established a comprehensive regulatory framework for the licensing and enforcement of cannabis cultivation for medicinal and adult use cannabis markets in California. In December of 2017, the Department prepared a final SRIA for the current cultivation licensing program regulations, which were adopted in January 2019. The analysis for this proposed CAP regulation uses data and analysis from the 2017 SRIA, updated where appropriate, and applied additional data, assumptions, and analysis to assess impacts.

1.1 CAP Regulation Overview

This section provides an overview of the CAP and a summary of how the CAP is structured based on other, similar labeling standards.

The CAP was developed by the Department to meet statutory requirements in Senate Bill (SB) 94, the Medicinal and Adult-Use Cannabis Regulation and Safety Act (MAUCRSA) and associated trailer bills. The statute requires the Department to establish “a process by which licensed cultivators may establish appellations of origin, including standards, practices, and

cultivars applicable to cannabis produced in a certain geographical area in California” that is not otherwise defined in the County of Origin labeling requirements specified in the existing California Code of Regulations. The CAP would develop a framework that allows cultivators, or groups of cultivators, to establish appellations. An appellation is a designation for cannabis grown under a defined set of conditions, which can be a combination of geography (location) and other production requirements (e.g. cultivation methods, management, other production practices defined by cultivators). The CAP regulations (and by extension, the Department) do not define geographical areas or prescribe any specific standards and practices. Rather, the regulations establish a framework for cultivators/industry to submit petitions to establish an appellation, and for the Department to review petitions and check compliance as part of broader cultivation licensing requirements. Important facts for the purposes of economic impact analysis are: many cultivators are already including appellation-like information on their labels; conversion from informal labelling of growing conditions to the regulated CAP appellation is completely voluntary; and it is up to individual cultivators to define an appellation’s geography and production requirements.

The proposed CAP shares some similarities with labeling requirements for U.S. and French wines¹. U.S. wine Appellation of Origin labeling requirements allow wine to be labeled based on geopolitical boundaries (e.g. county or state) or based on American Viticultural Area (AVA) regions. The labeling requirement for the U.S. Appellations of Origin is entirely based on the geographical location of grape production (e.g. county or AVA). Universal blending requirements specify the minimum share of wine produced in an area that can be labeled as from that area, but all of these requirements are related to the geographical area and not production requirements in those regions. An alternative model is the French appellation d'origine contrôlée (AOC) system. The AOC applies to a range of agricultural products, including wine. The AOC model defines geography in addition to production requirements for labeling and is enforced through a testing and verification program to ensure wine meets specified AOC labeling standards. Therefore, it is more expansive than the U.S. Appellation of Origin approach.

The proposed CAP does not independently establish production requirements or geographical areas. These designations are voluntary and up to the industry to define. However, CAP regulations do require the appellations to be established based on a combination of geography and production requirements. It is up to cultivators to define the combination of geography and standard, practice, and cultivar requirements that define an appellation. Cultivators are responsible for documenting and ensuring compliance with appellation production requirements. However, the Department will review and respond to complaints similar to its other enforcement duties under the existing cultivation licensing regulations.

¹ The Department considered alternative regulations that would have been more similar to the AOC model, but this alternative was rejected because the preferred alternative resulted in greater industry benefits and lesser costs (see Section 3 for a discussion of alternatives).

1.2 Public Outreach and Input

The Department conducted extensive public outreach to solicit public feedback as the draft regulations were being developed. Specific outreach activities supported the development of this EFIA. This included outreach to industry experts in order to benchmark industry data, update data applied in the existing SRIA of cultivation licensing regulations, and understand the impact (e.g. compliance time and cost) of components of the regulations. The following groups were contacted to support development of the EFIA:

- Dispensaries in the greater Sacramento area to validate price premiums associated with different appellations
- Cultivators to update cost of production information and verify industry wholesale price data and trends
- Cannabis alliances to get general feedback on how cultivators view appellations as part of broader business planning
- The Mendocino Appellations Project to understand current cannabis labeling options, how cultivators are using them, and what benefits and costs they are incurring

These data were used to guide development of the analysis and resulting impacts. The final EFIA benefited greatly from this input.

1.3 Major Regulation Determination

A preliminary economic impact analysis was prepared in the fall of 2019 using preliminary data but the same methods and approach described in this EFIA. That analysis applied conservative assumptions to test whether the economic impacts of the proposed amendment are likely to exceed the \$50 million threshold for a major regulation. This analysis was provided to the Department, and the Department determined that this regulation is not a major regulation. The economic impact analysis presented in this EFIA, using better data and assumptions, shows that impacts are less than \$20 million and well below the major regulation threshold.

1.4 EFIA Organization

The remainder of the report is structured as follows. The following section describes the analytic approach and data used to quantify economic and fiscal impacts. Section 3 provides an overview of the cannabis industry. Section 4 describes the conceptual framework for assessing the economic impact of the regulations. Section 5 summarizes the economic and fiscal impacts of the regulation and each alternative.

2. Analytic Approach and Data

The EFIA is developed to comply with economic impact analysis requirements specified in the Administrative Procedure Act (California Govt. Code 11340 et seq).

Publicly available data were leveraged to the extent possible. When data were not available, judgment and reasonable assumptions were applied. For example, given the limited data on cannabis appellations in California, wine data were used to supplement the analysis. These data were validated with industry groups and through interviews where possible.

2.1 Data Sources

The analysis relies primarily on publicly available data. However, data on the cannabis industry is limited because the industry is young and no federal agency (e.g., USDA) is responsible for collecting industry statistics. Production prices, yields, acreage, and costs are developed using the SRIA used to support prior rulemaking efforts (CalCannabis 2017). All prices and costs were indexed to current, 2019 dollars using the GDP Implicit Price Deflator (GDP-IPD). Additional cost and return information was developed and incorporated into the analysis through industry outreach and surveys conducted to support the EFIA.

2.2 Overview of the Analytic Approach

The CAP would result in quantifiable and unquantifiable (i.e. non-monetized) costs and benefits. The analysis provides a qualitative discussion and quantitative estimates of the following economic and fiscal impacts:

1. The effect on the cannabis market structure, and resulting change in market price, from introducing cannabis appellation labeling to the market.
2. Direct benefits that accrue to businesses and individuals that could result from the cannabis appellations program regulations.
3. Direct costs that accrue to businesses and individuals that could result from the cannabis appellations program regulations.
4. Indirect economic impacts to businesses and individuals that are related to the direct costs or benefits.
5. Fiscal costs to the Department from program administration, implementation, reporting, and periodic updates.

Non-monetized costs and benefits are described throughout the EFIA. Where possible, a qualitative sense of the magnitude of any effect is presented based on general economic logic. The technical approach to quantify economic costs and benefits of the CAP is as follows:

1. Develop a framework to assess the potential effect of the appellations labeling program on the cannabis cultivation market
2. Estimate the potential number of appellations and the share of licensed cannabis production that is likely to participate in the appellations program
3. Quantify benefits
 - a. Estimate the price premium associated with appellations of varying quality

- b. Quantify indirect and induced effect of an expansion in cannabis industry size, value, and potential businesses associated with the appellation
4. Quantify costs
 - a. Estimate cultivator costs to establish appellations
 - b. Estimate Department fiscal costs for staff level of effort to maintain program
 - c. Estimate other indirect costs to implement the program
 - d. Estimate indirect and induced effects of any direct economic costs of the program
5. Summarize total costs and benefits

The following sections provide additional data, assumptions and results of the analysis.

3. Cannabis Industry Overview

No comprehensive dataset exists for the cannabis industry. Prices, costs, yields, and regional production quantities are not consistently reported, and the industry is young and continuing to evolve. Therefore, it is necessary to assess the economic impact of the CAP based on other, similar agricultural products. A reasonable assumption is that the CAP would have an effect similar to wine labeling under the U.S Appellations of Origin and French AOC². Wine and cannabis are both recreational adult consumer products. Like wine, cannabis is perceived by consumers to have different characteristics based on region and production practices (sometimes called terroir). This is supported by a limited but growing science on the effect of breeding and different strains on cannabis properties (Bershaw et al. 2017, Mudge 2019). Therefore, the EFIA uses wine appellations as a model for the potential economic impacts of cannabis appellations under the CAP.

3.1 Cannabis Market Supply

Current conditions for the cannabis industry are developed using preliminary cultivation licensing data, industry data developed for the 2017 SRIA, and updated data developed for this EFIA.

The 2017 SRIA estimated that total cannabis production in California was greater than 10 million pounds³ annually. However, the share consumed in California based on market demand estimates (see Section 3.2) is significantly less. Table 1 summarizes the current distribution of active and inactive licenses based on a query of cultivation licenses as of September 2019.

² Coffee is another agricultural good with different regions associated with different taste profiles. However, this is a small and growing specialty segment of the coffee market (most coffee consumers do not purchase based on specialty labeling/appellations).

³ All units are in flower equivalents. That is, the total quantity includes non-flower processed retail products.

Table 1. Cultivation License Summary

License Type	Active	Inactive
Medium Indoor	33	118
Medium Mixed-Light Tier 1	72	103
Medium Mixed-Light Tier 2	19	55
Medium Outdoor	129	169
Nursery	124	217
Processor	67	126
Small Indoor	105	295
Small Mixed-Light Tier 1	801	980
Small Mixed-Light Tier 2	183	313
Small Outdoor	820	1600
Specialty Cottage Indoor	19	21
Specialty Cottage Mixed-Light Tier 1	61	95
Specialty Cottage Mixed-Light Tier 2	15	17
Specialty Cottage Outdoor	16	31
Specialty Indoor	126	210
Specialty Mixed-Light Tier 1	127	188
Specialty Mixed-Light Tier 2	21	32
Specialty Outdoor	145	224

Applying the active licenses to the estimated production for each license type shows that the current licensed market is producing between 1.2 and 1.6 million pounds per year. The baseline production estimates developed for the SRIA were not updated for the current EFIA because no more recent data is known to exist.

3.2 Cannabis Market Demand

Current conditions for the cannabis industry are developed using cultivation license data, industry data developed for the 2017 SRIA, and updated data developed for this EFIA. The 2017 SRIA estimated that total cannabis consumption in California was around 2.5 million pounds⁴ annually. The estimated share of production in the licensed market was approximately 50 percent, or around 1.25 million pounds per year.

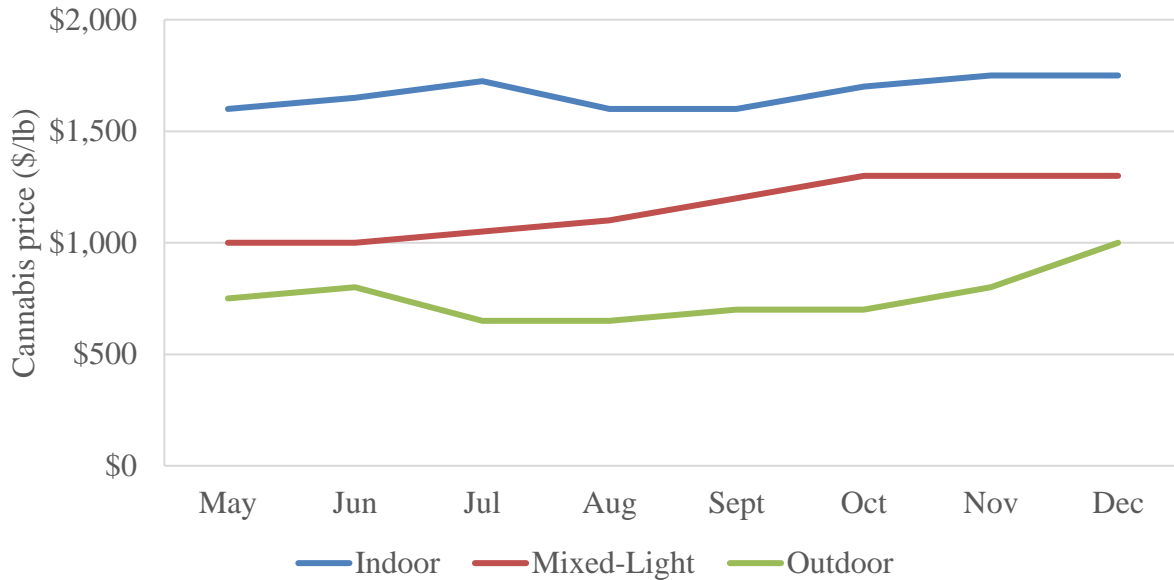
A conservative estimated market size of 1.25 million pounds per year is applied to this EFIA, consistent with the initial SRIA and preliminary market data.

Cannabis market prices exhibit seasonality similar to other agricultural products. There is no single source for unbiased price estimates. Industry feedback as this EFIA was being prepared was that wholesale cannabis prices were generally lower since the implementation of MAUCRSA, but had stabilized more recently. This is generally confirmed with a review of price

⁴ All units are in flower equivalents, including the quantity of non-flower processed retail products.

aggregation services. Figure 1 illustrates recent price trends using the Cannabis Benchmarks reporting. Average prices over the 8 months of data are approximately \$1,600/lb for indoor, \$1,150/lb for mixed-light, and \$750/lb for outdoor. These average prices are used in this analysis. It is important to note that this EFIA is concerned with economic impacts to cannabis cultivators, and as such the relevant metric is wholesale prices. Reported prices often conflate retail prices because of confusion in reporting and the direct-to-retail nature of production in some markets. True wholesale prices are typically lower than retail prices.

Figure 1. California Cannabis Price Summary (2019 May – December)



Source: Calculations using Cannabis Benchmark (<https://www.cannabisbenchmarks.com/>) data, adjusted with industry feedback.

Other market parameters including production costs, yields, and production methods are applied from the SRIA database. All costs are indexed up to 2019 dollars using the Gross Domestic Product Implicit Price Deflator (GDP-IPD).

3.3 Existing Cannabis Market Labeling

Some producers in California have been exploring and using labeling and marketing to differentiate specific geographical regions. In 2015 the Mendocino Appellations Project (MAP) was founded, which developed a proposal to subdivide Mendocino County into 11 cannabis appellations, based on a combination of AVA and AOC characteristics. Since formation, MAP has evolved into a statewide coalition of many local organizations promoting appellations for their local area, now called the Origins Council (OC). It is the most advanced cannabis appellation development program in the U.S.⁵. The MAP program is intended to differentiate

⁵ For example, various Oregon groups have pushed for appellations, both for marketing purposes and to prevent cross-pollination with hemp crops.

cannabis production in Mendocino County, highlighting craft cannabis and creating a niche market for cultivators.

Approximately 11 OC appellations were developed over a period of 4 years (2 – 3 per year). In the absence of the CAP regulations it is likely that some appellations would continue to be developed in California, based on consumer demand and market conditions. For the purposes of establishing industry baseline conditions in the absence of appellations program regulations, a growth rate of 2 appellations per year is used. Table 2 summarizes the non-CAP (i.e., baseline) appellation development by year used for this EFIA.

Table 2. Cannabis Appellation Development by Year without CAP

Year	# of Appellations Developed
1	11
2	2
3	2
4	2
5	2
Total	19

4. Conceptual Effect of Appellations on Cannabis Market Structure

The appellations program is effectively a labeling program. It provides cultivators with the opportunity to form appellations, develop labeling, and market specific attributes of the product that may be desirable to consumers. This section provides a brief overview of the economics of introducing labels into a market to put the subsequent economic impact analysis in context.

The economics of different types of labeling/branding requirements have been studied by economists for many decades. Most of this body of work is motivated by various food labeling requirements (e.g., organics, GMO, country of origin, traceability for food safety, and environmental labeling). Many of these examples share similarities with cannabis appellations. Introducing labeling to a market can impose costs and/or benefits on producers and/or consumers. The magnitude and distribution of costs and benefits varies based on specifics of the market characteristics and the type of product attributes that are being labeled.

Teisl and Roe (1998) broadly define a labeling program (or label) as a policy of an agency or third-party entity that "... regulates the presentation of product-specific information to consumers." They go on to define a range of information (product attributes) that could be represented to the consumer in a label, ranging from price to quality and environmental factors (e.g., non-GMO). Product attributes that are represented in a label are important for understanding the potential distributional impacts (to consumers and producers) of a labeling program. That that end, Bonroy and Constantatos (2014) define the following taxonomy of attributes that may be reflected in a label:

- **Search attributes.** Product attributes that consumers can identify through costless (or cheap) research. For example, freshness can be identified by simply looking at many food products.
- **Experience attributes.** Product attributes that can only be determined after purchasing and consuming the product. For example, it is typically necessary to purchase and taste food to determine if it is good.
- **Credence attributes.** These are attributes that cannot be verified (or are extremely difficult and/or cost-prohibitive to verify). For example, it is difficult for a consumer to determine and verify whether fresh produce is organic⁶. As such, consumers rely on labeling to signal if produce is certified organic.

Labeling is most important for credence attributes. Consumers can, in many cases, identify search and experience attributes at a relatively low cost. For example, consumers can inspect, smell, and potentially even sample a product prior to purchasing. Credence attributes are costly to identify and, as a result, labeling is more effective at adding information to the market in these cases. Importantly, the information in the label is typically new information for the consumer, but not for the producer. A producer knows if its crops are organic, but a consumer must rely on the label. Many of the attributes of a cannabis appellation (e.g. soil, production practices, location) are credence attributes.

The flow of information among market participants (producers and consumers) is critical for the efficient operation of markets (Akerlof 1970). Introducing labeling (in this case, appellations) provides additional⁷ information in the cannabis market. Cultivators are able to define appellations to signal specific product attributes to consumers. Consumers are able to identify specific attributes and adjust purchasing decisions accordingly. Additional information may cause (or correct) market distortions and it may also introduce new market distortions (Teisl and Roe 1996). For example, introducing labeling for non-GMO products has an effect on consumers' purchases of other products that are not labeled GMO (Zilberman 2014). The economic impact of a label depends on the characteristics of the labeling requirements, market structure, and nature of new information being introduced to the market.

It is useful to apply a standard framework to assess the economic implications of cannabis appellation labeling. Mussa and Rosen (1978) define a standard economic model to discuss the effects of introducing labeling (new information) to the market that can be adapted to the cannabis industry example. Define consumers' utility, U , (i.e. well-being) as $U(\theta) = \theta q - p$, where q is the quality of cannabis consumed and p is the price. The quality, q , represents a number of attributes, many of which are not known by the consumer. For example, the consumer

⁶ Bonroy and Constantatos (2014) further differentiate between process attributes as a type of credence attribute, but this analysis does not consider these distinctions.

⁷ Cultivators are already able to establish appellations/labeling, and have been doing so. The CAP formalizes appellations by establishing a state process.

does not know with certainty what production practices and inputs were applied by the cultivator. The quality of cannabis varies between $[q_L, q^H]$ (low and high quality). Consumers' valuation of quality varies in proportion to θ , where θ also ranges between low and high values $[\theta_L, \theta^H]$. In the absence of a label (appellation), consumers do not know with certainty what quality of product they are purchasing. This information is available to the cultivators, but since there is no labeling requirements/standards a consumer cannot directly observe product quality. This basic framework can be extended to assess the impact of labeling on consumer and producers in the market. However, for the cannabis market there is insufficient data to develop this type of model. Qualitative results of the analysis are discussed below.

Introducing labeling (appellations) causes several different effects in the market. Bonroy and Constantatos (2015) provide a detailed discussion of each effect, the general results are summarized here:

- **Market segmentation effect.** The introduction of labeling causes market segmentation. Consumers that demand specific attributes (appellations) now have better information to identify and purchase cannabis produced with those attributes. As a result, the market segments into different appellations/qualities. As long as the high-quality market remains competitive, meaning there are many cultivators in the market, the label provides an overall total benefit to producers and consumers (Zago and Pick 2004). This is likely to be the case in the cannabis market because there are many cultivators, even within an appellation.
- **Differentiation effect.** The label also creates competition between newly created segments of the market. The magnitude of this effect depends on how substitutable cannabis of different quality/appellations is from the perspective of consumers. As a result, market prices adjust in the low- and high-quality market segments. The degree of substitutability between different cannabis quality is not known, and no literature was identified on this topic. Therefore, it is not possible to assess the differentiation effect on market prices, and any associated benefits to producers and consumers. However, based on the wine AVA model, it is likely that the industry realizes an increase in price in the high-quality cannabis product markets. The net result is an increase in producer surplus (profits) but a reduction in consumer surplus (consumers' surplus of benefit received over price paid), with an overall positive increase in total welfare.
- **Ranking Effect.** Labeling may also cause impacts in input markets. For example, if a specific input to cannabis production is no longer used as a result of labeling, purchases for that input could fall (at least in the labeled market segment). As with the differentiation effect, there is insufficient information to establish whether this is the case for cannabis because specific appellation standards and practices are not known at this time.

The conclusion is that the likely effect of the CAP is an increase in total benefit (sum of producer and consumer surplus) for the industry. Labels will introduce a segmentation effect, but competition in all markets is likely to remain strong. Labeling will also create a differentiating effect, which is likely to increase competition across market segments, and this will be reflected in market prices adjusting in each market segment. In general, similar to wine AVAs, it is likely to cause a price premium in the high-quality appellation markets and a price reduction in the remainder of the market. The increase in producer surplus is likely to offset any reduction in consumer surplus within the cannabis market. The net effect on input markets is not known.

In summary, labels (appellations) introduce information to the market that was otherwise not easily available to the consumer (but was available to the producer). This additional information is beneficial to consumers as they are now more informed as to the exact attributes of the product. It is also beneficial to producers as they are able to segment and differentiate the market to reflect unique aspects of their product. The following EFIA analysis extends these qualitative results to quantify specific impacts on costs and benefits.

5. Economic and Fiscal Impact Analysis

The following sections present the results of three alternatives: the baseline, CAP (proposed regulation), and an alternative to the proposed regulation that was considered by the Department. Each section summarizes the analysis data, methods, and results. Subsections within each section summarize the economic and fiscal impacts as required by the Administrative Procedures Act.

5.1 Regulation Baseline Alternative

The baseline for the regulation is defined in Cal. Govt. Code §11346.3(e) as the most cost-effective alternative that is equally effective in achieving the purpose of the regulation. This alternative is to continue to allow cultivators to develop appellations on their own with no involvement by the Department.

The industry baseline is defined under Section 3, above. No economic impact would occur under the baseline alternative because industry appellations would continue to develop as they have been without protection against misuse. Therefore, by definition, there would be no change from current baseline conditions. These baseline conditions are used to assess the economic and fiscal impacts of the proposed CAP regulation (Section 5.2) and AOC alternative (Section 5.3), below.

5.2 CAP Regulation Alternative

The CAP regulation alternative is the preferred alternative upon which the proposed regulations are based. As described previously, the CAP is similar to components of the U.S. Appellations of Origin program and the French AOC model. However, the Department does not establish appellations or their standard, practice, and cultivar requirements. Defining geographies and production requirements is up to individual cultivators and the industry more broadly.

The salient features of the CAP that affect economic and fiscal impacts are as follows:

- The Department will allow cultivators to establish appellations through a petition process. The Department will not independently establish appellations.
- Appellations will be defined on the basis of geography and production requirements. Cultivators will define standard, practice, and cultivar requirements.
- A group of cultivators will submit a petition to establish an appellation and the Department will review and make a decision on the petition. A fee paid to the Department will cover staff costs.
- Each cultivator will be responsible for documenting compliance with appellation standard, practice, and cultivar requirements.
- Cultivators are free to use or not use an appellation; that is, the program does not mandate a cultivator to take any specific action.

The economic impact of the alternative includes any costs and benefits attributable to the CAP that accrue to cannabis businesses, consumers, and linked industries. As described under Section 4, the introduction of appellations has an effect on market structure as producers and consumers are better able to identify cannabis attributes and adjust production practices and purchasing patterns accordingly. A review of economic literature on other, similar labeling programs suggests that the program causes a net increase in total welfare (benefits). The effect on market structure and benefits is described under Section 5.2.1. The effect of the CAP regulation on costs are summarized in Section 5.2.2, and each regulation cost is estimated. Subsequent economic and fiscal impacts follow from the methods, data, and results summarized in Sections 5.2.1 and 5.2.2.

5.2.1 Economic Benefits

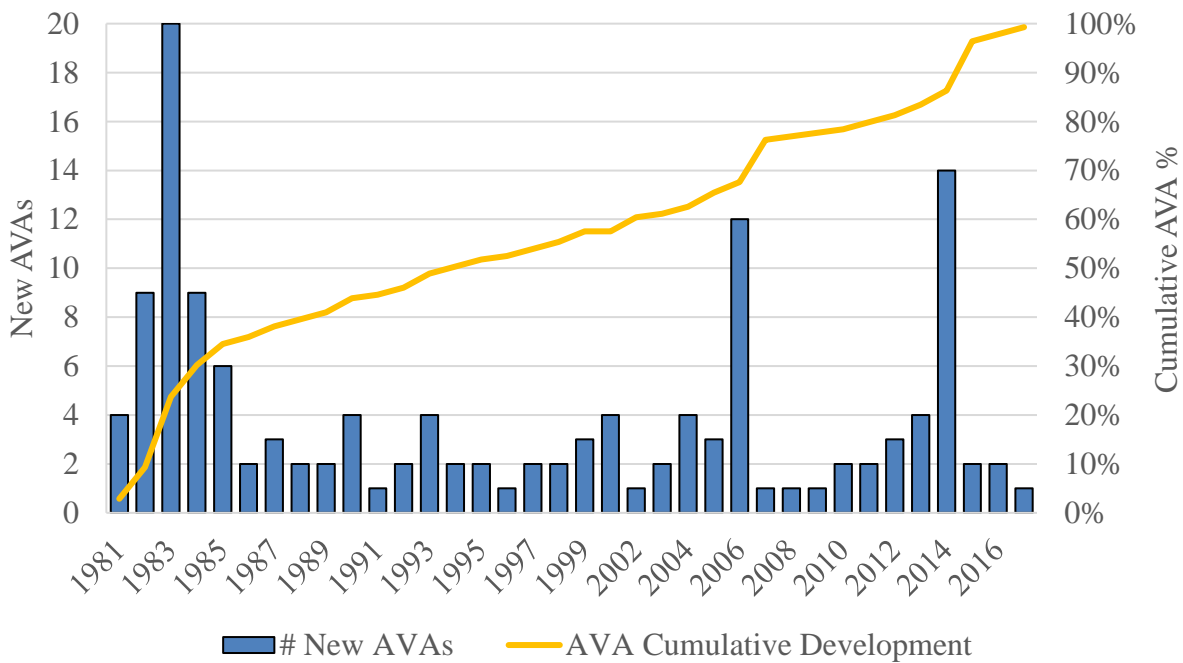
The CAP introduces labeling, allowing consumers and producers to identify unique cannabis attributes, and providing benefits to the industry. This EFIA leverages data from the California wine industry to estimate the direct benefits of the CAP, applying the methods described under Section 2.2.

An American Viticultural Area (AVA) recognizes a wine grape growing region that has unique and distinguishable geographical features. California AVA designations are some of the most widely recognized agricultural appellation/labels in California. As described under Section 3.3, AVA data were combined with cannabis industry data to estimate the number of California cannabis appellations and corresponding production volume in California under the CAP. Some cannabis growers have formed the OC and begun developing appellations. As of 2019, approximately 11 cannabis appellations have been developed by the OC in the Mendocino production area.

To establish the benefits of cannabis appellation labeling, the current OC appellations are assumed to be similar to high-quality wine AVAs. In particular, the quality of cannabis produced in the current appellations is assumed to be analogous to the quality of wine produced in the Napa AVA. Calculating the share of Napa AVAs (15) to the total number in California AVAs (125) and extrapolating that to the OC appellations (11) results in an estimated total of 92 cannabis appellations in California under the CAP.

As has occurred with wine AVAs, cannabis appellations will take several years to develop as consumers and producers begin to understand the unique attributes of cannabis grown in different geographies and using different production requirements. The current total of 125 California AVAs was established over 38 years, with an initial group of AVAs being established in the first 5 years after implementation (Wine Institute, 2019). Figure 2 illustrates the development of wine AVAs over time.

Figure 2. California Wine AVA Development



This EFIA assumes that cannabis appellations will be established over a period of only 5 years, however it is possible that the industry will continue to evolve over several decades. The California AVA establishment rate and pattern in the first 5 years was applied to the cannabis appellations. This results in 9 appellations established in the first year and 92 in total by year 5. As noted above, approximately 11 OC appellations have been developed over a period of 4 years (2 – 3 per year), and this would continue in the absence of the CAP. Table 1 summarizes appellation establishment by year under the proposed regulation and CAP program and under the baseline. The difference is used to estimate the impacts of the proposed regulation.

Table 3. Estimated Cannabis Appellation Establishment by Year

Year	# of CAP Appellations Established	# of Baseline Appellations Developed	Difference
1	9	11	(2)
2	17	2	15
3	38	2	36
4	17	2	15
5	11	2	9
Total	92	19	73

Estimated cannabis appellation production volume was based on California Grape Crush data for specific AVAs from 2016, 2017, and 2018 (CA Grape Crush Reports, Various Years). Cannabis appellation production volume was segmented into three quality classes: high, medium, and all other production:

- The highest quality production appellations are likely to be produced in lower volumes and at higher costs. These will receive the greatest price premium. Napa Valley is the highest quality wine grape producing region in California. The quantity of high-quality cannabis produced is estimated using the ratio of Napa Valley wine (Crush District 4) to total California wine grape production and applying that to the total cannabis market size.
- Medium-quality production is likely to have a greater share of total production volume, but at a lower cost and price. The analysis uses the production share of San Luis Obispo, Santa Barbara, and Ventura Counties (Crush District 8), a medium-high quality wine grape producing region, relative to total California wine grape production, to represent medium-quality appellation cannabis production volume.
- All other production is not assumed to be in an appellation. This is comparable to wine produced in the lower-quality AVAs, or not in AVAs across the state. There is no price premium associated with these areas.

The high and medium quality production shares were applied to the estimated legal-market size from the 2017 SRIA of 1.25 million pounds for the with-regulation and baseline conditions.

Table 4 summarizes production quantity and quality by year. For example, by year 5, a total of approximately 48,700 pounds of cannabis will be produced in the high-quality appellations and 65,400 in the medium-quality appellations. Netting out the baseline (without-regulation) production, approximately 38,400 pounds of high-quality and 51,500 pounds of medium-quality cannabis will be introduced to the market as a result of the proposed regulation. The overall size of the market does not change as a result of CAP regulations.

The CAP is fully implemented as of the effective date specified in MAUCRSA (January 1, 2021). The 12-month period following implementation of the regulation would be year 1. However, since appellations will be developed over a period of years and the annual pattern of petition submission is not known, the EFIA assesses economic impacts based on the average

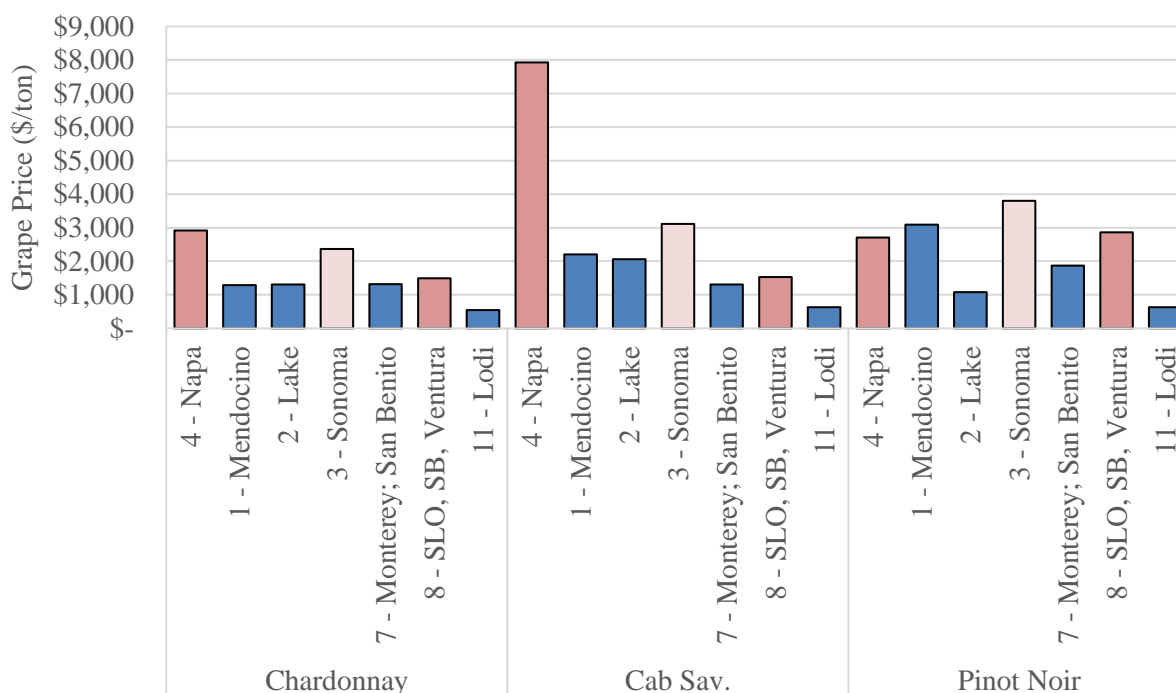
annual impact over the year 1 to 5 period. This provides a richer picture of the economic benefits and costs of the program.

Table 4. Estimated Cannabis Appellation Production by Year

		Year 1	Year 2	Year 3	Year 4	Year 5	Avg. Annual
<i>Production (lbs)</i>							
With Appellations	High-quality	4,057	13,184	33,467	42,594	48,679	9,736
	Middle-quality	5,449	17,709	44,953	57,213	65,386	13,077
	All Other	1,240,495	1,219,108	1,171,581	1,150,193	1,135,935	1,227,187
	Total	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Baseline	High-quality	5,950	7,031	8,113	9,195	10,277	2,055
	Middle-quality	7,992	9,445	10,898	12,351	13,804	2,761
	All Other	1,236,059	1,233,524	1,230,989	1,228,454	1,225,920	1,245,184
	Total	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Difference	High-quality	-1,893	6,152	25,354	33,399	38,402	7,680
	Middle-quality	-2,543	8,264	34,055	44,862	51,582	10,316
	All Other	4,436	-14,416	-59,409	-78,261	-89,984	-17,997
	Total	0	0	0	0	0	0

The economic model described under Section 4 predicts that labeling will result in price changes in the cannabis market. Wine AVA data are used to estimate the likely range of prices for high- and medium-quality appellations. Grape price premiums range by variety, district, and over time in response to changes in grape supply and demand. Figure 3 illustrates regional differences in wine prices for the recent year of 2018. It is important to note that a Crush District includes multiple AVAs, so AVA-specific farm-gate price differentials are not possible to identify in the data.

Figure 3. Wine Grape Prices (2018) by Crush District



Price premiums for high-quality cannabis are estimated using California Grape Crush data for three premium varieties: Cabernet Sauvignon, Pinot Noir, and Chardonnay. Medium quality crush prices are taken from Mendocino, Lake, Sonoma, Monterey, San Benito, San Luis Obispo, Ventura Counties, and the Lodi production region (Crush Districts 1, 2, 3, 7, 8, and 11). Napa was not used in the analysis because grape crush price premiums exceeded 400% above state averages.

Wholesale price premiums for these regions and premium varieties were calculated by comparing the average crush price against the state average using 2018 California Grape Crush Prices. Based on grape price data, high-quality⁸ grapes command a premium of approximately 30% and medium-quality grapes received about a 15% premium (half of the high-quality premium). However, feedback from dispensary and industry interviews conducted for the EFIA consistently suggested that a price premium of 30% to 15% was too high. Two reasons were cited. First, consumers are not able to differentiate between the various labels from specific areas currently used due to a significant number of products from those areas. Second, retail establishments indicated that consumers are price sensitive⁹ and typically shop for products with specific effects, and then shop at the lowest price point in that segment. To reflect this industry

⁸ Napa was not used in the analysis because grape crush price premiums exceeded 400% above state averages.

⁹ There is no data to support an estimate of the price elasticity of demand for different cannabis strains/qualities, and therefore there is no way to independently assess this claim.

feedback, premiums were reduced by 5%, to roughly 25% and 10%, respectively¹⁰. Table 5 summarizes the percentage price premiums by quality applied in this analysis.

Table 5. Estimated Cannabis Appellation Price Premium by Appellation/Quality

Appellation	Price Premium (%) Using Grape Crush Data	Adjusted Price Premium (%) used in EFIA
High-Quality	30.3%	25.3%
Medium-Quality	15.2%	10.2%
All Other	0.0%	0.0%

Baseline cannabis prices were summarized under Section 3, above. Average prices for indoor, outdoor, and mixed-light cultivation are used as the baseline and to assess the benefits (price premium) of the CAP. Industry feedback indicated much of the interest in appellations was from outdoor cultivators, particularly traditionally smaller outdoor cultivators in the northern part of the state. This is consistent with the early development of appellations in these areas under the current OC effort. However, there is no data that can be used to assess the share of indoor (IND), outdoor (OUT), and mixed-light (ML) production that would be in an appellation after implementation of the CAP. Therefore, the current mix of indoor, outdoor, and mixed-light production by region is applied using current cultivation license data. Table 6 summarizes baseline and with-CAP program prices, as well as industry share.

Table 6. Production Method Share and Price Summary (\$/lb)

Type	Share (%)	Baseline	With-CAP			Difference		
		Base Price	High-Quality	Med-Quality	All Other	High-Quality	Med-Quality	All Other
IND	11%	\$1,672	\$2,095	\$1,842	\$1,672	\$423	\$170	\$0
OUT	41%	\$756	\$948	\$833	\$756	\$191	\$77	\$0
ML	48%	\$1,156	\$1,449	\$1,274	\$1,156	\$293	\$117	\$0

The direct benefits of the CAP program to cannabis cultivators is calculated by multiplying the additional quantity produced in each appellation segment (high or medium quality) by the difference in price¹¹ (Table 6) for that production method and segment. The quantity and prices are determined based on the market share by cultivator type and associated market prices. The average annual direct benefit of the CAP regulation equals \$3.13 million. Table 7 summarizes the results of the direct benefits analysis for each year of the CAP program implementation.

¹⁰ As another cross-check, the range of 10% - 25% for the price premium is in-line (slightly greater) than the price premium for various organic commodities (e.g. miscellaneous fresh fruit and vegetables). Therefore, the price premium applied in this analysis is a conservative (high) estimate.

¹¹ Note that the difference in price is applied because the cannabis sold in the high-quality market at a premium would have been sold in the standard market, at baseline prices, in the absence of the CAP regulation.

Appellations that are not high or medium quality are not shown in the benefits analysis because they receive no price premium (or decrement).

Table 7. Direct Benefits of the CAP (in millions of dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Avg. Annual
# of Appellations	9	17	38	17	11	18
High-quality						
IND (lbs)	(200)	645	2,665	3,510	4,035	805
OUT (lbs)	(780)	2,535	10,455	13,770	15,835	3,165
ML (lbs)	(915)	2,970	12,235	16,115	18,530	3,705
IND benefits (\$M)	-\$0.08	\$0.27	\$1.13	\$1.49	\$1.71	\$0.34
OUT benefits (\$M)	-\$0.15	\$0.49	\$2.00	\$2.64	\$3.03	\$0.61
ML benefits (\$M)	-\$0.27	\$0.87	\$3.58	\$4.72	\$5.42	\$1.08
Medium-quality						
IND (lbs)	(265)	870	3,580	4,715	5,425	1,085
OUT (lbs)	(1,050)	3,410	14,040	18,500	21,270	4,255
ML (lbs)	(1,225)	3,990	16,435	21,650	24,890	4,980
IND benefits (\$M)	-\$0.05	\$0.15	\$0.61	\$0.80	\$0.92	\$0.18
OUT benefits (\$M)	-\$0.08	\$0.26	\$1.08	\$1.42	\$1.63	\$0.33
ML benefits (\$M)	-\$0.14	\$0.47	\$1.93	\$2.54	\$2.92	\$0.58
Total Direct Benefits (\$M)	-\$0.77	\$2.51	\$10.33	\$13.60	\$15.64	\$3.13

The direct benefits are cumulative over time, so by year 5 they total \$15.64 million, or an average annual increase of \$3.13. This average annual amount is used to represent the potential annual direct benefit in year 1, the first 12-month period after full implementation. The average annual direct benefit of \$3.13 million is used to assess the indirect and induced benefits of the CAP regulation. The direct benefit of the price premium is an increase in producer surplus (profits) to industry cultivators. This is modeled as an increase in proprietor income using the IMPLAN Model (MIG, Inc.) using the 2014 R3 database for California counties, including custom IMPAN model sectors developed for indoor, outdoor, and mixed-light cultivation activities (CalCannabis 2017). Table 8 summarizes the results of the analysis.

Table 8. Indirect and Induced Benefits of the CAP

Impact Type	Employment	Labor Income	Value Added	Output
Direct	0	\$0	\$0	\$0
Indirect	0	\$0	\$0	\$0
Induced	15.6	\$894,430	\$1,581,760	\$2,664,530
Total	15.6	\$894,430	\$1,581,760	\$2,664,530

The total annual benefit of the CAP regulation is \$3.13 million in direct benefits to cultivators and an additional \$2.6 million in induced sales in related industries. Total jobs increase by 16 as

a result of the CAP. No indirect sales or jobs are created because the additional proprietor income does not, by itself, lead to any additional input purchases for cannabis production.

Other benefits not quantified:

- It is possible that the CAP will encourage the development of new businesses for marketing and developing cannabis appellations. This would create additional jobs that are in addition to the analysis presented in Table 8. It is not possible to quantify these additional jobs because there is no way to estimate the number of new businesses entering the industry.
- Benefits would accrue to a range of businesses, including smaller outdoor cultivators in the northern part of the state. There is no data on the share of businesses that would participate in the CAP, therefore this benefit is not quantified.
- As discussed under Section 4, the CAP may increase or reduce benefits to consumers, called consumer surplus, but these changes are not quantified in this analysis. Data to estimate the necessary own- and cross-price elasticities are not available.
- Increased product differentiation and increased market penetration for specialty products developed by cultivators and other businesses could encourage innovation in the industry.
- Additional indirect economic activity in appellation regions that produce a premium product could include agritourism, additional sales to support industry expansion, and other regional employment benefits.

The total benefit of the CAP is the sum of the direct, indirect, and induced benefits. Not including benefits not quantified (monetized) listed above, the total benefit of the CAP in year 1 would equal \$5.8 million¹² and approximately 16 jobs. In year 5, the total benefit would equal about \$29.0 million and 78 jobs.

5.2.2 Economic Costs

The appellations program introduces the option for developing labels (appellations) that allow consumers and producers to identify unique cannabis attributes. Cultivators incur costs to participate in the CAP. Cultivators are required to prepare and submit paperwork to the Department and develop the standards and practices of the appellation.

The CAP regulations require specific paperwork and documentation to establish an appellation. Each cost is identified, and an itemized cost is assigned in this analysis. The three general categories of economic costs for the CAP are: appellation development costs, fees paid by the petitioner to the Department, and the cost for cultivators to comply with appellation production

¹² Benefits and costs are reported in terms of output (sales) value. The measure of value added can be used to assess the net contribution to gross state product.

requirements. Fiscal costs (Department staff level of effort) are discussed separately under Section 5.2.7.

- **Appellation development costs.** This category includes costs to establish the appellation. Each appellation petition must include specific information about the geography, standards, practices, economic importance of cannabis, and narrative summary of the history of cannabis production in the proposed appellation. This information must be prepared in a standard format (report) and submitted to the Department. Petitions would be prepared by appellation proponents in coordination with any technical consultants required to develop specific components of the petition. For example, petitioners may engage a GIS expert to assist with map development. A level of effort range (number of labor hours) is developed for each task. Costs are based on the high estimate of level of effort and the opportunity cost of cultivators' time using hourly rates in the 2017 SRIA, indexed to current dollars. Tasks that require technical consultant support are estimated using consulting rates. Costs were discussed with industry experts to cross-check the assumed level of effort. Itemized costs based on the CAP requirements for appellation development include:
 - **Demonstrate climate, geographical, physical features of the appellation.** This includes administrative time to develop background material and sections of a document/report submitted to the Department. It is assumed that appropriate documentation and paperwork would be prepared by appellation proponents. The estimated level of effort to prepare this component of the petition is between 60 and 80 hours.
 - **Describe the link between cannabis production and unique features of the appellation.** This requirement is related to the unique features (above) of the appellation. Petitioners are required to demonstrate how key appellation features make cannabis produced in the area unique. It is assumed that appropriate documentation and paperwork would be prepared by appellation proponents. The level of effort to prepare this component of the petition is estimated between 20 and 40 hours.
 - **Document the legacy, history, and economic importance of cannabis cultivation in the appellation.** Appellation proponents would develop most of the required history and legacy information based on local knowledge. Additional technical consultant support may be necessary to document importance to the region, including any economic benefits. The total estimated level of effort includes appellation staff and consultant technical support, between 60 and 80 hours in total.
 - **Identify standard, practice, and cultivar requirements that will be specific to the appellation.** This requirement includes petition development (research, analysis, and report development). It also includes public outreach efforts. This

would include meetings with cultivators, local officials, and other local businesses to solicit feedback on appellation standards and practices, and ultimately agree to each standard and practice. A total of 120 hours of level of effort is included for this requirement.

- **Specify the boundaries on a map.** CAP regulations allow petitioners to develop a map of the appellation in GIS or other map making package (or by hand). This analysis estimates 20 hours of consultant time plus appellation support of 8 hours to develop a GIS layer package.
- **Submit other evidence to support appellation name.** This requirement includes research and documentation that the appellation name is unique and specific to the appellation area. A total level of effort of 20 hours is estimated for this requirement.
- **Final document preparation and submission.** Petitioners are required to submit the petition to the Department and may be required to follow up on any missing information. This also includes costs to organize public comment in support of the petition. This is estimated to include 20 – 30 hours of appellations proponent time.
- **Ongoing costs for updates.** Appellations may modify boundaries and standards and practices at any time. The cost of modifications depends on the magnitude of the changes. A significant overhaul of an appellation’s standards and practices would require developing and submitting all new content. However, smaller modifications may require minimal paperwork time. A conservative estimate of 60 hours of effort is included in this EFIA.
- **Fees paid to the Department.** The Department charges petition fees of \$20,880 for a petition for a new appellation and \$10,440 for a petition to amend an appellation to cover staff costs to review, make a decision on, and administer petitions. It is up to the petitioning cultivators how to share the fees. The petition fee of \$20,880 is included as a direct cost of the CAP regulation. For the purposes of estimating the total cost of fees paid to the Department, it is assumed that 10% of appellations will submit petitions to amend an appellation.
- **Cultivator costs.** Cultivators may incur costs to change cultural practices to meet the standards and practices of the appellation. Cultivators are also responsible for documenting and ensuring compliance with production requirements (to maintain the credibility of the appellation label). Cultivator costs include:
 - **Specific cultural practice costs.** Cultivators may change cultural practices to comply with appellation production requirements. However, the CAP does not mandate any changes. Any changes in cultural practices would be voluntary. It is likely that standards and practices for an appellation would be similar to current

standards and practices used in that area. Therefore, there is no regulatory cost for this component.

- **Self-enforcement, promotion, and monitoring.** Protecting the integrity of appellation labels will be important. This includes ensuring that cultivators comply with production requirements and represent the label well, and that any suspected misuse of the label is referred to the Department for investigation and enforcement. These costs are assumed to be similar to other self-assessments in conventional agricultural products, including Marketing Orders and grower-funded organizations. These assessments range from 0.10% to 1.25% of gross product price (see for example, almonds and processing tomatoes (USDA 2016, UCCE 2007). A cost of 0.2% is applied to this analysis using recent average outdoor cannabis prices (\$750/lb) and outdoor production quantities, or approximately \$1.9/lb per cultivator. In practice, each appellation community will set its own promotion and monitoring policies, engage additional consultants and businesses to support branding, and each cultivator will document their compliance with production requirements. It is likely that appellations will also benefit from good neighbor effects.

Table 9 summarizes estimated CAP direct regulatory costs. The total cost to establish, maintain, and enforce an appellation, including all indirect management costs, equals approximately \$68,920 per appellation.

Table 9. CAP Regulation Costs per Appellation

CAP Regulation Components	Estimated Cost (\$/Appellation)
Demonstrate climate, geographical, physical features of the appellation	\$3,280
Describe the link between cannabis production and unique features of the appellation	\$1,640
Document the legacy, history, and economic importance of cannabis cultivation in the appellation	\$8,730
Identify standard, practice, and cultivar requirements that will be specific to the appellation	\$4,925
Specify the boundaries on a map	\$3,330
Submit other evidence to support appellation name	\$820
Final document preparation and submission	\$1,230
Ongoing costs for updates	\$2,460
Fees paid to the Department	\$21,925
Appellation promotion and monitoring	\$20,580
Total	\$68,920

The appellation development timeline summarized under Section 5.2.1 is applied to estimate the total cost of the CAP each year, and the average annual cost. The estimated average annual direct cost of the CAP equals \$1.27 million. Table 10 summarizes the results of the analysis.

Table 10. CAP Regulation Total Direct Cost Summary

Cost Item	Year 1	Year 2	Year 3	Year 4	Year 5	Avg. Annual
<i># of New Appellations</i>	<i>9</i>	<i>17</i>	<i>38</i>	<i>17</i>	<i>11</i>	<i>18.4</i>
Appellation Development	\$237,735	\$449,055	\$1,003,770	\$449,055	\$290,565	\$486,035
Fees	\$197,325	\$372,725	\$833,150	\$372,725	\$241,175	\$403,420
Cultivator/Appellation Costs	\$185,220	\$349,860	\$782,040	\$349,860	\$226,380	\$378,670
Total	\$620,280	\$1,171,640	\$2,618,960	\$1,171,640	\$758,120	\$1,268,125

The average annual direct cost of \$1.27 million is used to assess the indirect and induced costs of the CAP regulation. In contrast to the benefits, costs for new appellations are not cumulative. The indirect and induced effects depend on how costs are managed by appellations. If costs are passed through to cultivators, and cultivators bear these costs and complete much of the work for submitting the petition, then all of these costs would be a decrease in proprietor income (i.e. profits) to cannabis cultivators. In practice, appellations/cultivators will pay other consultants/businesses to complete portions of the petition. These costs to cultivators become income to other businesses in the state, which provides an offsetting economic benefit.

The exact distribution of costs between cultivators and other consulting businesses is not known at this time. The total cost of the appellation development is modeled as a reduction in proprietor income and all consultant-related costs are evaluated as an increase in sales for this sector of the economy. This provides a small offsetting benefit.

The direct cost (\$1.27 million) is a reduction in producer surplus (profits) to industry cultivators. This is modeled as a decrease in proprietor income using the IMPLAN Model (MIG, Inc.) using the 2014 R3 database for California counties, including custom IMPAN model sectors developed for indoor, outdoor, and mixed-light cultivation activities (2017 SRIA). Purchases from supporting businesses (e.g. consultants) equal approximately \$427,800¹³. This is modeled as an increase in purchases under IMPLAN Sector 460, “Marketing research and other miscellaneous professional services.” Table 11 summarizes the results of each component of the analysis. The additional induced cost caused by the \$1.27 million in direct costs equals \$1.08 million. The net effect is slightly negative (decrease in gross output value of \$168,055) because the total benefit of increasing business purchases (\$913,810) is slightly less than the induced effect of reduced proprietor income. However, the net effect on jobs is slightly positive because the reduction in

¹³ In other words, the total direct cost of CAP regulations is \$1.27 million per year, of which approximately \$427,800 are costs that result in purchases from other businesses, and therefore provide a partial offsetting benefit.

employment caused by the reduction in proprietor income is more than offset by increased expenditures on services from other businesses.

Table 11. CAP Regulation Total Indirect Cost Summary

<i>Change in Cultivator Proprietor Income</i>				
Impact Type	Employment	Labor Income	Value Added	Output
Direct	0	\$0	\$0	\$0
Indirect	0	\$0	\$0	\$0
Induced	-6.4	(\$363,160)	(\$642,235)	(\$1,081,870)
Total	-6.4	(\$363,160)	(\$642,235)	(\$1,081,870)
<i>Increase in Section 460 Professional Services Business Activity</i>				
Impact Type	Employment	Labor Income	Value Added	Output
Direct	5.2	\$275,650	\$265,105	\$427,800
Indirect	1	\$72,325	\$112,005	\$184,695
Induced	1.8	\$101,055	\$178,840	\$301,315
Total	8	\$449,030	\$555,950	\$913,810
<i>Net Total Impact</i>				
Impact Type	Employment	Labor Income	Value Added	Output
Direct	5.2	\$275,650	\$265,105	\$427,800
Indirect	1	\$72,325	\$112,005	\$184,695
Induced	-4.6	(\$262,110)	(\$463,395)	(\$780,550)
Total	1.6	\$85,870	(\$86,285)	(\$168,055)

The total cost of the CAP is equal to the sum of the direct, indirect, and induced effects. Proprietor income falls by \$1.27 million, which causes an additional reduction in gross output value equal to \$168,055 as a result of changes in spending in other sectors of the economy. Therefore, the estimated total economic cost of the CAP regulation equals approximately \$1.44 million with negligible but positive (1.6 FTE) job impact.

5.2.3 Employment (Job) Estimated Effects

Benefits (Section 5.2.1) of the CAP create an additional 16 full time equivalent jobs statewide. This does not include additional jobs that could be created in new industries the develop to support expansion of cannabis appellations in the future. These would be additional job benefits that are not monetized.

Costs (Section 5.2.2) of the CAP results in a loss of 6.4 jobs. However, these are offset by increased spending on business support/consulting services, resulting in a net increase of 1.6 full time equivalent jobs.

In summary for the first year of full implementation, the net effect of the CAP on statewide jobs is an increase of approximately 18 full time equivalent jobs statewide. The increase in jobs may

seem modest for such a large industry. The reason there are not more jobs created is that most of the proponents of appellations are currently employed in the industry (e.g. cultivators), and most of the net effect of the CAP is a change in proprietor income, not new business activity. However, as noted above, this does not include any additional jobs that are developed in new industries that could develop in the future to support appellations.

5.2.4 Estimated Effects on Small Businesses

The impact of the regulation on small businesses is likely to be similar to the impact on all businesses. To approximate the impact on small businesses, cultivation licensing data were reviewed and classified by license size. The proportion of small licenses is 19.7% on average. However, in practice large businesses may hold multiple small license types (see Table 12). Proportioning annual benefits and costs using the 19.7% estimate results in total (direct and indirect/induced) benefits of \$1.14 million (3 jobs), and costs of \$283,600 (no job impact), attributable to small businesses. The net effect of the CAP is positive (total estimated annual benefits are greater than annual costs), equal to \$856,320 per year and 3 FTE jobs.

Table 12. CAP Effect on Small Businesses

Type	Small License	Total	Small License Share (%)
IND	145	283	51.2%
OUT	161	1,110	14.5%
ML	224	1,299	17.2%
Total	530	2,692	19.7%

Appellation labeling may provide additional benefits to smaller outdoor cultivators in legacy cannabis regions in California (e.g. northern part of the state). If producers in these areas can develop product attributes that are desirable to consumers, appellations give these regions the ability to label, market, and capitalize on these attributes. However, these benefits are not possible to quantify in this analysis because industry data are limited.

5.2.5 Estimated Effects on Housing Costs

The proposed CAP is not estimated to have any direct effect on housing costs.

5.2.6 Other Economic Impacts to Businesses or Individuals

As summarized under Section 5.2.1 and 5.2.2, the proposed CAP is likely to have a net positive effect on businesses and individuals in the State. The CAP does not have any effect on local fees, assessments, or rates. It does not have a significant statewide adverse effect on the ability of businesses in the State to compete. The proposed CAP does not require additional business reports or the use of specific technologies or equipment.

The proposed CAP is likely to encourage expansion of businesses in the State. It is not possible to quantify the number of new businesses. However, the CAP is likely to increase interest in

appellations labeling and development. Similar to other commodities that benefit from regional labeling, such as wine and coffee, it is likely that the CAP would spur innovation and other research to identify specific cannabis traits, unique characteristics, and regional marketing. Since the net benefit of the CAP is positive, this would be likely to further increase benefits.

5.2.7 Department Fiscal Costs

The Department estimated an additional 2 full-time equivalent employees/positions (FTEs) to manage the appellations program. This includes 2 staff environmental scientists. The additional FTEs will largely be responsible for reviewing appellation petitions and communication with the petitioners. Additional time will also be required to monitor and record appellation usage in the market and investigate complaints received by the Department. Department personnel cost for the appellations program equals approximately \$251,000 annually. These costs will be recovered through petition fees (see Section 5.2.2). Table 13 summarizes the fiscal cost of the CAP.

Table 13. CAP Fiscal Costs Summary

Items	Year 1	Ongoing
Staff Salary Cost	\$134,580	\$134,580
Staff Overhead Costs	\$82,850	\$82,850
Other Direct Costs	\$34,000	\$34,000
Total	\$251,430	\$251,430

5.2.8 Other State and Local Public Agencies Fiscal Costs

The proposed CAP is not estimated to have any direct fiscal effect on other local public agencies.

5.3 Regulation Alternative 1

The Department considered an alternative to the proposed CAP regulation based on stakeholder feedback during public outreach meetings conducted in late 2018 and early 2019. Under this alternative, the Department would have a more significant role in developing and enforcing appellations, similar to the French AOC model applied to wine labeling.

The American Viticultural Area (AVA) model was rejected because it does not address production requirements and is therefore inconsistent with MAUCRSA. The French AOC model was considered as an alternative because it does include locally-defined production requirements. The economic impact of this alternative is summarized in this section.

Under the alternative regulation, the Department would expand its role in developing and implementing cannabis appellations in California. It would assume full authority in defining appellations and for enforcing appellations. The differences between the proposed regulation and the alternative are summarized as follows:

- The Department increases its role in developing, implementing, reviewing, and enforcing cannabis appellations in California. As a result, the Department expands its program staff to support administration, oversight, and enforcement. These additional fiscal costs are passed on to cultivators (appellations) in the form of higher fees. This results in an increase in fiscal and economic costs.
- Cannabis cultivators reduce the level of effort for appellation development and enforcement. This results in direct cost savings to cultivators, and as a result economic costs decrease.
- Other aspects of the appellations program remain unchanged.

The following sections summarize the economic costs and benefits, and fiscal costs of the alternative.

5.3.1 Economic Benefits

The economic benefit of the alternative would be approximately equal to the CAP. That is, cultivators would establish appellations at approximately the same rate, and the estimated price premium would be the same as the CAP. This is because the price premium is largely driven by consumer preferences for specific appellations, and not the specific costs or implementation details of the program. However, Fulton and Giannakas (2004) showed that if the cost of labeling (i.e. administering the appellations program) is too high than this can result in a new loss in producer surplus (profits) to producers that more than offsets and surplus benefits to consumers. In such cases the program can result in net costs instead of net benefits. However, there is insufficient data¹⁴ to determine whether this effect would hold or not in the case of the alternative to the CAP regulation. For the purposes of this analysis, it is assumed that benefits would approximately equal the CAP alternative.

As summarized under Section 5.2, the average annual benefit would equal \$3.13 million in direct benefits to cultivators and an additional \$2.6 million in induced sales in related industries. Total jobs would increase by 16 statewide (\$5.8 million total benefit). The increase in jobs does not include additional direct jobs from new businesses in the appellations industry (e.g. marketing, testing, consulting, sales, etc.). These jobs would be in addition to the estimated values.

5.3.2 Economic Costs

The alternative to the CAP would result in different economic costs. The Department would increase its staff costs relative to the proposed regulation. These costs would be passed on to cultivators in the form of higher fees. Cultivators would also incur slightly lower costs due to

¹⁴ A careful economic analysis of these effects requires data to estimate own and cross prices elasticities of demand/supply in the different market segments. Since no sales and pricing data are available for cultivators using the OC program, it is not possible to estimate these parameters.

reduced management, petition, and enforcement efforts, because these would be borne by the Department.

The results of the CAP economic cost analysis are refined to illustrate the costs under this alternative. Under this alternative, appellation petitioners would no longer be required to specify map boundaries, submit name evidence, or prepare and submit documentation to the Department. This would reduce costs per appellation by approximately \$27,300.

Department costs would increase significantly. The alternative would require Department technical, administrative, and legal staff to implement and manage the appellations program. The Department determined that a mix of staff would be required to operate the appellations program proposed under this alternative. The staff level of effort would include:

- 2 Supervising Scientists
- 2 Senior Scientists
- 8 Environmental Scientists
- 1 Full Time Legal (equivalent)

Average annual (full time equivalent) salaries would range from \$3,851 to \$11,552 per month. The total direct staff cost would equal \$1.4 million. Including overhead, benefits, and other direct costs, the annual program cost would equal \$1.97 million. These costs are reported in Table 14.

Table 14. Alternative 1 Department Costs Summary

Items	Year 1	Ongoing
Staff Salary Cost	\$1,220,820	\$1,220,820
Staff Overhead Costs	\$684,085	\$684,085
Other Direct Costs	\$68,000	\$68,000
Total	\$1,972,905	\$1,972,905

The cost of program implementation (\$1.97 million) would be recovered through fees charged to each appellation (and in turn, cultivators). The cost savings to cultivators in direct petition development costs (\$27,300 per appellation) would be more than offset by the costs passed through to cultivators from greater petition fees. Table 15 summarizes the direct economic cost of the program.

Table 15. Alternative 1 Direct Economic Cost Summary (\$ in millions)

	Year 1	Year 2	Year 3	Year 4	Year 5	Avg. Annual
# of Appellations	9	17	38	17	11	18.4
Appellation Development	\$0.37	\$0.71	\$1.58	\$0.71	\$0.46	\$0.77
Fees	\$1.97	\$1.97	\$1.97	\$1.97	\$1.97	\$1.97
Cultivator/Appellation Costs	\$0.19	\$0.35	\$0.78	\$0.35	\$0.23	\$0.38
Total	\$2.53	\$3.03	\$4.34	\$3.03	\$2.66	\$3.12

The average annual direct cost of \$3.12 million is used to assess the indirect and induced costs of the alternative regulation. The indirect and induced effects of this cost depend on how costs are managed by appellations. The direct cost to cultivators would be a decrease in proprietor income (i.e. reduction in profits). This is modeled as a reduction in proprietor income using the IMPLAN model data (2017 SRIA). Table 16 summarizes the results of the indirect and induced cost analysis.

Table 16. Alternative 1 Indirect and Induced Economic Cost Summary

Impact Type	Employment	Labor Income	Value Added	Output
Direct	0	\$0	\$0	\$0
Indirect	0	\$0	\$0	\$0
Induced	-15.6	(\$892,175)	(\$1,577,775)	(\$2,657,820)
Total	-15.6	(\$892,175)	(\$1,577,775)	(\$2,657,820)

The total cost of the alternative includes \$3.12 million in direct costs and an additional \$2.6 million in induced costs. Therefore, the total cost of the alternative (\$5.72 million) would be significantly greater than the cost of the CAP alternative (\$1.44 million). Roe et al. (2014) demonstrate that when the economic costs of labeling (certification) exceed expected benefits, mandatory labeling is required to achieve compliance and this results in a net loss of benefits to producers and consumers.

Total costs (\$5.72 million) would be slightly less than total benefits (\$5.8 million). This alternative was considered by the Department and it was determined it would not be more effective or as effective and less burdensome than the proposed CAP regulation because the CAP achieves the same level of benefits at a fraction of the cost.

5.3.3 Employment (Job) Estimated Effects

Benefits (Section 5.3.1) of the alternative create an additional 16 full time equivalent jobs statewide. This does not include additional jobs that could be created in new industries that may develop to support expansion of cannabis appellations in the future. These would be additional job benefits that are not monetized. Costs (Section 5.3.2) of the alternative result in a loss of approximately 16 (15.6) FTE jobs.

In summary, the net effect of the alternative on statewide jobs would negligible. This is less than the 12 jobs created under the CAP regulation alternative.

5.3.4 Estimated Effects on Small Businesses

The impact of the alternative on small businesses would likely be similar to the CAP alternative. Using the share of small licenses (see Section 5.2.4) of 19.7% to allocate benefits and costs, total (direct and indirect/induced) benefits attributable to small businesses would be \$1.14 million (3 jobs), with costs of \$1.12 million (and negligible job impacts). The net benefits of the alternative to small businesses would be less than the CAP alternative.

5.3.5 Estimated Effects on Housing Costs

The alternative is not estimated to have any direct effect on housing costs.

5.3.6 Other Economic Impacts to Businesses or Individuals

The alternative would likely create effects on businesses and individuals in the State that are similar to the CAP alternative.

The alternative would not have any effect on local fees, assessments, or rates. It would not have a significant statewide adverse effect on the ability of businesses to compete in the State. The alternative would not require additional business reports or the use of specific technologies or equipment.

5.3.7 Department Fiscal Costs

As summarized under Section 5.3.2, Department costs would increase significantly under the alternative relative to the CAP. The alternative would require Department technical, administrative, and legal staff to implement the appellations program. The Department determined that a mix of staff would be required to operate the appellations program proposed under this alternative. The staff level of effort would include:

- 2 Supervising Scientists
- 2 Senior Scientists
- 8 Environmental Scientists
- 1 Full Time Legal (equivalent)

Average annual (full time equivalent) salaries range from \$3,851 to 11,552 per month. The total direct staff cost would equal \$1.2 million. Including overhead, benefits, and other direct costs, the annual program cost would equal \$1.97 million. These costs are summarized in table 17.

Table 17. Alternative 1 Department Costs Summary

Items	Year 1	Ongoing
Staff Salary Cost	\$1,220,820	\$1,220,820
Staff Overhead Costs	\$684,085	\$684,085
Other Direct Costs	\$68,000	\$68,000
Total	\$1,972,905	\$1,972,905

5.3.8 Other State and Local Public Agencies Fiscal Costs

The alternative is not estimated to have any direct fiscal effect on other local public agencies.

6. Summary

The proposed CAP regulation provides positive benefits to California businesses and individuals by introducing information into the marketplace that improves consumers' ability to identify preferable products and allows producers to more effectively market those products. The average

annual net benefit (including the sum of total benefits net of total costs) of the CAP equals approximately \$4.36 million. The alternative to the CAP, where the Department would implement a program similar to the AOC, would result in significantly higher economic and fiscal costs and would not generate any additional benefits. Therefore, the proposed CAP regulation provides equal benefits at a lower economic cost.

7. References

- Akerlof, G.A. 1970. “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism” *Quarterly Journal of Economics*. 84:488–500.
- Bershaw, John, Bethany Carder, Scott Burns, Tessa Carlson. (2017). Cannabis Terroir: Where is the Grass Greener? 10.1130/abs/2017AM-305064. GSA Annual Meeting in Seattle, Washington, USA – 2017.
- Bonroy, O. and Constantatos, C. On the Economics of Labels: How their Introduction Affects the Functioning of Markets and the Welfare of all Participants. *Amer. J. Agr. Econ.* 97(1): 239–259; doi: 10.1093/ajae/aau088.
- CalCannabis. 2017. Standardized Regulatory Impact Analysis (SRIA) of the CalCannabis Cultivation Licensing Program. Prepared by ERA Economics for the California Department of Food and Agriculture. CalCannabis Licensing Program.
- California Grape Crush Reports. USDA National Agricultural Statistics Service. Various Years.
- Caswell, J., and S. Anders. 2011. Private versus Third Party versus Government Labeling. In *The Oxford Handbook of the Economics of Food Consumption and Policy*, ed. J.L. Lusk, J. Roosen, and J.E. Shogren, 472–498. Oxford University Press.
- Fulton, M., and K. Giannakas. 2004. Inserting GM products into the Food Chain: The Market and Welfare Effects of Different Labeling and Regulatory Regimes. *American Journal of Agricultural Economics* 86 (1): 42–60.
- Haeck, C., Giulia Meloni, Johan Swinnen, The Value of Terroir: A Historical Analysis of the Bordeaux and Champagne Geographical Indications, *Applied Economic Perspectives and Policy*, Volume 41, Issue 4, December 2019, Pages 598–619, <https://doi.org/10.1093/aep/ppz026>.
- Mudge, E. M. (2019). Chemometrics and metabolomics of Cannabis sativa L. (T). University of British Columbia. Retrieved from <https://open.library.ubc.ca/collections/ubctheses/24/items/1.0376606>
- Mussa, M., and S. Rosen. 1978. Monopoly and Product Quality. *Journal of Economic Theory*. 18 (2): 301–17.

Roe, B.E., M.F. Teisl, and C.R. Deans. 2014. The Economics of Voluntary Versus Mandatory Labels. *Annual Review of Resource Economics* 6: 1–21.

Teisl, M.F., and B.E. Roe. 1998. The Economics of Labeling: An Overview of Issues for Health and Environmental Disclosure. *Agricultural and Resource Economics Review* 27 (2): 140–50.

UC Cooperative Extension (UCCE). 2007. Sample Costs to Produce Processing Tomatoes.

USDA. 2016. Almonds Grown in California; Assessment Rate; Docket Number: AMS-SC-16-0045 Effective: December 21, 2016

Wine Institute. 2019. California AVAs, using Federal Register Information.

Zago, A.M., and D. Pick. 2004. Labeling Policies in Food Markets: Private Incentives, Public Intervention, and Welfare Effects. *Journal of Agricultural and Resource Economics* 29 (1): 150–65.

Zilberman, D., S. Kaplan, E. Kim, and G. Waterfield. 2014. Lessons from the California GM Labeling Proposition on the State of Crop Biotechnology. In *Handbook on Agriculture, Biotechnology, and Development*, ed. S.J. Smyth, P.W.B. Phillips, and D. Castle, Chapter 34. Cheltenham: Edward Elgar.