

California Cannabis Market Outlook

2024 Report

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Definitions

Active Canopy Area – The canopy area of plants cultivated by a licensed cultivator.

Amortized Fixed Costs – Costs of production that do not depend on quantity of output produced amortized over a 10-year standard equipment life (some inputs may apply a different economic life) at 3.75 percent. Includes startup costs, fencing, pots, netting, etc.

Annual Local Tax – Taxes levied on production at the county and/or municipality level. Production is taxed by local counties and municipalities in different ways, such as per harvested pound or per square foot of canopy. Calculated as the weighted average of tax rates weighted by production (in pounds).

Annual Other Regulatory Cost – Regulatory compliance costs associated with labor, pesticide use, plan updates, etc.

APN – Assessor Parcel Number. A fourteen-digit number that is used to legally identify and distinguish a property in California.

Canopy Capacity – Total Licensed Canopy area across all licenses.

CCTT – California Cannabis Track and Trace system – seed to sale tracking system used to collect data at various points of the industry supply chain.

CDPH – California Department of Public Health – state department responsible for developing regulations to protect public health.

CDTFA – California Department of Tax and Fee Administration – state department responsible for collecting and reporting cannabis-related taxes.

Consumption – Total dry-flower equivalent cannabis purchases by household and/or individual.

Cultivation Method – Sometimes also referred to as “production technology,” indicates whether license type is outdoor, indoor, mixed-light tier 1 or 2.

EFIA – Economic and fiscal impact analysis. The analysis that accompanies new regulations or changes to regulations proposed by the Department.

Eradication – Destruction of unlicensed cannabis plants by county, state, or federal agencies.

Harvested Weight – Weight of dry cannabis flower that cultivators obtain from plants and is packaged to be sold.

Heavy Users – Consumers that use cannabis 20+ days per month.

Licensed Canopy Area – Calculated as the maximum allowable canopy area per license multiplied times the number of licenses.

Licensed Market Share – The share of cannabis consumed in the state that is purchased from and produced in the licensed market.

Light Users – Consumers that use cannabis less than 20 days per month.

Limited Operations Status – A license status, introduced as part of the regulations to implement SB 833, that would allow cultivators to temporarily be inactive, not harvest cannabis, and pay 20 percent of the standard license fee.

MAUCRSA – The Medicinal and Adult Use Cannabis Regulation and Safety Act. Established licensed, adult-use cannabis market in California effective January 1, 2018.

NSDUH – National Survey on Drug Use and Health – survey conducted by region and age group on frequency of use of tobacco, alcohol, and drugs.

Premium Costs – Risk premiums associated with cultivating a product that is sold in an illicit market.

Production – The weight of cannabis flower harvested, packaged, and transferred for sale by cultivators.

Production Capacity – The total production that would be achieved if licenses produce at their expected yield at their maximum allowed Licensed Canopy Area.

Reduced-Size Cultivation License – An option for cultivators, introduced as part of SB 833, that would allow them to temporarily reduce the size of their license (and pay the associated reduced fee), provided it is the same cultivation method and within the same premises.

SAMHSA– Substance Abuse and Mental Health Services Administration – Federal agency that conducts public health surveys.

Stacked License – Any license held by the same owner and on the same APN as other cultivation licenses of the same cultivation method.

Transferred Weight – Weight of dry flower packaged, sold, and transferred by a cultivator to a distributor, manufacturer, or other business.

Variable Cost – Costs of production that depend on quantity of output produced. Includes cultural costs (soil amendments, grow and bloom stage costs, etc.); irrigation costs; electricity; labor costs (excl. manager time); etc.

1 Overview

The Department of Cannabis Control (DCC or “Department”) engaged ERA Economics (ERA) to prepare a report summarizing current market conditions and outlook for the California cannabis industry. The report provides a snapshot of current industry conditions (i.e., economics of the cannabis market) and recent trends. It is structured to provide an overview of factors affecting the supply of cannabis, consumer demand for cannabis, and how these factors are changing over time in California and other markets. This 2024 report also includes an initial overview of the hemp market and how intoxicating cannabinoids derived from hemp are linked to the cannabis market.

The report provides a data-driven assessment of current conditions and expected future trends. Data come primarily from the California Cannabis Track and Trace (CCTT) system, the cannabis Unified License Search (ULS), the National Survey on Drug Use and Health (NSDUH), and other publicly available sources, in addition to confidential business outreach efforts conducted by ERA and data from other states’ cannabis markets.

This report describes the economic analysis of the California cannabis market, hemp market overview, and markets in other states. It focuses on the period since passage of the Medicinal and Adult Use Cannabis Regulation and Safety Act (MAUCRSA¹) in 2018, through late 2024. The analyses for the first year following MAUCRSA have limited data (e.g., CCTT was just established), and analyses for 2024 are also limited by data availability (e.g., some data are released on a lagged schedule of up to one year). The report is based on the best available data through 2023/24.

The report is organized as follows:

- Section 1 provides an overview of the purpose and structure of the report, followed by a concise summary of the key findings of the 2023/24 market conditions and the 2024/25 market outlook.
- Section 2 provides an overview of the cannabis market supply and factors driving change in supply, namely licensed cannabis production statistics, unlicensed production estimates, and regulatory changes. An analysis of production capacity and costs and the production outlook for 2024/25 is presented.
- Section 3 details cannabis demand and factors driving change in demand, including estimates of cannabis consumption, licensed market share, and retail sales trends.

¹ The period after passage of MAUCRSA is sometimes referred to as post “legalization” of cannabis. This refers to introduction of the licensed market. Cannabis is still illegal at the federal level.

- Section 4 describes price trends, market entries and exits, and how the supply and demand dynamics discussed in Sections 2 and 3 affect those trends. Section 4 also includes comparisons of California to other state markets, an overview of the hemp market, and a short discussion of how the unlicensed market affects the licensed market.
- Section 5 describes the market outlook for 2024/25, including a summary, brief description of data limitations, and recommendations.

1.1 Keys to 2024 and the 2025 Market Outlook

In general, market conditions for licensed cannabis businesses in California have been challenging since 2021, through 2024. Wholesale licensed cannabis prices peaked in Q4 2020 and have declined since. As of Q4 2024, wholesale cannabis inflation-adjusted prices are down 57 percent on average from that peak. Wholesale price changes vary by cultivation method: indoor prices are down 46 percent, outdoor prices are down 74 percent, and mixed-light prices are down 60 percent. Inflation-adjusted retail prices have also been decreasing since late 2020 through the first half of 2024.

Despite challenges the California licensed market continues to grow. California produced more cannabis for the licensed market in 2024 than any year since MAUCRSA. Consumption of cannabis produced for the licensed market also continued to increase in 2024. The share of total consumption supplied by the licensed market continues to be stable at about 40 percent. Statewide efforts to eradicate unlicensed cannabis production are having some effect as unlicensed production is around the same levels compared with pre-MAUCRSA. That is, cannabis consumption has modestly increased and many of those consumers are purchasing cannabis from licensed cannabis businesses, but there is still a substantial illicit market in California. Careful analysis of the data does not show an explosion of illicit market production.

Estimates of total production and consumption (including licensed and unlicensed cannabis) in California for 2019 through 2024 are normalized by weight of dry-flower equivalent. To capture these estimates while accounting for incomplete data and uncertainty, we have developed a confidence interval, which is an estimated range of values that the true value is statistically likely to fall within. The confidence interval for the illicit market is 7 to 16.3 million lbs. and the middle of that range is 11.4 million lbs. Based on our analysis of the data, we believe it is more likely that illicit production is closer to the lower end of the confidence interval (closer to 7 million lbs.) due to the following qualitative factors: (i) substantial double-reporting in law enforcement eradication data that is not possible to fully account for in the analysis, (ii) applied production/yields for illicit operations are high because they are based on licensed market practices under “ideal” farming conditions, and (iii) there are limited data in some counties and information from other counties with better data/reporting is applied to extrapolate to these areas, which may overstate total illicit production. These factors will continue to be evaluated as new information becomes available, and the range and midpoint-estimate will be updated.

As of 2024, around an estimated 1.4 million pounds of licensed cannabis are produced and consumed in California. California consumption is around 3.8 million pounds, meaning that 2.4 million pounds are supplied from unlicensed cannabis operations and consumed in California.

Current industry conditions, challenges, opportunities, and policy recommendations are summarized as follows.

Current conditions:

- Despite substantial headwinds, licensed cannabis production in California continued to increase through 2024. Production has been increasing since 2018 (MAUCRSA), from about 580 thousand pounds (dry-flower equivalent) in 2019 to approximately 1.43 million pounds in 2024. This indicates the licensed market is growing.
- Unlicensed (illicit) production in California is difficult to estimate because it is not reported in any standardized way. Eradication data was gathered, combined with extensive law enforcement and local agency interviews, and used to estimate total unlicensed production. An average of 11.4 million pounds of unlicensed cannabis (dry-flower equivalent) is produced in California each year. The statistical confidence interval for the illicit market is large, at 7 to 16.3 million lbs. As described previously, the confidence interval is not symmetrical, and it is likely that the illicit market size is in the lower range of the confidence range.
- An estimated 3.8 million pounds of cannabis were consumed in California in 2024 on average with a statistical confidence interval of 2.6 to 5.0 million pounds. That is about 56 grams per capita. California per capita consumption is still lower than in states that legalized adult non-medicinal cannabis before California. This implies that the California licensed market still has room to grow, and California use rates are not above that of other, comparable states.
- The total value of retail sales in the licensed market is down, leading some to conclude that the licensed market is failing or shrinking. The total volume of retail sales for nearly all product categories is up. That is, the decrease in the total dollar amount of retail sales is driven by lower prices, not less production or a contraction in the licensed market. The licensed market is continuing to grow.
- Wholesale flower prices dropped dramatically from the peak in 2020. This put substantial financial stress on cultivation and other cannabis businesses. The downward price trends in California are also seen in other states. However, prices have been relatively stable in 2023 and 2024. Nominal wholesale prices increased slightly in 2024, by about 4.8 percent from Q4 2023 to Q4 2024, driven by increasing indoor and mixed-light prices.
- Competition from the illicit market contributes to lower prices in the licensed market. Some consumers still purchase cannabis from illicit operations and illicit cannabis

production moves across state lines into different markets. It is not possible to empirically measure the impact of the illicit market on licensed market prices due to current limitations in illicit and licensed market data. However, we continue to find ways to overcome data gaps, and economic models such as those applied in this market report can be used to illustrate the plausible range of price impacts.

- Active Department licenses (including annual and provisional) have been decreasing since 2022. This is driven mainly by fewer cultivation licenses. However, the rate of decline in cultivation licenses is stabilizing. This indicates continued consolidation.
- In contrast to distributor, cultivator, and manufacturer licenses, the number of retail licenses has been increasing. This is important for continued growth of the licensed market. Expanding local retail provides options for consumers that can help discourage purchases from the illicit market. Over time, inefficient businesses exit and other businesses consolidate and grow. As businesses innovate and benefit from economies of scale, their business costs decrease. Low barriers to entry are necessary to encourage this innovation and market competition. Local restrictions or prohibitions on licenses stifle growth and innovation, providing a competitive advantage to illicit businesses.

Challenges:

- Licensed businesses compete with illicit businesses. Illicit cannabis moves across state lines. A statistical analysis of price trends across states finds that the national unlicensed market continues to affect state licensed market prices. Licensed California cultivators are (effectively) competing in price with illicit producers in California and producers from other states despite not being able to (legally) sell across state lines. The most effective ways to eliminate the illicit market include: (i) decreasing costs for licensed businesses, (ii) increasing costs for illicit cannabis (e.g., more enforcement makes it riskier/most costly to provide illicit cannabis), and growing consumer demand for licensed cannabis.
- The state has made efforts to lower costs for licensed cannabis businesses. For example, eliminating the statewide cultivation tax unambiguously decreased costs. These savings are partially passed forward to market intermediaries and end consumers.
- The Department's enforcement costs have been steadily increasing and these costs were not contemplated when MAUCRSA was passed. Enforcement is critical to ensuring licensees comply with regulations and combating the illicit market. Currently, these efforts are funded through license fees. To sustain enforcement activities and cover other Department expenses, revenue must increase, either through higher fees or alternative funding sources. This creates a challenging conundrum: while enforcement supports the licensed market by curbing illicit operations, relying on license fees to fund these efforts raises costs for legitimate businesses.

- The share of consumption that is coming from the licensed market has remained about the same since 2021 (after increasing between 2018 and 2020 following legalization). Local (e.g., county and city) regulations that limit consumer access to licensed retailers, other regulatory burdens placed on licensed producers, and federal restrictions on interstate trade are factors that support the illicit market.
- Local municipalities impose additional restrictions, taxes, and fees for cannabis businesses. These additional costs to cannabis businesses affect decisions on where to locate and resiliency of businesses during down years. Recent state-level changes have eased some regulatory cost burden, but local regulations continue to create additional barriers for licensed producers.
- The Department is continually adjusting to new laws and its expanding obligations to protect public health and the environment. Potential upcoming legislative and regulatory (e.g., concepts discussed at Cannabis Advisory Committee meetings) changes may improve the consumer safety controls and the enforcement thereof, safeguard the environment, and reduce diversions to the unlicensed market. However, there may be increased administrative/management costs for the Department and businesses to implement some of these changes. Potential changes summarized by the Department in recent, or upcoming, Cannabis Advisory Committee meetings include modifying CCTT reporting, lab testing requirements, introducing animal products to the market, streamlining cultivation regulations, and restructuring license fees, among others.
- The state Cultivation Tax was suspended in 2022. However, as part of a compromise with those that benefited from some of the cannabis tax receipts, a provision was included to raise the cannabis excise tax rate starting on January 1, 2025, to address specified funding gaps from the Cultivation Tax being eliminated. This is an important headwind for the licensed market in 2025.

Opportunities:

- The licensed cannabis market is growing. Data through 2024 show that overall cannabis consumption is modestly increasing and that more licensed cannabis is being produced and sold. Growing demand for licensed cannabis eventually puts upward pressure on prices.
- The number of active storefront retail licenses continues to increase. Several counties now have active retail licenses (as of February 2024) that had none as of December 2022. Cities and counties can develop taxes, fees, and ordinances limiting—or banning—the number of cannabis businesses. Lowering local costs and removing restrictions can increase the number of retail locations, which can help pull consumers into the licensed market that would have otherwise purchased from unlicensed producers.

- Increased sales volume and consistently stable prices for value-added products such as edibles and pre-rolls shows that there is growth potential for licensed businesses across the cannabis supply chain.
- Other changes in the past few years (e.g., suspension of the cultivation tax, limited operations status) help reduce costs to licensed cannabis businesses. Cost savings are shared across the supply chain (and by consumers), but generally provide a benefit to all businesses in the licensed market.
- The Department is considering alternatives to the current license fee structure to redistribute fees and improve fee equity overall. The Department is also considering changes for cultivation regulations, CCTT, and others. These help the licensed market.
- The Department is considering a regulatory package that would integrate medicinal cannabis products for pets into the licensed cannabis market. This may expand opportunities for the licensed market.
- In September 2024, Governor Newsom directed CDPH to regulate/ban intoxicating cannabinoids derived from hemp, an imminent threat to public health and youth. Proposed amendments to the 2024 Farm Bill take similar steps to restrict access to intoxicating cannabinoids from hemp. Restricting or banning intoxicating cannabinoids derived from hemp would provide direct benefits to licensed cannabis cultivators and retailers by reducing the supply of substitute products. Consumers of hemp derived products would be pushed to the cannabis market (both licensed and illicit). This will increase demand for licensed cannabis and put some upward pressure on prices in 2025 and beyond.
- Hemp integration with the cannabis market is important to monitor and get right. After the 2018 Farm Bill, farmers invested in hemp as a profitable alternative to traditional crops, though oversupply crashed prices. Since industrial hemp cannabinoids are not currently subject to Department regulations, it is generally cheaper to produce cannabinoids from hemp than cannabis. There are uncertainties and health concerns, related to the safety of intoxicating cannabinoids produced from hemp.

Policy Recommendations and Next Steps:

- The illicit market continues to account for about 60 percent of consumption in California. This share has been stable for the past few years. Finding ways to increase the cost of producing unlicensed cannabis (e.g., more enforcement), decrease costs to produce for licensed cannabis, and increase consumer demand for licensed cannabis are critical for growing the licensed market.
- An analysis of wholesale prices in state-level licensed markets shows that prices in these markets are converging and following a similar downward trend that has stabilized. These markets are linked, and with the absence of a federal legal market, this link is

through the unlicensed market. Federal legalization of cannabis and facilitation of trade between different states with licensed markets would reduce trade of illicit cannabis and could lead to more stable prices in California and other states.

- Local taxes, fees, and restrictions increase costs for licensed businesses and can result in an effective local tax rate of more than 30 percent. Working to lower local restrictions, taxes, and fees for licensed cannabis businesses would support the licensed market. Local costs affect decisions on where to locate and how resilient businesses are to down years in the market. These barriers to entry create advantages for unlicensed businesses.
- Identifying other ways to reduce the costs for licensed businesses would support the licensed market. Regulatory costs, taxes, and fees can be especially burdensome to smaller businesses as they may represent a more substantial share of their business costs. Shifting enforcement costs to a source other than licensing fees would provide some relief to licensees and could allow for more enforcement efforts directed at the unlicensed market.
- Increasing demand for licensed cannabis through outreach and education to consumers about the risks and other negative consequences of unlicensed production would help put upward pressure on licensed market price. Illicit operations using harmful and illegal chemicals pose risks to human and environmental health. International crime syndicates that engage in human trafficking have also been found to operate these illegal grow operations.
- The hemp market is indirectly linked to the cannabis market through products containing cannabinoids including but not limited to CBD, as well as THC and other intoxicating cannabinoids. Expanding the analysis in this market report to evaluate consumer demand for these products would provide insights on market potential and interaction between cannabis and hemp in California. Educating consumers of the risks of intoxicating hemp products that are not subject to equivalent regulatory standards as California's legal cannabis products could also shift demand away from these products in favor of the licensed cannabis market. Emergency regulations restricting the sale of products containing synthetic and intoxicating cannabinoids derived from industrial hemp should further shift sales to the licensed market.
- Industry data are limited but improving. Continuing to improve data availability would provide better insights into the market.
 - Create standardized CCTT cultivator data entry procedures. Harvest data entry errors, whether intentional or not, currently lead to total harvest weights and plant counts that are an order of magnitude greater than expected production based on active licenses and tax data. Creating standardized procedures to record weights of flower, trim, and frozen-, dry-, or wet-weight plants—and continuing to

dedicate resources to educating cultivators of these procedures—would help further reduce data entry error. CCTT changes may address some of these issues.

- Create standardized CCTT retail data entry procedures. Volumes and weights of cannabis products sold at retail can be entered incorrectly. As a result, aggregating weights and volumes of products sold leads to total quantities that are several times higher than expected. Implementing categories for common package types of other cannabis products would improve data accuracy. This information could be identified by scannable codes at the point of sale.
- The Department continues to dedicate resources to ongoing review and cleaning of CCTT data. Identifying errors and documenting corrections for them continues to improve data accuracy and usefulness. This supports enforcement actions for diversion out of and inversion into the licensed market.
- Local, state, and federal agencies conduct eradication efforts independently and jointly. Efforts involving local agencies may or may not be reflected in state or federal eradication totals depending on the source of funding and lead agency of each operation. The state could work with departments to standardize reporting and support local and federal partners in aligning eradication data is tracked and reported. This would improve understanding of the state of the unlicensed market.

The short-run market outlook for 2024/25 is similar to 2023/24, namely a period of continued adjustment. Department changes (from legislative mandates and potential regulatory updates) planned in 2024/25 may help to lower costs for many licensed producers, improve cannabis product safety and transparency to the benefit of human and environmental health, and aid in the enforcement of illicit cannabis production and diversions. Additional opportunities to reduce costs at the state and local levels could further benefit the licensed industry. Increasing enforcement of illicit operations would support the licensed market.

Increasing consumer demand for cannabis will put upward pressure on prices. The Department is evaluating options for introducing cannabis products for animals into the market. It has also provided a proposal outlining potential regulation of hemp cannabinoids, but this ultimately requires legislative action for the Department to regulate cannabinoid hemp products. These and other changes may increase demand for licensed cannabis. This should continue to make the licensed market more competitive with the unlicensed market and guide the market towards less volatility than experienced in recent years.

2 Cannabis Market Production (Supply)

This section describes cannabis production (supply) in California. This report focuses on licensed cultivation as the foundational piece of the cannabis supply chain. Cultivation is reported in terms of pounds harvested and transferred by cultivators and the costs to produce cannabis.

Cannabis production was estimated for the licensed and unlicensed markets for 2024 and prior years (where data are available). California licensed cannabis production is the amount of cannabis produced and sold by licensed cultivators in California. Unlicensed production is the amount of cannabis produced by unlicensed cultivators in California or diverted to unlicensed distributors, manufacturers, or retailers, for consumption within California or other states. Licensed production is tracked through CCTT. Federal, state, and county plant eradication combined with geospatial data of farms in different regions serve as the basis for estimating unlicensed production.

2.1 Licensed Cannabis Production

Total production in the licensed market was estimated by combining multiple data sources and applying statistical methods. Data include CCTT, production budgets, and cultivation tax receipts. This section describes estimated licensed production based on cultivation tax and CCTT data.

Cultivation (production) data, stratified by taxes on flower, leaves and other plant material, and fresh plant material, are available from CDTFA through July 1, 2022. Collection of the cultivation tax began in 2018 and was suspended on July 1, 2022. Prior to July 1, 2022, the cultivation tax rate was \$10.08 per ounce for dry-weight flowers (\$9.65 prior to January 2022 and \$9.25 prior to January 2020), \$2.87 per ounce for dry-weight leaves (\$2.75 prior to January 2020), and \$1.35 per ounce for fresh cannabis (\$1.29 prior to January 2020). The “dry-weight leaves” category includes leaves and all other dry non-flower plant material, such as trim.

Cannabis leaves and other plant material typically undergo further processing, and THC is extracted from this plant material for products such as edibles and vape cartridges. Cannabis trim is also included in the “dry-weight leaves” category. Trim can include sugar leaves and bits of buds, which are highly variable in THC content, but considerably higher in THC content than fan leaves. Cultivation volumes of trim, other plant material, and fresh plants are converted to dry-flower equivalents based on approximate THC content. Historically, fresh cannabis plants were typically cultivated for propagation purposes, and were not processed for direct consumption. However, it has become more common for fresh plants to be frozen and distributed to manufacturers to undergo processing for manufactured products such as vapes and edibles.

Cultivation tax data were used to estimate cannabis production through 2021². CCTT data were used to estimate the quantity of licensed cannabis production sold for adult-use and medicinal consumption in California for 2019–2024. CCTT data were adjusted to account for reporting errors³.

Table 1 shows estimated total licensed cannabis production distributed to the licensed adult-use and medicinal retail markets for 2020–2024. Production has been increasing since 2020, with an estimated increase of 17.3 percent from 2020 to 2021, from 0.84 to 0.98 million pounds. 2022 production increased by 13.2 percent to 1.11 million pounds, 2023 cultivation increased by 14.7 percent to 1.28 million pounds, and 2024 production is expected to increase by 11.8 percent to 1.43 million pounds. Cannabis production distributed to the medicinal market has been decreasing since 2021 from 120.7 to about 92.7 thousand pounds, whereas cannabis distributed to the adult-use retail market has steadily increased year-over-year.

Table 1. Estimated Cannabis Production by Medicinal and Adult-Use

Year	Adult-Use Total, Dry-Flower Equivalents	Medicinal, Dry-Flower Equivalents	Total Licensed, Dry-Flower Equivalents	Year-Over- Year Change
	<i>Pounds, Thousands</i>			<i>%</i>
2020	734.1	104.7	838.9	N/A
2021	863.3	120.7	984.0	17.3%
2022	1,014.5	99.8	1,114.3	13.2%
2023	1,184.4	93.7	1,278.0	14.7%
2024	1,336.7	92.7	1,429.4	11.8%

Notes: ERA has updated estimation of cannabis distributed to the medicinal market based on CCTT data and CDTFA estimates of donated cannabis.

Total licensed cannabis production has been increasing since the licensed market was introduced in 2018. Wholesale and retail prices have been declining since 2020 (see Section 4). Increasing total production shows that the licensed market is growing, even if the value of some products (e.g., wholesale cannabis flower) has decreased due to declining unit prices.

Table 2 summarizes the value of licensed production in California (nominal, not adjusted for inflation). The value is shown for production that is supplied to the licensed California retail market and excludes any estimated diversions to the unlicensed market. The total value of licensed production has decreased from \$1.16 billion in 2020 to \$1.03 billion in 2024. However, the total wholesale value of licensed production increased by 7.5% in 2024 relative to 2023.

² The Cultivation Tax was suspended; other cannabis business tax receipt data are available through 2024 and are applied for other components of the market report.

³ Adjustment methods include a range of statistical analyses and labor-intensive review, cleaning, and flagging errors. This process is informed by working with the CCTT data for several years and understanding the nuances of reporting and likely errors, which is done in coordination with Department staff.

After declining substantially between 2021 and 2022, the wholesale value of licensed cannabis has increased each year.

Table 2. Annual Value of Licensed Production

Year	Average Wholesale Price	Wholesale Value
	<i>\$ per Pound</i>	<i>\$, Millions</i>
2020	\$1,377	\$1,155
2021	\$1,297	\$1,276
2022	\$791	\$881
2023	\$750	\$959
2024	\$721	\$1,031

2.2 Unlicensed (Illicit) Cannabis Production

The size of the unlicensed market is more difficult to measure than the size of the licensed market because data for illicit cultivation, processing, and sales are not consistently reported. A review of other academic research and reports by for-profit companies found an overly wide and implausible range for the estimated size of the unlicensed market. ERA completed a careful review of unlicensed market data to develop a statistical analysis of the unlicensed market. Statistical confidence intervals were developed and included to illustrate the uncertainty range of the estimates.

Consumption estimates are based on econometric analysis of survey data (described in Section 3, Cannabis Consumption), eradication data collected from county, state, and federal agencies, and geospatial grow site data used to fill in missing values. These sources were combined with licensed production data to and used in statistical analyses to establish an estimated size of the unlicensed market in California.

Evaluation of licensed production data and a review of available industry estimates⁴ suggests that average yield is close to 0.3 pounds of dry-flower per plant, outdoor yield is roughly 0.5 pounds per plant, and mixed-light and indoor yield is around 0.25 pounds per plant. Yield uncertainty is incorporated in the range of estimated unlicensed production. In 2022, licensed production in California (by plant count) is composed of 34 percent indoor, 44 percent mixed-light, and 17 percent outdoor.

Table 3 summarizes U.S. total eradications and consumption for 2011–2022 on a dry-flower equivalent (lbs.) basis. The unrealized flower production from U.S. Drug Enforcement Agency (DEA) eradications is equivalent to between 5.7 and 14.7 percent of total U.S. cannabis consumption. All else equal, for each plant eradicated by the DEA, between 6.8 and 17.6 plants

⁴ See, for example, Leafly (2022). Yield estimates are continually being refined through ERA outreach to cultivators.

are cultivated, processed, and distributed to U.S. consumers across licensed and unlicensed markets. Subtracting U.S. licensed cannabis production from total consumption, unrealized flower production from eradications is equal to between 7.3 and 16.1 percent of unlicensed cannabis demand. Stated another way, for each unlicensed plant eradicated, flower from 6.2 to 13.7 unlicensed plants successfully reach U.S. consumers.

Table 3. Total U.S. DEA Cannabis Eradications and U.S. Cannabis Consumption

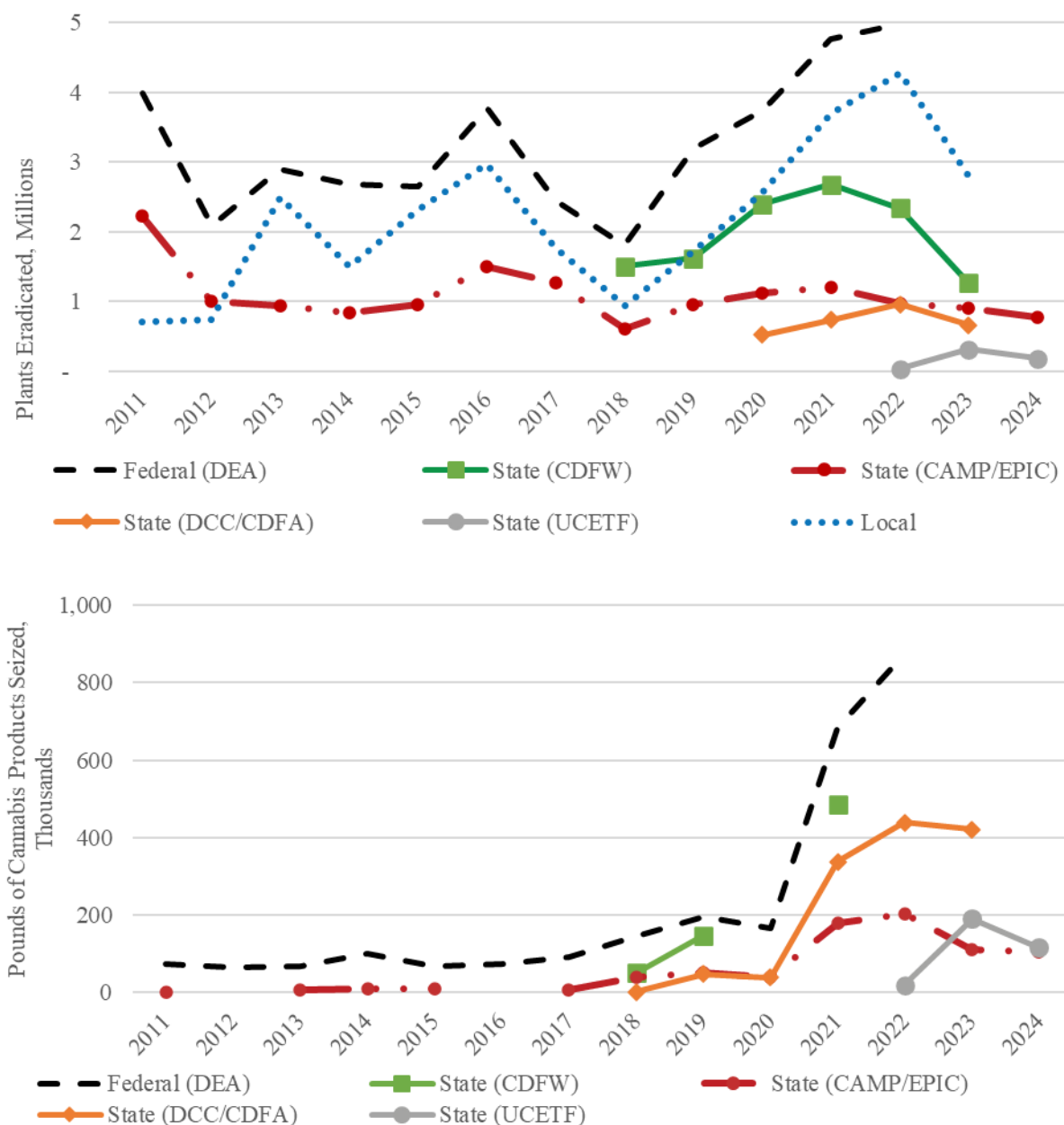
Year	Eradication, Low Yield	Eradication, High Yield	Consumption, U.S. Total
<i>Pounds, Millions</i>			
2011	1.68	2.53	10.1
2012	0.98	1.48	10.5
2013	1.10	1.65	11.3
2014	1.08	1.61	12.0
2015	1.06	1.60	12.8
2016	1.34	2.01	13.6
2017	0.85	1.27	14.6
2018	0.71	1.06	16.2
2019	1.00	1.50	18.2
2020	1.14	1.70	20.1
2021	1.38	2.07	21.8
2022	1.42	2.13	23.5

Note: DEA data are only available through 2022.

Enforcement and eradications in California are different than the total U.S. average. DEA efforts in California have increased disproportionately in recent years relative to the rest of the U.S. From 2011–2016, DEA eradications in California were 62 percent of national eradications. From 2019–2022, they accounted for 84 percent of total eradications. This could imply that unlicensed production has increased in California at a higher rate compared to the rest of the U.S., that DEA eradication efforts in 2011–2016 were low relative to California’s share of total unlicensed cannabis production, or that DEA eradication efforts in 2019–2022 were high relative to California’s share of total unlicensed cannabis production. DEA offices did not offer comments regarding changes to enforcement efforts in California.

Figure 1 illustrates annual plant eradications and seized cannabis products in California reported by the DEA, California Department of Fish and Wildlife (CDFW), DCC and California Department of Food and Agriculture (CDFA) and California’s Unified Cannabis Enforcement Task Force (UCETF), the Department of Justice’s Campaign against Marijuana Planting (CAMP) and Eradication and Prevention of Illicit Cannabis (EPIC), and the sum of eradications across counties (where data are available). Enforcement actions typically involve multiple agencies, therefore there is some double-reporting across enforcement actions.

Figure 1. Reported Annual Eradications by Agency and Jurisdiction; Plants and Pounds



Federal eradications have increased substantially in recent years, from an average of 3.0 million plants and 76 thousand pounds of product per year in 2011–2016 to 4.2 million plants and 480 thousand pounds of product per year in 2019–2022.

In general, state agency eradications have been relatively stable the past few years, and the quantity of eradications are similar to pre-MAUCRSA levels for applicable state agencies. Meanwhile, there has been an increased emphasis on seizures of cannabis products since 2021.

CDFW plant eradication increased from 1.5 million in 2018 to a peak of 2.7 million in 2021, while CDFA/DCC eradication increased from 0.5 million in 2019 to a peak of 1.0 million in 2022. CDFW cannabis product seizures increased from 51 thousand pounds in 2018 to 487 thousand pounds in 2021. CDFA/DCC seizures increase by a factor of 10 from 39.7 thousand pounds in 2020 to a peak of 429.8 thousand pounds in 2022.

UCETF eradication and seizures were low (30 thousand plants and 19 thousand pounds) in 2022, the first year the taskforce operated; eradication increased to 318 thousand plants and 190 thousand pounds in 2023, and there were 179 thousand plants eradicated and 115 thousand pounds of product seized in 2024. UCETF continues to expand its operations.

CAMP/EPIC eradication are relatively stable, decreasing from an average of 1.2 million plants per year in 2011–2016 to 0.9 million plants per year in 2019–2024. However, the quantity of seized cannabis products increased during this time from an average of 8 thousand pounds to 116 thousand pounds per year.

Local eradication (by county) are highly variable from year to year because sheriff's offices do not report total eradication every year, and CAMP does not conduct operations in the same counties each year. Additionally, differences in county-to-county tracking of seized cannabis products make it difficult to examine county-level trends over time.

Plant eradication in California are estimated to represent between 6.9 and 16.8 percent of unlicensed production that is cultivated in the state for 2011–2016, and between 7.5 and 18.3 percent for 2019–2024. That is, between 7.5 and 18.3 percent of illicit production⁵ (excluding seized cannabis production) is identified/eradicated and removed from the illicit market.

Table 4 summarizes average annual unlicensed production in California prior to legalization/MAUCRSA (2011–2016) and in the period following MAUCRSA (2019–2024). Estimated illicit production in 2019–2024 ranges from 7.0 to 16.3 million pounds per year, with an average of 11.4 million pounds. The confidence interval is not symmetrical. It is likely that the illicit market size is in the lower range of the confidence interval due to the following qualitative factors: (i) substantial double-reporting in law enforcement eradication data that is not possible to fully account for in the analysis, (ii) applied production/yields for illicit operations are high because they are based on licensed market practices under “ideal” farming conditions, and (iii) there are limited data in some counties and information from other counties with better data/reporting (e.g., Emerald Triangle) is applied to extrapolate to these areas, which may overstate illicit production.

⁵ Illicit production includes both unlicensed production and licensed production that is diverted to the unlicensed market.

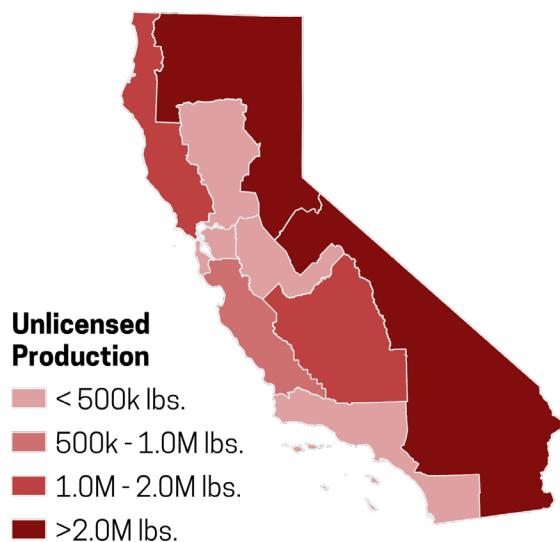
Table 4. Average Annual California Unlicensed Production Estimates

Year	Low Range	Average	High Range
<i>Pounds, Millions</i>			
2011–2016	6.2	10.0	14.9
2019–2024	7.0	11.4	16.3

Illicit production is estimated to be slightly higher post-MAUCRSA than pre-MAUCRSA (increasing from 10.0 to 11.4 million lbs. per year on average), but this difference is not statistically significant. One potential explanation for this trend is that data are more widely available in the post-MAUCRSA period.

County-level eradications and geospatial data were applied to estimate the distribution of unlicensed production by county.

Figure 2 illustrates the estimated distribution of unlicensed/illicit production in California⁶. Illicit production is highest in the Southeast Interior, with San Bernardino and Riverside counties accounting for the greatest share of the total. This includes production in the high and low desert areas, with a mix of indoor and mixed light grow sites. Illicit production is also high in the Intermountain and North Coast regions that include legacy cannabis operations. A substantial share of illicit production comes from the Emerald Triangle counties, led by Humboldt.

Figure 2. Average Annual Unlicensed (Illicit) Production, 2019-2024

⁶ The state is divided into regions that are typically used for conventional agricultural commodities. This includes the Southern San Joaquin Valley, Northern San Joaquin Valley, Sacramento Valley, North Coast, South Coast, Central Coast, Intermountain, and Southeast Interior (including desert regions).

Illicit production has shifted over time—this is driven by multiple factors, including but not limited to differences in local statute and regulations that affect the licensed market. These regional differences could be further evaluated.

This report uses historical wholesale cannabis price data to estimate the value of unlicensed production in California⁷. The weighted average wholesale price (across indoor, outdoor, and mixed-light cannabis) from 2019–2024 is \$1,040 per lb.

Table 5 summarizes the estimated value of unlicensed production in California. The value is shown for production that is consumed in (supplied to) California and unlicensed cannabis that is exported. The total value is around \$11.9 billion dollars (\$2.0 billion within the state and \$9.9 billion exported).

Table 5. Average Annual Unlicensed Cannabis Production Value, 2019-2024

Supplied to	Low Range	Average	High Range
<i>\$, Billions</i>			
California	1.5	2.0	3.4
Export	5.8	9.9	13.6

2.3 Department Responsibilities and New Regulation, Statute, and Tax Impacts

The Department was formed by merging three separate cannabis programs that were housed under three different state agencies⁸. The three legacy programs had unique responsibilities and different license fee structures that were established when MAUCRSA was passed. Since the development of these legacy programs and fee structures, the cannabis industry has evolved, and with it so have the responsibilities of the Department.

Changes in laws, regulations, and taxes have affected the cannabis market in recent years, and more changes are anticipated. Previous and anticipated changes include but are not limited to equity programs, modifications to license types, enhanced coordination with other state agencies, reporting, market evaluations, and enforcement.

The cannabis market has continued to mature since MAUCRSA, and Department responsibilities have continued to expand because of new laws and regulations, evolving market conditions, and the need to protect consumers, the environment, and the public. Key legislative bills since MAUCRSA that affect Department responsibilities include but are not limited to:

⁷ Law enforcement operations value cannabis differently based on existing policy/regulations. For example, the retail value of seized cannabis, rather than a wholesale value, may be applied.

⁸ In 2021 Assembly Bill (AB) 141 consolidated three different state cannabis agency programs (the Bureau of Cannabis Control (BCC) in DCA, the Manufactured Cannabis Safety Branch (MCSB) in CDPH, and CalCannabis in CDFA into the Department.

- Assembly Bill 133 (2017)
- Senate Bill 1459 (2018)
- Assembly Bill 1793 (2018)
- Senate Bill 67 (2019)
- Assembly Bill 97 (2019)
- Assembly Bill 1525 (2020)
- Assembly Bill 45 (2021)
- Senate Bill 166 (2021)
- Assembly Bill 1885 (2022)
- Senate Bill 1326 (2022)
- Assembly Bill 195 (2022)
- Assembly Bill 623 (2023)
- Senate Bill 51 (2023)
- Senate Bill 540 (2023)
- Senate Bill 166 (2023)
- Senate Bill 622 (2023)
- Assembly Bill 179 (2024)
- Senate Bill 1064 (2024)
- Senate Bill 1109 (2024)
- Senate Bill 1498 (2024)
- Assembly Bill 1775 (2024)

The Department has also implemented regulatory changes in recent years aimed at providing relief to licensees. Some recent examples of changes implemented by the Department or legislature include but are not limited to:

- The Retail Access Grants program was authorized by the Budget Act of 2022, Item 1115-102-0001, found in Assembly Bill 178 (Ting, 2022). The Department is currently administering 16 active Retail Access Grants.
- Introducing Large (Type 5) cultivation licenses (2023), managing license consolidation, and issuing these new license types.
- AB 97 in 2019 made statutory changes and additions related to cannabis for the Budget Act of 2019. Most notably, this bill extended and expanded the provisional licensing system, which was a significant change to Department responsibilities.
- SB 67 in 2019 made enhancements to the cannabis Appellations of Origin program, requiring CDFA and the Department to conduct additional regulatory and programmatic updates and development.
- Equity fee waivers were implemented in 2021 by the Department as required under SB 166, in addition to fee deferrals.

- MAUCRSA established cannabis-specific taxes and allocated a portion of these revenues to public health, environmental, criminal justice and research initiatives. \$10 million is allocated annually for an Academic Research Grant Program administered by the Department. In 2020, the Bureau of Cannabis Control awarded the first round of grant funding - nearly \$30,000,000 for 34 research projects. The Department now has over 50 grant-funded research projects being actively administered, and will add roughly another 20-25 next year.
- AB 45 in 2022 established a regulatory structure for cosmetic, food, and beverage hemp products, requiring the Department to report to the Governor's Office and increase capacity to regulate products in this space.
- Senate Bill (SB) 833, which allows cultivators to change their renewal dates, temporarily change to a smaller, Reduced-Size Cultivation License, and/or temporarily put a license into Limited Operations Status (2024).

In addition to modifications in response to new laws and regulations, other local and state changes affect licensed cannabis businesses. For example, changes in local fees and taxes for cannabis businesses (as set by various local agencies) and suspension of the state Cultivation Tax. The Department and partner programs continue to respond to evolving market needs. Examples of potential policy changes in 2024/25 include but are not limited to:

- Modifying lab testing regulations to limit lab shopping and support product testing and safety for licensed products.
- Restructuring licensee fees to be more equitable and to ensure Department revenues cover expenditures.
- Modifying Department regulations related to electricity reporting and carbon offset purchasing requirements, pesticide recording and sanitation requirements, and cultivator transfers of clones, immature plants, and seeds to nurseries.
- Modifying Department regulations to introduce cannabis products for animal consumption.
- Updating CCTT reporting requirements to improve data accuracy and reduce potential diversions to the illicit market.
- Implementing other changes as required under laws passed in 2024 such as AB 179, SB 1064, SB 1109, SB 1598, and AB 1775.

In short, Department responsibilities and enforcement efforts have continued to expand since MAUCRSA to effectively regulate the multi-billion California cannabis industry. The Department efforts have necessarily increased with these increased responsibilities to protect the public and environment. Department budget authority has not increased in proportion to these responsibilities.

2.3.1 Summary of Recent Policy Changes/Updates

Key changes to the licensed market that continue to affect conditions in 2024/25 include:

- Suspension of the cultivation tax,
- Type 5 (Large) cultivation licenses,
- Limited Operations status licenses, and
- Changes in local fees/taxes.

Cultivation tax. Eliminating the statewide cultivation tax essentially reduced the cost of production by \$161 per pound (\$10.08/oz) of flower and by \$46 per pound of trim (\$2.87/oz). Analysis showed that the tax suspension may have resulted in the reduction of wholesale flower prices by more than \$161 per pound. This would suggest that market intermediaries (e.g., distributors and retailers) and end consumers are the main beneficiaries from the elimination of the cultivation tax. However, as part of a compromise with those that benefited from some of the cannabis tax receipts, a provision was included to raise the cannabis excise tax rate starting on January 1, 2025. This provision aims to address specified funding gaps from the Cultivation Tax being eliminated.

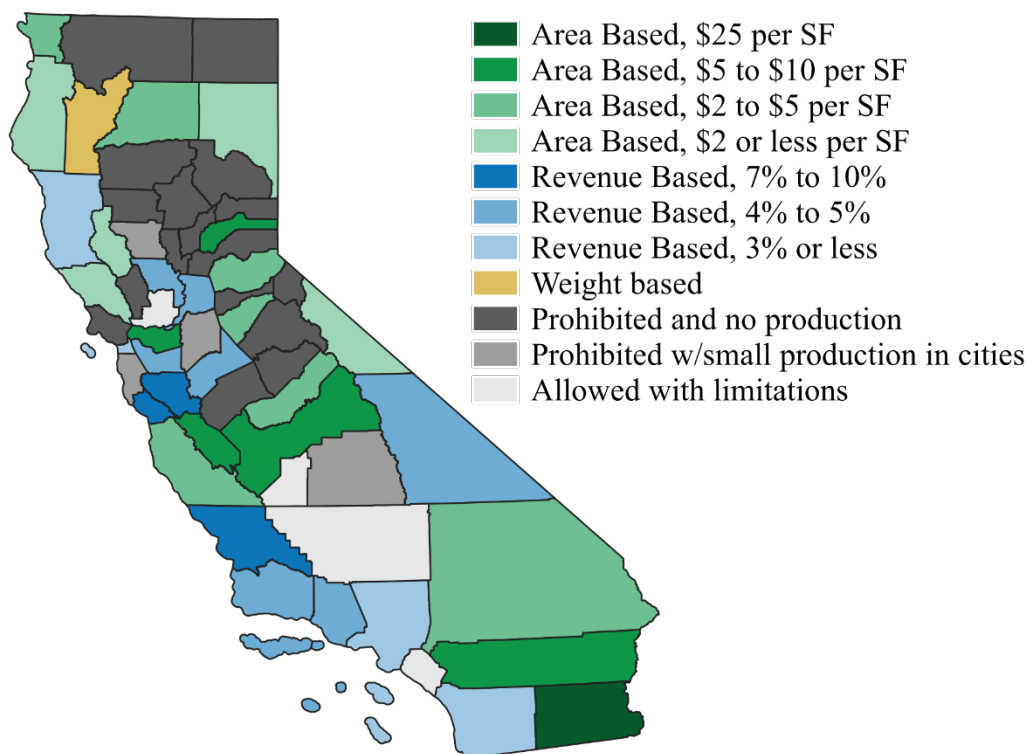
Large cultivation licenses. Large (Type 5) cultivation licenses were available starting in 2022. These regulations allow for both conversion to the new Large cultivation license, or to convert smaller licenses into a Medium license. Many cultivators have already obtained large cultivation licenses, others have applied for new Large/Medium cultivation licenses and are in the process of converting, and some businesses some will keep stacked licenses to avoid the prohibition on maintaining a distribution license. Section 4.3 describes trends in converting cultivation licenses.

Limited Operations Status. SB 833 allows licensees to put a cultivation license into Limited Operations Status or change a cultivation license to a Reduced-Size Cultivation License type with a smaller canopy size. Additionally, it provides licensees with a one-time opportunity to change the renewal date of licenses. DCC released regulations implementing the law in March 2024. The economic impacts of SB 833, and more specifically the regulations to pass SB 833, were analyzed in the economic and fiscal impact analysis (EFIA). Expected regulatory impacts included reduced license fee revenue of about \$2 million, a short-term decrease in production of 9.8 percent, and a 1.3 percent increase to the price of flower. Thus far, the number of licenses placed in Limited Operations is lower than the estimated number in the EFIA, which is reasonably expected since the EFIA is designed to avoid underestimating impacts.

Local taxes. Local taxes and regulations also affect cultivators throughout the state. Figure 3 illustrates how counties (or municipalities within counties) assess cannabis cultivation taxes. Although the state cultivation tax was suspended in 2022, many counties use a revenue-based cultivation tax structure and square footage charge. The lowest local revenue-based tax structure is in San Francisco, at only 1 percent. The other lowest revenue-based tax structures are in the

south coast region, including Los Angeles, at 2 percent, where most cannabis grown is indoors. The highest revenue-based tax structures are further up the coast in Santa Cruz, San Luis Obispo, and Santa Clara Counties, at 7, 8, and 10 percent, respectively. Lake is the lowest rate structure based on square footage, at a weighted average of \$1 per SF. The two highest rate structures are in Riverside and Imperial Counties, at \$10 and \$25 per SF, respectively.

Figure 3. Map of Local Cultivation Tax Structures and Rates (as of 2024)



This assessment relies on tax structures and rates originally determined from a comprehensive review in 2022, with updates for 2024. Counties are constantly updating tax structures, so these values are subject to change. Many counties have a range of taxes levied depending on cultivation method. In this case, the values in Figure 3 represent the most prevalent cultivation method in each county. Local taxes and regulations will continue to be monitored and could be further analyzed.

2.3.2 Department Budget and License Fees

Department costs have increased since the 2021 merger of three legacy programs. As described above, this is in response to new laws and expanded Department responsibilities for regulating the licensed market. Since the Department was formed, its responsibilities have continued to increase in response to new laws and expanded Department responsibilities. This includes, among other activities described throughout this report, substantial expansion of enforcement to fight the illicit market, thereby supporting the licensed market.

Department license fee revenues are currently insufficient to cover Department⁹ obligations to manage a safe marketplace for licensed cannabis in California. Therefore, Department revenues must increase. This can be accomplished by increasing license fees, redistributing fees by license type, securing alternative Department funding streams (e.g., existing sources such as the Cannabis Tax Fund), and identifying opportunities for improving Department efficiency.

With a few specific exceptions¹⁰, most of the Department budget is covered by license fees because MAUCRSA required license fees to cover the costs of the three legacy programs (individually). This is not true for other industries, or for cannabis markets in other states. Department license fees were compared to examples in other states and industries including Michigan's Cannabis Regulatory Agency (CRA), California's Department of Alcoholic Beverage Control, and the Alcohol and Tobacco Trade Bureau (TTB). Key findings of this comparison include:

- The Department receives less external funding than comparable agencies within and outside of California. For example, Michigan's CRA receives funds from the state's General and Restricted Funds, and licensing fees are not directly tied to agency expenditures. ABC receives millions from the state's General Fund to cover expenditures (\$20.5 million in FY 2023-24).
- California cannabis has considerably higher fees and excise taxes relative to product value. The value of cannabis at wholesale in California is 35 percent higher than in Michigan. However, excise tax collections are 124 percent higher, and fees are 162 percent higher. Higher fees and excise taxes in California lead to a greater tax and fee burden on consumers and higher retail prices. Taxes and fees are higher because they pay for programs that would otherwise be paid for by licensed businesses, such as track and trace (CCTT). Licensing fees in California (unlike Michigan) fully cover CCTT program costs, including technology and tags (roughly \$28 million in FY 2024-25), in addition to transfers of funds to other agencies to cover program costs (e.g., CDFR).
- Excise taxes and licensing fees for cannabis in California are also higher than alcohol and tobacco relative to their wholesale value. State excise taxes and fees for cannabis are roughly 77.5 percent of wholesale value. Excise taxes and fees for alcohol are about 8.4 percent of wholesale value, and excise taxes and fees for tobacco are 29.5 percent of

⁹ This analysis is primarily concerned with the Cannabis Control Fund. Some Department programs could be supported with other tax revenues and funding. The current imbalance is based on the existing budgets for Department Funds.

¹⁰ The department also receives revenue from delinquent fees, other regulatory fees, and investment income (interest accrued on the fund). Selected lab positions are set to be reimbursed by CDPH (AB 45). The Department's LJAG labor is paid from General Fund.

wholesale value. This is because cannabis taxes and fees cover more regulatory programs than alcohol and tobacco.

2.3.3 Cultivation Regulations Changes

The Department evaluated changes in cultivation requirements for the industry. The purpose of these changes is to streamline regulations for licensed cultivators. These changes include clarifications as well as changes with market implications, such as:

- Requirements for submitting electricity reports would be removed, as would the carbon offset purchase requirements for some indoor and mixed-light tier 2 cultivators.
- Introduction of new regulations for good production practices, i.e., sanitation standards.
- Updating requirements to allow cultivators to transfer clones, immature plants, and seeds to nurseries.

An economic analysis of the proposed changes estimated around \$4.76 million in direct benefits (cost savings) for licensed cannabis cultivators, that would be partially offset by additional costs of about \$4 million.

2.3.4 Animal Products

The Department is evaluating options for introducing animal products (products for animal consumption) in the licensed cannabis market. This includes defining what is considered an animal product, particularly for products that may exist for both humans and animals (e.g., tablets, tinctures, edibles/treats), and establishing product standards, labeling, and potency.

There are expected to be some costs to the Department for integrating the animal product market into the regulated cannabis market. These include additional enforcement and administrative costs associated with implementing animal product regulations. However, this increases demand for licensed cannabis. A preliminary assessment of the potential market for animal products derived from cannabis in California is upwards to \$10 million. This would create an opportunity for manufacturers and retailers to expand their product offerings and market space. The size of this market is not yet known.

2.3.5 CCTT Changes

The Department is evaluating changes focused on CCTT requirements with the primary objectives of implementing safeguards to prevent diversion to the illicit market, improving public safety, and improving data accuracy. This may include but is not limited to:

- Prohibiting second test sample packages.
- Mandatory use of CDTFA sales tax fields.
- Retail disclosure of Certificates of Analysis (COA).

- Requiring the same units of measurement (UOM) when accepting transfers.
- Prohibiting future dating of certain activities in CCTT.

In general, the changes to CCTT would support the licensed market by making it more difficult to divert and invert products and operate in the illicit market. All else equal, these types of changes would increase the price of licensed cannabis. This simultaneously increases costs for illicit businesses who must find product from alternative, higher cost, sources. Higher illicit costs put upward pressure on illicit market prices, which makes licensed cannabis more competitive.

2.4 Production Capacity and Canopy Capacity

Production capacity is defined as the maximum amount of cannabis that could be produced from existing, active licenses. It is the total expected production if every active cultivation license produced at the potential yield¹¹ for each license type. Most cultivation businesses do not produce at the maximum canopy area due to factors including underutilization of canopy area, failed/rejected harvests, disease impacts, and other operational constraints. Production capacity therefore is a useful metric to track because it provides an indication of how much production could increase under existing, active licenses. Historically, production capacity was intended to assess how much room the industry had to expand.

Previous assessments by ERA showed statewide licensed production was about 31.5 percent of total estimated licensed production capacity in 2021 – 2023. This was based on limited, available data at that time. As cultivation licenses have consolidated, production capacity has become less of a measure of the potential for the industry to expand and more of a measure of licensed cultivators' efficiency. In order to measure this more effectively precise information on current and potential yields and total industry production is needed.

A measure of canopy capacity based on the area of canopy is based on the licensed area¹². This measurement reflects available capacity because most cultivators' premises are smaller than the maximum allowable licensed capacity. Table 6 summarizes reported canopy area and allowed canopy area by license type.

¹¹ "Yield" in this context is defined as the typical pounds of flower harvested per year by license type.

¹² This analysis of total licensed canopy capacity includes only the cultivators that reported available canopy area. That is, licenses with no reported canopy use were excluded from the analysis.

Table 6. Reported Canopy Capacity and Maximum Licensed Capacity by License Type

License Type	Reported Canopy Capacity (SF)	Maximum Licensed Canopy Capacity (SF)
Large Indoor	81,906	84,000
Large Mixed-Light Tier 1	181,652	228,000
Large Mixed-Light Tier 2	31,965	32,000
Large Outdoor	9,100,738	10,214,880
Medium Indoor	2,427,415	3,472,000
Medium Mixed-Light Tier 1	1,283,327	1,342,000
Medium Mixed-Light Tier 2	540,060	638,000
Medium Outdoor	19,810,378	35,120,920
Small Indoor	2,350,340	3,400,000
Small Mixed-Light Tier 1	5,928,208	6,220,000
Small Mixed-Light Tier 2	2,614,884	2,860,000
Small Outdoor	13,494,648	14,850,000
Specialty Cottage Indoor	14,353	14,500
Specialty Cottage Mixed-Light Tier 1	113,624	122,500
Specialty Cottage Mixed-Light Tier 2	27,946	35,000
Specialty Cottage Outdoor	103,033	122,500
Specialty Indoor	834,423	1,525,000
Specialty Mixed-Light Tier 1	433,685	495,000
Specialty Mixed-Light Tier 2	164,584	190,000
Specialty Outdoor	1,074,791	1,285,000
Total	60,611,959	82,251,300

Canopy area is 60.6 million square feet compared to total licensed canopy capacity of 82.3 million square feet. This estimate excludes canopy capacity for licenses without reported canopy.

Based on estimated yields per square foot by license type, total licensed capacity for production is 4.02 million pounds of dry-flower equivalents. This would require 100 percent utilization of the 60.6 million square foot capacity reported by licensees. Cultivation volume was estimated based on a combination of cultivation tax receipts prior to July 2022 (see Section 2.1) and retail sales volumes (see section 4). An estimated 1.43 million pounds of dry-flower equivalents are sold at retail. Therefore, canopy utilization is roughly 36 percent of total canopy capacity in 2024. This estimate excludes any production diverted to the illicit market.

Canopy capacity utilization in California appears to be comparable or lower than that in other states with licensed cannabis markets, based on limited information available from previous years. In 2022, the estimated canopy capacity utilization in Maine was 73 percent. From 2019 to 2020, Colorado MED’s Regulated Marijuana Market Update (which has not been updated since 2020) reported that “plant allocation utilization” rates fluctuated between 38 and 52 percent in

the adult-use market. In Washington, previous estimates of canopy capacity utilization were below 40 percent before capping the number of licensed cultivators in 2018.

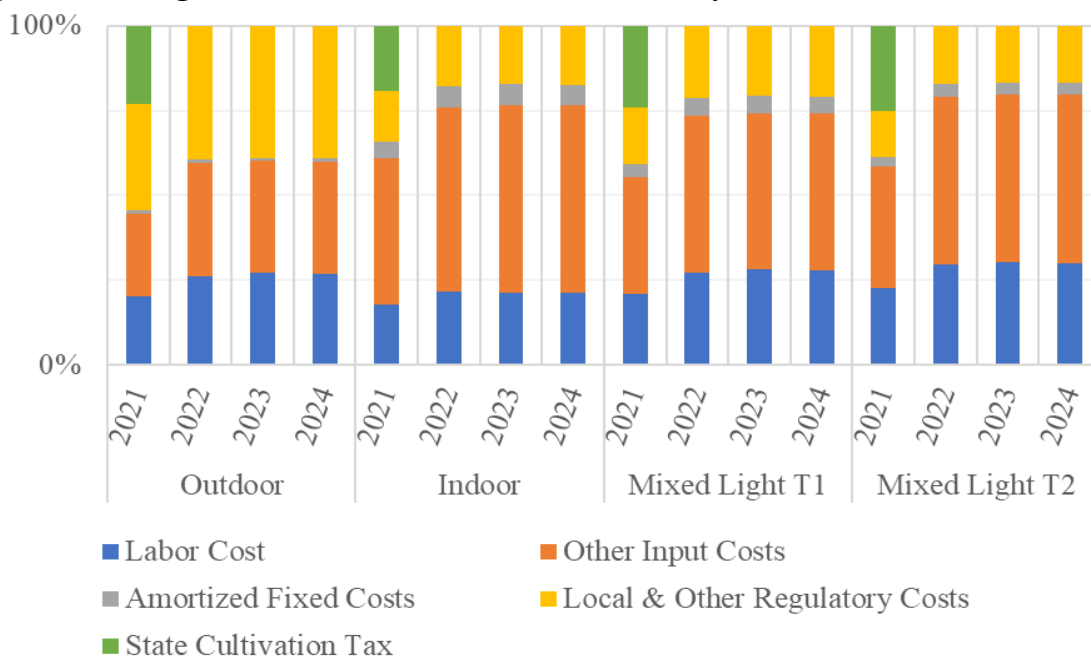
2.5 Production Costs

Cannabis cultivation production costs have been increasing over the last several years. This is primarily due to higher labor and input costs. Regulatory costs have been decreasing under changes implemented by the Department as well as other legislative changes.

The cost to produce cannabis in California is split into production cost categories (fixed and variable costs), taxes, and other regulatory compliance costs. Prior studies have summarized some of the key cost changes between 2021 and 2023. These include increasing wages, regulatory cost changes, suspension of the cultivation tax, and other inflationary cost pressures.

Figure 4 illustrates estimated average annual cost shares by cultivation method from 2021 to 2024. Production costs are largely unchanged between 2023 and 2024. Labor costs include labor associated with cannabis cultivation, excluding labor associated with compliance—these are included in “Local & Other Regulatory Costs.” “Other Input Costs” include the other, non-labor variable costs associated with cannabis production, such as fuel, fertilizer, water, and electricity. These increased substantially from 2021 to 2022 due to supply chain shortages and other inflationary pressures. Inflation has continued; however, some input costs such as fuel and fertilizer decreased in 2024. “Local & Other Regulatory Costs” include local taxes, local licensing fees, state licensing fees, and other compliance costs.

Figure 4. Average Estimated Cultivation Cost Shares by Cultivation Method, 2021–2024



The costs in Figure 4 do not include a return on management time, inventory, other local business fees and taxes, or other marketing costs. Actual cost shares will vary by cultivation business. These cost shares are based on average operations by cultivation method and input prices as of 2024.

Production costs are expected to change in 2025 as new policies and regulations are implemented (see Section 2.3).

2.6 Production Summary and Outlook: 2024/25

The production outlook for 2024/25 shows both opportunities for growth and potential challenges. The general outlook is similar to 2023, with continued adjustment to past and forthcoming regulatory changes, and expected overall growth in production. This trend is driven by expected improvements in the ability to deter diversions to the illicit market, additional enforcement activity, and steadily increasing demand for cannabis products (including potential for introducing animal products)—each of these places upward pressure on cannabis prices. Counteracting this trend are low margins that are a result of soft wholesale cannabis prices (in part due to a large unlicensed cannabis market), and higher costs of regulatory compliance.

Key findings include:

- Licensed cannabis production in California has been increasing since passage of MAUCRSA. From 2020 to 2024, production (dry-flower equivalent) increased from about 840 thousand pounds (dry-flower equivalent) to approximately 1.43 million pounds. This indicates the licensed market is growing.
- Licensed cannabis production has continued to increase through 2024, despite unfavorable prices for cultivators in the last few years. Wholesale price trends are discussed later in this report in Section 4.1 Wholesale Prices.
- Statistical analyses were applied to multiple data sources to estimate illicit production. Between 7.0 and 16.3 million pounds of unlicensed/illicit cannabis is produced in California each year. The confidence interval is not symmetrical. It is likely that the illicit market size is in the lower range of the confidence interval due to the following qualitative factors: (i) substantial double-reporting in law enforcement eradication data that is not possible to fully account for in the analysis, (ii) applied production/yields for illicit operations are high because they are based on licensed market practices under “ideal” farming conditions, and (iii) there are limited data in some counties and information from other counties with better data/reporting (e.g., Emerald Triangle) is applied to extrapolate to these areas, which may overstate illicit production.
- Illicit production is not statistically significantly different than production pre-MAUCRSA. Additional eradication and enforcement efforts, along with consumer awareness campaigns, should help continue to push producers (and consumers) towards

the licensed market. How rapidly the licensed market grows, and the illicit market contracts, ultimately depend on cultivator costs and market conditions, both in California and other states (e.g., reducing costs for licensed producers and increasing illicit market enforcement efforts; legalization in other states or federally).

- Most unlicensed cannabis produced in California is distributed outside of the state. In terms of wholesale value, \$2.0 to \$3.4 billion of unlicensed California cannabis is distributed within the state, and \$5.8 to \$13.6 billion leaves the state.
- The Department's enforcement and operational costs have been increasing. Enforcement is necessary to ensure licensees are compliant with regulations and to combat the illicit market. However, enforcement efforts are currently funded by license fees. To continue to fund enforcement efforts and other Department costs, license fees may increase. This would place additional financial burden on licensed cannabis businesses. Alternatively, enforcement costs could potentially be funded from another source. This would further reduce the fee burden for licensees and, if funding is increased, would allow for more extensive enforcement efforts aimed at curbing the illicit market.
- License fees could be restructured to shift the regulatory burden away from cultivators to downstream businesses such as distributors and retailers, which is consistent with how fees are charged in other industries such as alcohol and tobacco. Fees could also be restructured to consider factors such as equity, fairness, competitiveness, and market diversity.
- Upcoming potential cultivation regulatory changes would improve the safety of cannabis products, help protect the environment, and eventually lead to long-run benefits to cultivators through potential improvements in yield and quality related to genetic improvements, innovation, research, and development. However, these changes would also lead to increased administrative/management costs for cultivators from implementing new sanitation standards.
- Introducing regulations for cannabis products to be used on or consumed by animals would create an opportunity for manufacturers and retailers to expand their product offerings and potentially expand the size of the licensed market.
- Potential changes to CCTT requirements would lead to reduced diversions of cannabis to the unlicensed market, better information for consumers, and more accurate CCTT data.
- Licensed production utilization is estimated to be 36 percent of total canopy capacity.

Industry outreach is ongoing to address data gaps to assess production costs and production capacity.

3 Cannabis Consumption (Demand)

Total cannabis consumption is the amount of cannabis consumed in California from both licensed and unlicensed (illicit) production. Since cannabis is consumed in different forms, consumption is typically normalized to a dry-flower equivalent basis. This report presents consumption on a dry-flower equivalent basis and summarizes trends in retail sales of selected products.

3.1 State-Level Cannabis Consumption and Trends

Total cannabis consumption is estimated using statewide (and nationwide) survey data. The federal Substance Abuse and Mental Health Services Administration (SAMHSA) conducts the National Survey on Drug Use and Health (NSDUH) quarterly, with a total of 67,625 people surveyed annually. Interviewees are sampled from all 50 states and the District of Columbia. Survey responses are weighted by SAMHSA based on census characteristics to be both representative of the nation as well as the 50 states and District of Colombia individually.

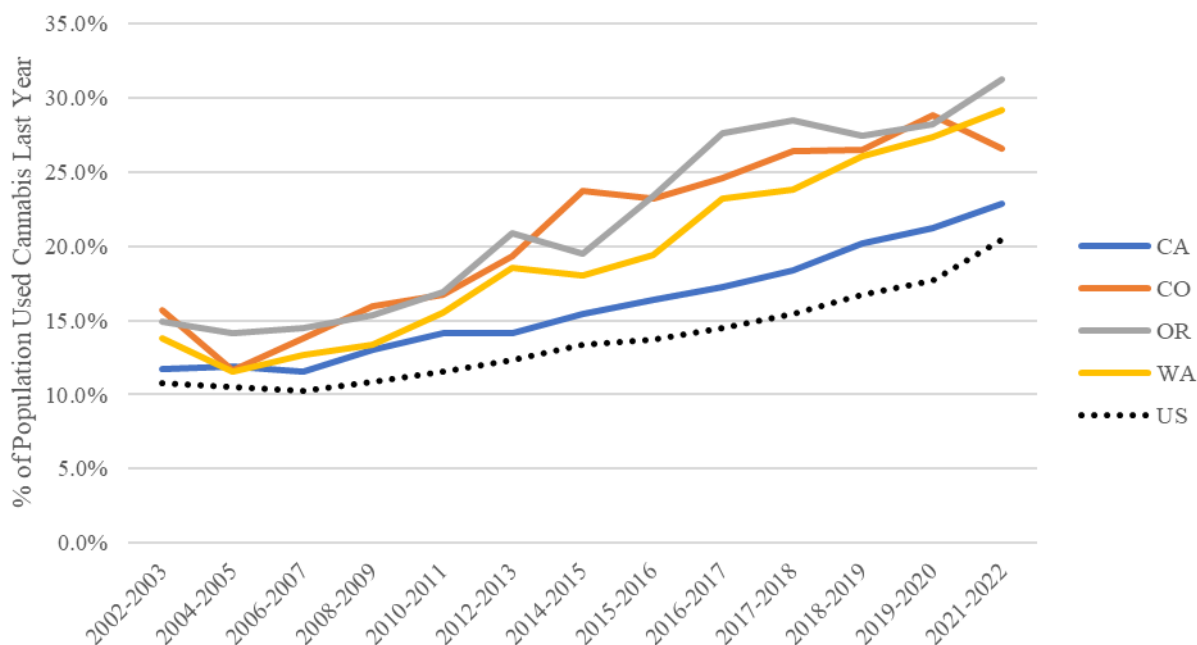
NSDUH survey data (as with all drug use surveys) may underreport cannabis consumption. Respondents may deny use or misreport frequency of use of cannabis products—an unsurprising outcome when individuals are asked to report use of a federally illegal substance to the federal government. Fear of criminal penalty is a primary factor influencing underreporting. Therefore, underreporting is expected to decline following legalization of cannabis. This analysis applies an econometric model to identify the effects of legalization on underreporting cannabis use. In short, the method applied adjusts for both denial/misreporting issues (as identified by academic researchers cited¹³) and the effect of legalization/policy change over time, at both state and federal levels. This analysis is completed for all states (inclusive of California).

Frequency of use estimates were combined with estimates of cannabis consumption per use-day to calculate total state-level consumption. Grams per use-day values by Light et al. (2015) were applied. Total annual consumption estimates for each year were calculated. The dataset was then used in a reduced form econometric analysis to estimate the effects of underreporting and legalization on consumption. The econometric model estimates grams per capita as a function of factors that affect consumption including market data (e.g., sales), socioeconomic data, and indicators for legalization and other policy changes. Separate regressions are run for heavy users and light users to allow for heterogeneous effects by user type. The model outputs allow for adjustments for underreporting, and to project consumption for 2023–2024 (years for which NSDUH surveys are not yet available).

¹³ Kilmer et al. (2013), Kilmer et al. (2019), and Caulkins et al. (2019) use an adjustment factor of 1.22 to correct for this issue in Washington; Light et al. (2015) and Orens et al. (2018) use an adjustment factor of 1.11 for heavy users and 1.22 for light users in Colorado; and Canada’s Office of the Parliament Budget (OPBO, 2016) and MacDonald and Rotterman (2018) use an adjustment factor of 1.063 for heavy users and 1.125 for light users in Canada. However, none of these studies adjust for how underreporting may change over time.

Figure 5 shows 2-year averages of cannabis consumption prevalence in California compared to the U.S. and other selected states. These are raw survey estimates from NSDUH, prior to adjustments for underreporting. Survey results from NSDUH represent average prevalence of consumption for the adult population, and for teen users who may be using cannabis illegally. In California, the trend in increasing cannabis prevalence (use) was clear prior to legalization and has persisted since legalization, but at a slower rate.

Figure 5. NSDUH Prevalence of Past-Year Cannabis Consumption, Unadjusted



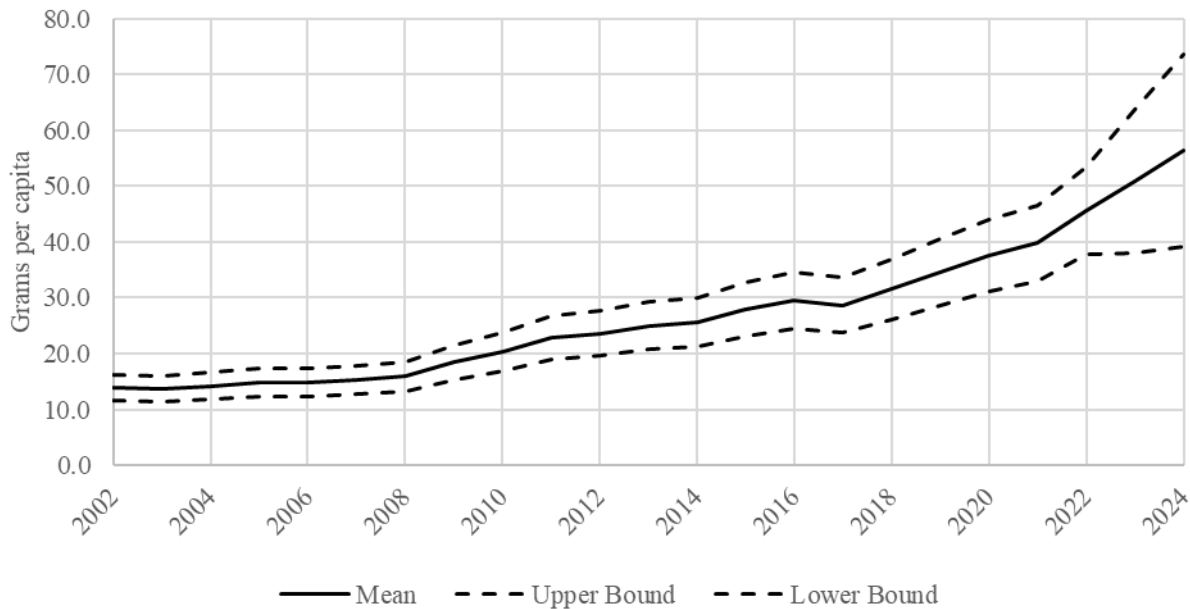
Note: NSDUH data are only available through 2022.

There are a few factors that likely contribute to the slower growth rate of cannabis consumption in California relative to other states that have decriminalized/legalized cannabis. The market in California has been established longer prior to legalization than in other states, and there has been a longer history of growing cannabis in California. Historically, there are more favorable attitudes towards cannabis use in California—as the first state to legalize medicinal cannabis, there is less stigma and perceived harmfulness of cannabis, and therefore decriminalization may not bring as many new consumers to the market.

Figure 6 illustrates estimated per capita consumption in California since 2002. The solid line represents mean estimated per capita consumption, and the dashed lines correspond to a 95 percent confidence interval. Consumption for 2002–2022 is estimated by adjusting NSDUH data for underreporting. Confidence intervals for 2002–2022 reflect the degree of uncertainty in underreporting and the uncertainty in average consumption volumes per use-day. Because survey data are only available through 2022, consumption estimates for 2023–2024 are projected using an econometric model. They are therefore subject to additional statistical error and the confidence interval is considerably wider. The model forecasts consumption in part based on the

expected growth rate for per capita consumption. However, if annual growth in per capita consumption has slowed in recent years, then per capita consumption would likely fall within the lower range of the confidence interval.

Figure 6. California Per Capita Consumption Estimates, Adjusted for Underreporting



Note: Per capita consumption for 2023–2024 is estimated using an econometric model.

Table 7 summarizes estimated total cannabis consumption from 2019–2024 for the California population age 18 or older. Total state level cannabis consumption is estimated at 3.80 million pounds in 2024. In terms of grams consumed per capita per year, consumption is estimated to be 56.35 grams in 2024. This is an 11 percent increase from 50.83 grams per capita in 2023 and a 79 percent increase from 31.5 grams per capita in 2018 when licensed sales began.

Table 7. California Total Cannabis Consumption Estimates, 2019 – 2024

Year	Lower Bound Consumption	Mean Consumption	Upper Bound Consumption
<i>Pounds Dry-Flower Equivalent, Millions</i>			
2019	1.92	2.32	2.72
2020	2.08	2.51	2.94
2021	2.20	2.66	3.11
2022	2.52	3.04	3.57
2023	2.55	3.41	4.27
2024	2.64	3.80	4.96

Note: Per capita consumption for 2023–2024 is estimated using the econometric model/analysis described in this report.

Increasing per capita consumption reflects growing demand as well as the shift toward value-added retail products that require more cannabis (dry-flower equivalent) to produce. This is

consistent with the trend prior to MAUCRSA in California, and consistent with broader U.S. trends and trends in other states with licensed cannabis markets.

Increased consumption appears to be primarily driven by an increase in heavy cannabis users—light users only account for 9 percent of the increase in consumption volume from 2020 to 2024. The prevalence of heavy users in California is still lower than in states that legalized recreational cannabis before 2016.

3.2 County-Level Cannabis Consumption

County-level consumption estimates are based on regional prevalence of use estimates, population growth, and state-level estimates of cannabis consumption growth. Consumption prevalence varies substantially from county to county. Survey estimates of regional consumption are only available through 2018. State-level growth rates are applied to regional-level user counts to estimate prevalence of consumption through 2024.

Table 8 shows estimated total consumption by county. It also shows the data breakdown of adult population and percent of the population who used cannabis from the NSDUH surveys. NSDUH consumption data are aggregated into 21 regions, and there are insufficient data to differentiate prevalence of cannabis use by county within these regions.

Table 8. Estimated Users and Consumption by County, 2024

County	Adult Population	Used Last Year	Used Last Month	Total Consumption
	<i>Thousands</i>	<i>%</i>	<i>%</i>	<i>Pounds, Thousands</i>
Alameda	1,325.1	36.5%	25.6%	171.0
Alpine	1.0	32.4%	19.7%	0.1
Amador	33.7	32.4%	19.7%	4.2
Butte	164.9	49.6%	33.8%	23.2
Calaveras	36.7	32.4%	19.7%	4.6
Colusa	16.2	49.6%	33.8%	2.3
Contra Costa	894.6	32.3%	23.9%	112.1
Del Norte	20.3	49.6%	33.8%	2.9
El Dorado	150.0	29.0%	21.5%	18.4
Fresno	730.7	25.2%	19.7%	87.1
Glenn	20.5	49.6%	33.8%	2.9
Humboldt	107.5	49.6%	33.8%	15.1
Imperial	130.9	30.0%	19.1%	16.1
Inyo	14.9	22.1%	14.9%	1.7
Kern	644.4	22.1%	14.9%	75.0
Kings	110.7	22.1%	14.9%	12.9
Lake	50.8	49.6%	33.8%	7.1
Lassen	22.8	49.6%	33.8%	3.2
Los Angeles	7,849.4	31.9%	22.9%	981.0
Madera	116.6	23.4%	18.0%	13.7

County	Adult Population	Used Last Year	Used Last Month	Total Consumption
	<i>Thousands</i>	<i>%</i>	<i>%</i>	<i>Pounds, Thousands</i>
Marin	207.0	29.4%	19.3%	25.4
Mariposa	13.8	23.4%	18.0%	1.6
Mendocino	69.8	49.6%	33.8%	9.8
Merced	205.0	23.4%	18.0%	24.1
Modoc	6.6	49.6%	33.8%	0.9
Mono	10.7	32.4%	19.7%	1.3
Monterey	326.3	44.7%	26.8%	44.5
Napa	109.2	29.4%	19.3%	13.4
Nevada	82.7	29.0%	21.5%	10.1
Orange	2,491.9	22.1%	14.3%	290.1
Placer	323.7	29.0%	21.5%	39.7
Plumas	15.4	49.6%	33.8%	2.2
Riverside	1,857.1	30.0%	19.1%	229.1
Sacramento	1,218.3	31.4%	22.7%	151.8
San Benito	48.8	44.7%	26.8%	6.6
San Bernardino	1,626.8	26.9%	16.8%	196.2
San Diego	2,583.8	32.3%	20.5%	323.9
San Francisco	728.5	48.6%	27.8%	101.7
San Joaquin	581.2	32.4%	19.7%	72.9
San Luis Obispo	230.4	44.7%	26.8%	31.4
San Mateo	601.5	38.5%	21.7%	78.7
Santa Barbara	343.2	29.4%	17.3%	42.2
Santa Clara	1,531.4	25.6%	15.6%	183.0
Santa Cruz	213.6	44.7%	26.8%	29.1
Shasta	138.1	49.6%	33.8%	19.4
Sierra	2.6	49.6%	33.8%	0.4
Siskiyou	34.2	49.6%	33.8%	4.8
Solano	347.7	29.4%	19.3%	42.7
Sonoma	387.7	29.4%	19.3%	47.6
Stanislaus	398.7	23.4%	18.0%	46.9
Sutter	73.9	29.0%	21.5%	9.0
Tehama	48.5	49.6%	33.8%	6.8
Trinity	13.3	49.6%	33.8%	1.9
Tulare	335.3	22.1%	14.9%	39.0
Tuolumne	44.0	32.4%	19.7%	5.5
Ventura	645.7	29.4%	17.3%	79.3
Yolo	176.5	29.0%	21.5%	21.6
Yuba	60.2	29.0%	21.5%	7.4
Total	30,574.9	31.0%	20.8%	3,798.3

Note: Consumption estimates rely on NSDUH survey data that aggregates counties to 21 regions.

Consumption volume is generally driven by population, but there are some exceptions based on surveyed regional cannabis usage. For example, San Francisco County adult population is only 1 percent higher than Fresno County, but total estimated cannabis consumption is 19 percent higher.

3.3 Licensed Market Share of Total Consumption

The licensed market share is the estimated share of California cannabis consumption that is met by licensed market production and purchased at licensed retail locations (i.e., excluding homegrown cannabis and diversions from licensed producers to the illicit market). The analysis of licensed market production and total consumption was combined to estimate licensed market share and trends over time.

Table 9 summarizes the estimated the share of California cannabis consumption met by licensed market production for 2019–2024. The licensed market share is based on CDTFA and CCTT sales data through 2024 and NSDUH frequency of use survey data that extend only through 2022. The confidence interval reflects uncertainty in underreporting consumption in the NDSUH survey, uncertainty in average consumption volumes per use-day, and additional statistical error from estimating consumption for 2023–2024 (missing NSDUH survey years).

Table 9. Licensed Cultivation Share of California Cannabis Demand, Adjusted for Underreporting

Year	Applying Lower Bound Per Capita Consumption	Applying Average Per Capita Consumption	Applying Upper Bound Per Capita Consumption
2019	30%	25%	21%
2020	40%	33%	29%
2021	45%	37%	32%
2022	44%	37%	31%
2023	50%	38%	30%
2024	54%	38%	29%

Notes: Licensed cultivation is a share of survey-based demand estimates, with *ex post* adjustments made for underreporting.

The average market share of licensed cannabis in 2024 is 38 percent, with a statistical confidence interval range of 29–54 percent. The licensed market share increased annually from 2018 through 2021. The licensed market share from 2021 through 2024 has not significantly changed, remaining at 37–38 percent on average. Estimated consumption growth approximately matches licensed production growth. As a result, the average estimated licensed market share has remained stable despite increased production. It is possible that the cannabis consumption growth rate has decreased since the last survey year (2022), in which case the licensed market shares for 2023–2024 would be higher than the estimates in Table 9.

3.4 CCTT Retail Sales Data

Total cannabis retail sales revenue has been decreasing since 2021. This is driven by lower unit prices, not by lower quantity of cannabis demanded. The licensed market is continuing to expand (as measured by volume of product) but falling unit prices cause the total sales value to decrease.

Table 10 shows the breakdown of active retail licenses by county as of September 23, 2022, and October 11, 2024, as well as CDTFA retail sales in 2022 and 2023 (CCTT sales totals are not available by county at this time, and CDTFA sales data are only available through Q2 2024). Retail licenses include annual and provisional storefront and non-storefront licenses but not microbusinesses.

Table 10. Active Retail Licenses and Retail Sales

County	Retail Licenses			Retail Sales		
	9/23/2022	10/11/2024	Change	2022	2023	Change
	<i>Count</i>	<i>Count</i>	<i>%</i>	<i>\$, Millions</i>		
Alameda	157	100	-36%	\$296.95	\$263.31	-11%
Butte	0	3	N/A	N/A	\$6.41	N/A
Calaveras	4	4	0%	\$10.68	\$11.14	4%
Colusa	2	2	0%	N/A	N/A	N/A
Contra Costa	17	20	18%	\$114.21	\$114.00	0%
Del Norte	6	6	0%	\$3.71	\$4.59	24%
El Dorado	10	12	20%	\$45.55	\$44.64	-2%
Fresno	17	20	18%	\$40.27	\$77.83	93%
Humboldt	27	25	-7%	\$35.88	\$33.56	-6%
Imperial	17	13	-24%	\$27.19	\$34.97	29%
Inyo	3	5	67%	\$4.11	\$3.90	-5%
Kern	11	8	-27%	\$21.67	\$20.21	-7%
Kings	4	5	25%	\$34.78	\$28.49	-18%
Lake	6	11	83%	\$7.66	\$9.63	26%
Lassen	1	2	100%	N/A	N/A	N/A
Los Angeles	426	528	24%	\$1,504.61	\$1,369.36	-9%
Madera	0	1	N/A	N/A	N/A	N/A
Marin	8	9	13%	\$15.78	\$14.22	-10%
Mendocino	24	19	-21%	\$22.59	\$18.73	-17%
Merced	9	8	-11%	\$40.08	\$35.93	-10%
Mono	5	4	-20%	\$5.25	\$4.76	-9%
Monterey	27	24	-11%	\$73.84	\$67.49	-9%
Napa	8	9	13%	\$14.56	\$19.61	35%
Nevada	5	6	20%	\$10.27	\$18.60	81%
Orange	49	64	31%	\$278.86	\$279.93	0%
Placer	1	1	0%	\$0.43	\$0.80	85%
Riverside	133	128	-4%	\$421.07	\$402.68	-4%
Sacramento	104	87	-16%	\$292.33	\$275.50	-6%
San Benito	1	1	0%	N/A	N/A	N/A
San Bernardino	50	37	-26%	\$140.85	\$138.00	-2%
San Diego	71	74	4%	\$567.50	\$550.03	-3%
San Francisco	80	80	0%	\$232.81	\$215.83	-7%
San Joaquin	16	14	-13%	\$57.65	\$61.83	7%

County	Retail Licenses			Retail Sales		
	9/23/2022	10/11/2024	Change	2022	2023	Change
	<i>Count</i>		<i>%</i>	<i>\$, Millions</i>		<i>%</i>
San Luis Obispo	21	17	-19%	\$63.19	\$63.18	0%
San Mateo	18	16	-11%	\$62.59	\$60.52	-3%
Santa Barbara	30	27	-10%	\$66.62	\$61.04	-8%
Santa Clara	9	14	56%	\$205.02	\$186.63	-9%
Santa Cruz	23	25	9%	\$63.37	\$63.44	0%
Shasta	9	8	-11%	\$42.89	\$36.56	-15%
Siskiyou	5	5	0%	\$5.92	\$5.68	-4%
Solano	18	17	-6%	\$81.08	\$78.27	-3%
Sonoma	33	36	9%	\$108.82	\$114.72	5%
Stanislaus	26	26	0%	\$148.26	\$131.82	-11%
Tehama	0	3	100%	N/A	\$2.37	N/A
Trinity	0	1	N/A	N/A	N/A	N/A
Tulare	14	16	14%	\$57.20	\$60.59	6%
Tuolumne	2	2	0%	\$3.89	\$2.57	-34%
Ventura	27	34	26%	\$81.76	\$87.61	7%
Yolo	8	5	-38%	\$29.56	\$27.27	-8%
Yuba	2	2	0%	\$8.86	\$5.26	-41%
Total	1,544	1,584	3%	\$5,394.57	\$5,176.73	-4%

Note: Total count of active adult and medical licenses. Retail sales based on CDTFA data. Retail sales by county are not yet available for 2024 for this report.

Total active retail licenses increased 11 percent. Three counties have active licenses in 2023 that had zero in 2022. Contrary to the increase in active licenses, total sales value has been decreasing, down 4 percent from 2022 to 2023, and down 4.4 percent year-over-year for the first half of 2024. CCTT sales quantities were used to analyze the downward trend in retail (this section). Prices are discussed more in sections 4.1 Wholesale Prices and 4.2 Retail Prices.

Table 11 shows CDTFA taxable sales and NSDUH based estimates of consumption by region.

Table 11. NSDUH-Based Regional Consumption and CDTFA-Based Regional Sales

Region	Estimated Total Consumption, 2024	CDTFA Receipts, 2023	Consumption Share	Sales Share
	<i>Pounds, Thousands</i>	<i>\$, Millions</i>	<i>%</i>	
Bay Area	463.6	\$653	12.2%	13.1%
Central Coast	294.6	\$380	7.8%	7.5%
Intermountain	109.9	\$117	2.9%	2.1%
North Coast	121.4	\$215	3.2%	3.9%
North San Joaquin Valley	157.6	\$229	4.1%	4.6%
Sacramento Valley	267.7	\$395	7.0%	7.6%
South Coast	1,716.5	\$2,347	45.2%	46.3%
South San Joaquin Valley	214.0	\$187	5.6%	2.9%
Southeast Interior	451.7	\$586	11.9%	11.2%
CA Total	3,798.3	\$5,176	100.0%	100.0%

In general, consumption shares are close to regional sales shares. The largest discrepancies are in the South Coast with 45.2 percent of consumption and 46.3 percent of sales, and the Southern San Joaquin Valley with 5.6 percent of consumption and 2.9 percent of sales.

The remainder of this section relies on CCTT data through June 2024 to describe retail sales. Relative to CDTFA retail sales, total CCTT retail sales are lower (although the discrepancy has decreased recently). This difference is due to differences in tracking retail sales. CDTFA qualifies all sales from dispensaries as taxable sales, and therefore includes sales of non-cannabis merchandise (e.g., shirts or pipes). In addition, CDTFA might include other locations (e.g. smoke shops that do not sell cannabis) in this category. CCTT retail sales totals were 7.5 percent lower than CDTFA in 2021, 9.1 percent lower in 2022, 4.0 percent lower in 2023, and 2.1 percent lower in the first half of 2024.

Figure 7 illustrates quarterly retail sales (in millions of dollars, nominal) by product type. On an annual basis, flower sales dropped considerably from a peak of \$2.27 billion in 2021 to \$1.73 billion 2023; extracts and concentrate sales also decreased during this period, from \$484 million to \$391 million. Edible sales have been relatively stable, with quarterly sales between \$127 and \$140 million from 2021 through 2024. Pre-roll and vape sales have steadily increased since 2020: annual pre-roll sales increased from \$419 million in 2020 to \$809 million in 2023, and vape sales increased from \$889 million in 2020 to \$1.43 billion in 2023. Total sales in 2023 were \$4.97 billion, up from \$4.90 billion in 2022. Sales through the first half of 2024 were \$2.39 billion, down from \$2.50 billion in the first half of 2023.

Figure 7. Quarterly Retail Cannabis Sales by Product Type

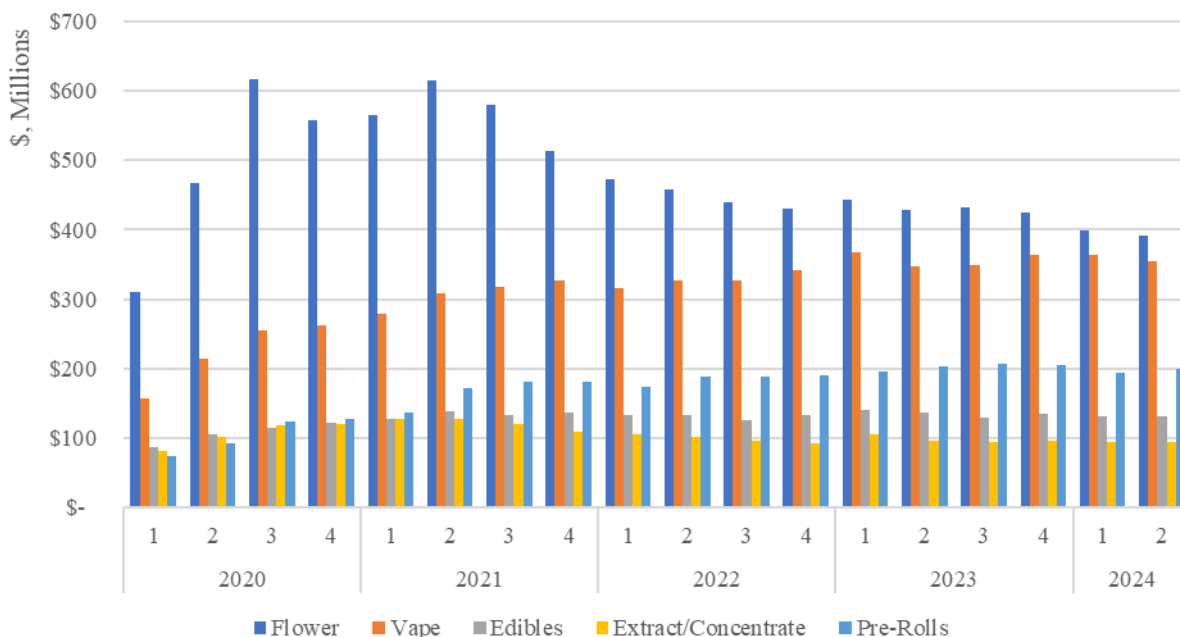
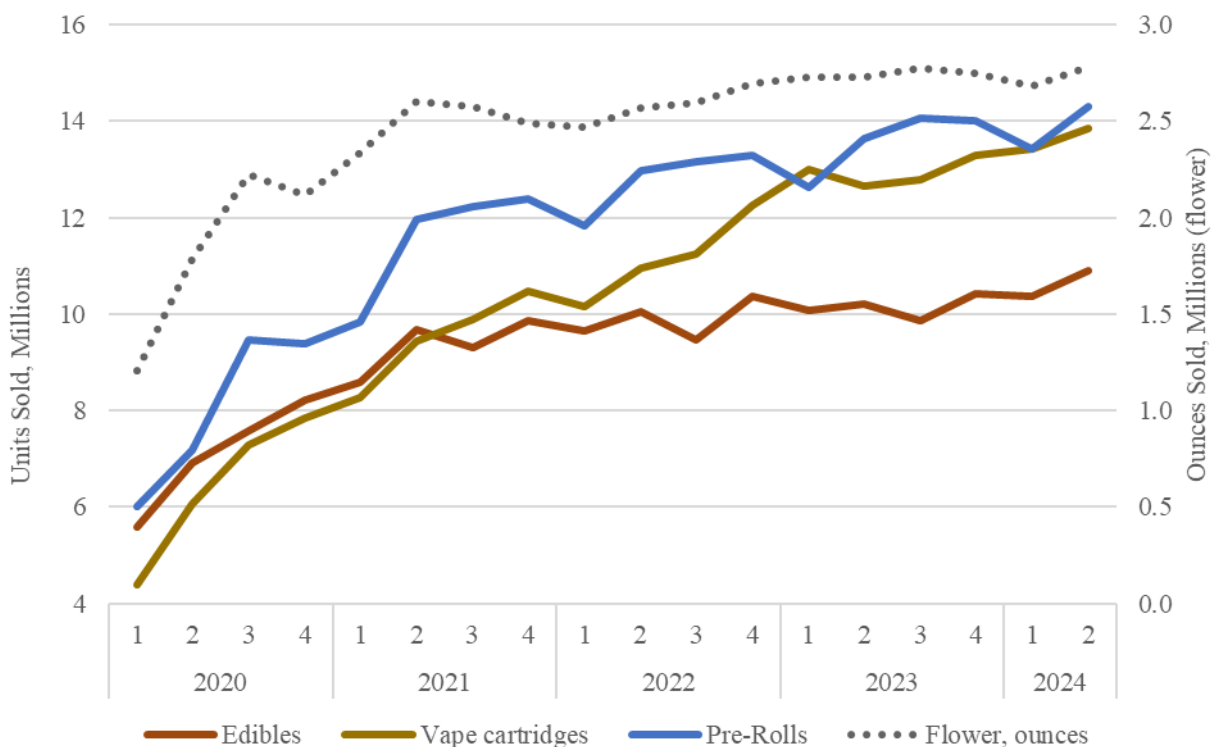


Figure 8 illustrates quarterly units sold of the four largest categories of cannabis sales: flower, edibles, vape cartridges, and pre-rolls. Edibles, vape, and pre-roll categories are prone to volume and weight reporting issues; the weight reporting issues for flower are considerably less pronounced. Therefore, sales are described as units sold rather than total weight or volume for edibles, vape cartridges, and pre-rolls. Millions of units sold are shown on the left vertical axis, and millions of ounces sold of flower are shown on the right vertical axis.

Figure 8. Quarterly Units Sold by Product Type and Ounces Sold of Flower



Although annual cannabis sales revenue decreased in 2023, the quantity of products sold increased. Units sold of edibles increased by 2.6 percent, from 39.5 to 40.6 million. Ounces of flower sold increased by 6.3 percent, from 10.3 to 11.0 million. Vape cartridges sold increased by 15.9 percent, from 44.6 to 51.7 million. Pre-rolls sold increased by 6.1 percent from 51.2 to 54.4 million. In short, the total value of retail sales has decreased because the price per unit sold (unit price) has decreased, not because fewer units of licensed cannabis products are being sold.

Total cannabis consumption and volume of licensed cannabis sold has steadily increased since MAUCRSA. However, retail sales revenue has been decreasing since 2021. This is caused by decreasing cannabis prices. Unit sales continue to increase, which is consistent with a growing licensed market. Retail sales data also show a trend away from flower to other value-added products including pre-rolls (lightly processed) and vape products. Processed products such as edibles and vape cartridges require a higher volume of plant material to produce an equivalent amount of THC as contained in unprocessed flower. This is due to a few factors, such as loss of

cannabinoids during processing and higher THC content of flower relative to plant material used for manufactured products.

Higher demand for manufactured products relative to flower is leading to higher demand for cannabis overall. Converting the units sold of the four categories shown in Figure 8 to approximate dry-flower equivalents implies an increase in quantity of cannabis sold of 15 percent from 2022 to 2023, and an increase of 12 percent from the first half of 2023 to the first half of 2024.

3.5 Consumption Summary and Outlook

Similar to the production outlook, the consumption outlook for 2024 and 2025 shows both opportunities for continued growth and potential challenges. The general outlook for the upcoming year is stable consumption trends as consumers continue to shift to value-added products (e.g., vape, extracts, edibles) and away from flower.

Key findings include:

- Averaged estimated total California cannabis consumption is equal 3.8 million pounds of dry-flower equivalent in 2024, about 56.4 grams per capita.
- California per capita consumption is still lower than in states that legalized recreational cannabis before California. This implies that the California licensed market still has room to grow, and California use rates are not above that of other, comparable states.
- State-level analysis was combined with surveyed regional cannabis usage data to estimate total cannabis consumption through 2024 by county. There are regional differences in consumption use—many counties in the Sacramento Valley, Intermountain, and North Coast regions have monthly prevalence of use as high as 33.8 percent compared to the state average of 20.8 percent.
- The average estimated licensed market share increased from 25 percent in 2019 to 38 percent in 2024. This includes both licensed adult-use and medicinal cultivation but excludes personal (homegrown) production. In short, the share of cannabis consumed in California that is purchased in the licensed market appears to have increased since legalization. Since 2021, this share has remained stable at 37–38 percent on average, although there is a wide range in the confidence interval (29–54 percent in 2024) for estimated market share due to reporting and statistical error.
- NSDUH data are not available for 2023–2024. It is possible that the cannabis consumption growth rate has decreased since the last survey year (2022), in which case the licensed market shares for 2023–2024 would be higher than reported estimates.
- At the retail level, sales revenues have been decreasing since Q3 2021. This downward trend is driven entirely by prices—quantity sold, in terms of flower weight and units of

edibles and vape cartridges, has continued to increase. The licensed market is growing even as retail revenues decrease.

- Increased demand for manufactured cannabis products relative to raw flower is contributing to an overall increase in cannabis demand.
- Retail sales revenue in the first half of 2024 is down 4.4 percent from the first half of 2023, from \$2.50 to \$2.39 billion.
- Sales revenue from all packaged flower (excluding pre-rolls) decreased from \$615 million in Q2 2021 to \$391 million in Q2 2024. During this same period, sales of vape products increased from \$309 to \$354 million, and sales of pre-rolls increased from \$171 to \$200 million.
- From 2022 to 2023, total units sold of edibles increased by 2.6 percent, from 39.5 to 40.6 million; ounces of flower sold increased by 6.3 percent, from 10.3 to 11.0 million; vape cartridges sold increased by 15.9 percent, from 44.6 to 51.7 million; and pre-rolls sold increased by 6.1 percent from 51.2 to 54.4 million.

4 Cannabis Market Conditions

Price movement and cannabis market entries and exits are the outcome of changes in supply and demand occurring over time. Characteristics of supply and demand were described separately under Sections 2 and 3. This section summarizes the results of the supply and demand characteristics in terms of price changes and market participation. An assessment of the hemp market is included to contextualize the implications of regulating intoxicating hemp products.

4.1 Wholesale Prices

Wholesale flower prices are a useful indicator of the health of the licensed cannabis market in California. Wholesale prices have decreased substantially since 2021, which likely has contributed to the decrease in active cultivator licenses and exit of some businesses from the licensed market since 2022 (discussed further in Section 4.3 Market Entries and Exits).

Wholesale prices in California, Colorado, Oregon, and Washington are analyzed to illustrate price trends by cultivation method. Data are from CCTT, internal wholesale price listings, and Cannabis Benchmarks. This section illustrates trends in wholesale price with everything normalized (indexed) to 2018 to preserve confidentiality of the data.

Table 12 shows the low, average, and high weekly weighted-average wholesale cannabis price indices in California each year since 2015 (adult-use and medicinal market purchases). Price data shown in subsequent tables and figures are from Cannabis Benchmarks,¹⁴ as well as validation with local wholesale listing and limited CCTT data. Prices are averaged across indoor, outdoor, and mixed-light cannabis and weighted by volume, inflation-adjusted, and indexed with average prices in 2018 = \$100.

Table 12. Low, Average, and High Weekly Prices per Pound (Indexed 2018 = \$100)

Year	Low	Average	High
2015	\$127	\$146	\$166
2016	\$111	\$139	\$163
2017	\$111	\$128	\$147
2018	\$87	\$100	\$122
2019	\$90	\$101	\$115
2020	\$99	\$111	\$128
2021	\$76	\$102	\$117
2022	\$47	\$58	\$70
2023	\$44	\$52	\$58
2024	\$42	\$49	\$59

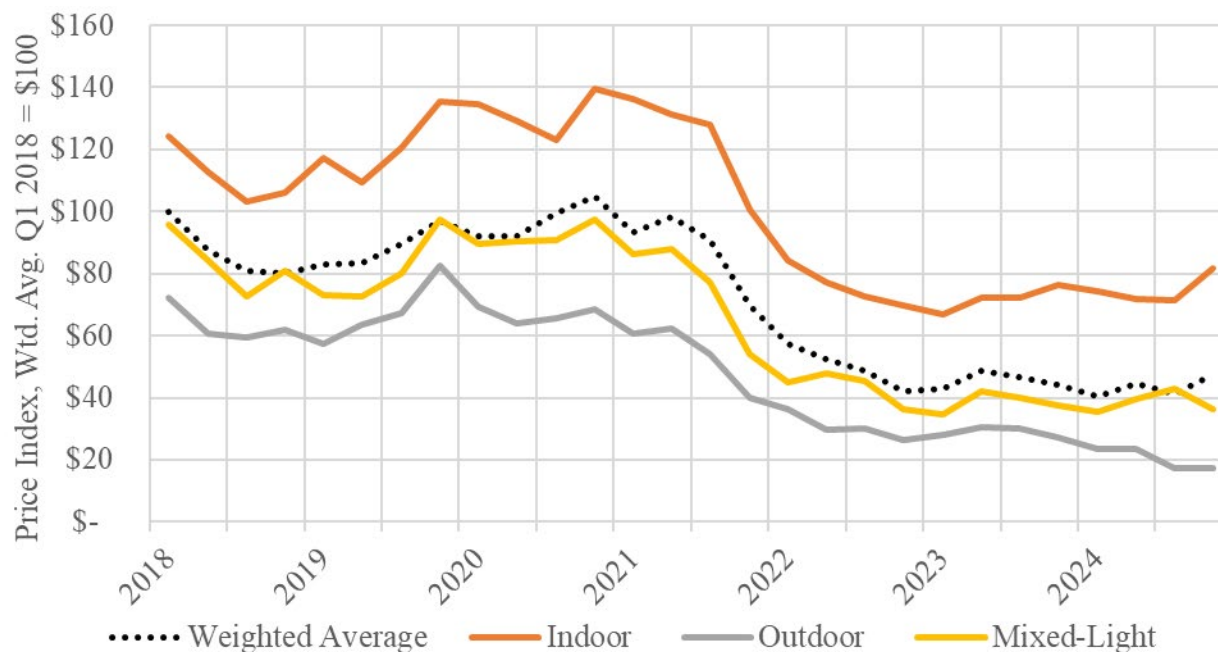
Note: Prices are inflation-adjusted and indexed with average prices in 2018 = \$100; using Cannabis Benchmarks, CCTT data, and local wholesale price data.

¹⁴ See <https://www.cannabisbenchmarks.com/>

Prices dropped substantially in 2018, the first year of adult-use legalization. Indexed average wholesale prices were between \$87 and \$122 per pound in 2018 and increased to range of \$99 to \$128 per pound in 2020. Prices rebounded through 2021 but have declined since by more than 50 percent, with peak prices in 2024 lower than the lowest weekly average prices in 2021. Average prices in 2024 are down 6.1 percent compared to average prices in 2023. Cultivator interviews indicated that wholesale prices were substantially lower for some transactions.

Figure 9 illustrates indexed and inflation-adjusted quarterly average wholesale prices in California by cultivation method from 2018 through 2024, with weighted average quarterly prices in Q1 2018 = \$100. Prices are continuing to stabilize after decreasing substantially in 2021. The weighted average price index of cannabis at wholesale across all cultivation methods decreased substantially from 2021 to 2022, decreasing by 57 percent from Q2 2021 to Q4 2022. Prices rebounded in 2023, increasing by 15 percent from Q4 2022 to Q2 2023. Although prices in 2024 are down on average, year-over-year prices in Q4 2024 are up 2 percent. Prices for each cultivation method have generally followed the same downward trend, however indoor cannabis prices have generally been more volatile and mixed-light prices have increased to the highest level seen since Q3 2022.

Figure 9. Quarterly Wholesale Price Index (2018 = \$100) by Cultivation Method, 2015–2024



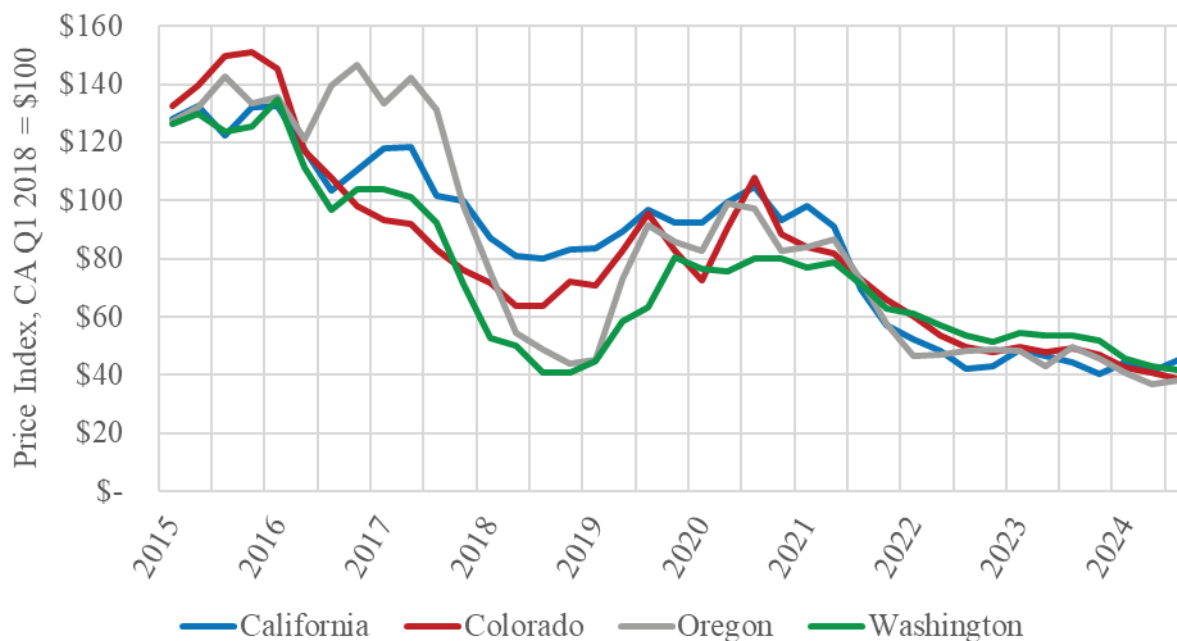
Note: Prices are inflation-adjusted and indexed with average prices in 2018 = \$100; using Cannabis Benchmarks, CCTT data, and local wholesale price data.

Cannabis from outdoor and mixed light cultivators faced substantially lower prices than indoor cultivators. This is driven by differences in quality and production costs across cultivation methods. Historically, indoor prices are on average 2.2 times higher than outdoor prices and 1.5 times higher than mixed-light prices. The price ratio for indoor-to-outdoor flower is at an all-time high as of Q4 2024, at 4.7:1.

In the absence of the unlicensed market, price trends across states with licensed cannabis should be independent because there is no interstate trade of cannabis. However, an analysis of wholesale prices showed that prices in the licensed markets in California, Colorado, Oregon, and Washington are related. This link between the licensed cannabis markets in California, Colorado, Oregon, and Washington has increased over time. The link is the unlicensed market.

Figure 10 illustrates this trend showing historical weighted average wholesale prices for California, Colorado, Oregon, and Washington, from May 2015 through September 2024. Prices are inflation-adjusted and indexed, with weighted average prices in California Q1 2018 = \$100. Wholesale prices, on average, decreased by nearly 70 percent from Q2 2015 to Q4 2024. Prices have been considerably more stable in the last couple of years compared to the years leading up to and first couple years following MAUCRSA.

Figure 10. Quarterly Wholesale Price Index (2018 = \$100) by State, 2015–2024



Note: Prices are inflation-adjusted and indexed with average prices in 2018 = \$100; using Cannabis Benchmarks, CCTT data, and local wholesale price data.

Prices in these states have converged, and statistical analysis confirms these markets are cointegrated. Market cointegration generally occurs as a result of trade between nations (or in

this case, states). However, without any legal interstate trade, this result indicates that the illicit market is a driving factor that connects prices across states.

4.2 Retail Prices

Retail cannabis prices have followed a similar trend to wholesale prices. This is a benefit to consumers that are able to purchase cannabis at a lower price, but also results in lower margins to cannabis retail businesses throughout the supply chain.

An eighth is historically the most popular package size for flower. However, pre-roll sales (in terms of units sold) have recently surpassed sales of eighths, with infused pre-rolls being the most popular type of pre-roll. Vape cartridges are sold either by volume or by weight. The industry standard is that a 1 milliliter cartridge holds 1 gram of oil. Weights and volumes of cartridges are often subject to reporting errors in CCTT. Therefore, instead of converting prices to dollars per gram, the average price per vape cartridge is shown in this analysis. Edibles are sold with weight recorded in CCTT, but the weight corresponds to the full package weight, not the actual cannabis content. Therefore, this analysis looks at edibles strictly on a per unit basis. Edible packages most commonly contain 100 mg of THC.

Figure 11 illustrates trends in retail prices in CCTT¹⁵ for four leading products sold at retail: eighths of flower, infused pre-rolls, vape cartridges, and edibles. Prices are inflation-adjusted to show changes in real prices (Q3 2024 dollars). An aggregate price index that is a weighted average of these four categories is included to show overall price movement. Eighths, vape cartridges, and edibles have seen a similar downward trend in price. From Q1 2020 to Q2 2024 the average price of eighths of flower decreased by 42 percent from \$38.86 to \$22.72, the average price of vape cartridges decreased by 44 percent from \$43.80 to \$24.70, and the average price of edible packages decreased by 36 percent from \$19.71 to \$12.59. Infused pre-rolls, which have seen a substantial increase in demand during this period, saw a relatively modest price decrease of 19 percent during this period, from \$22.39 to \$18.07. The weighted average prices of these four categories decreased by 36 percent, from \$31.12 to \$20.05. By contrast, inflation-adjusted wholesale prices of flower decreased by 52 percent during this period. However, this does not necessarily translate to increased margins for market intermediaries.

¹⁵ Sales receipts are pre-tax and after discount so the true retail advertised price might not be reflected in the CCTT data.

Figure 11. Quarterly Retail Cannabis Prices

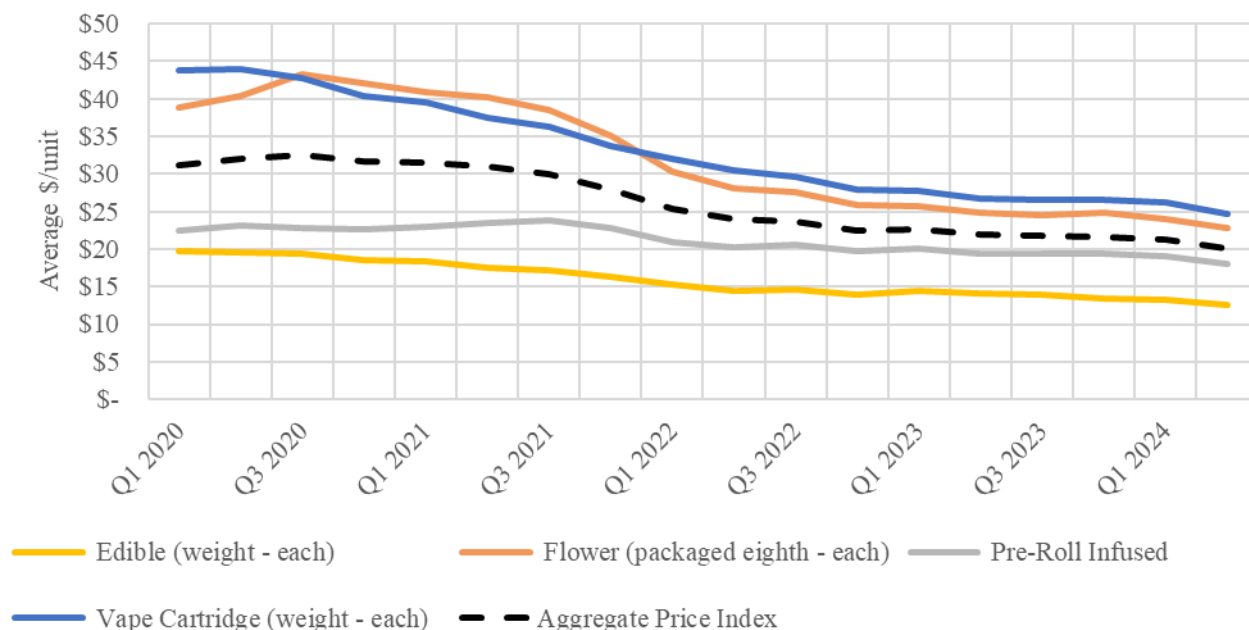
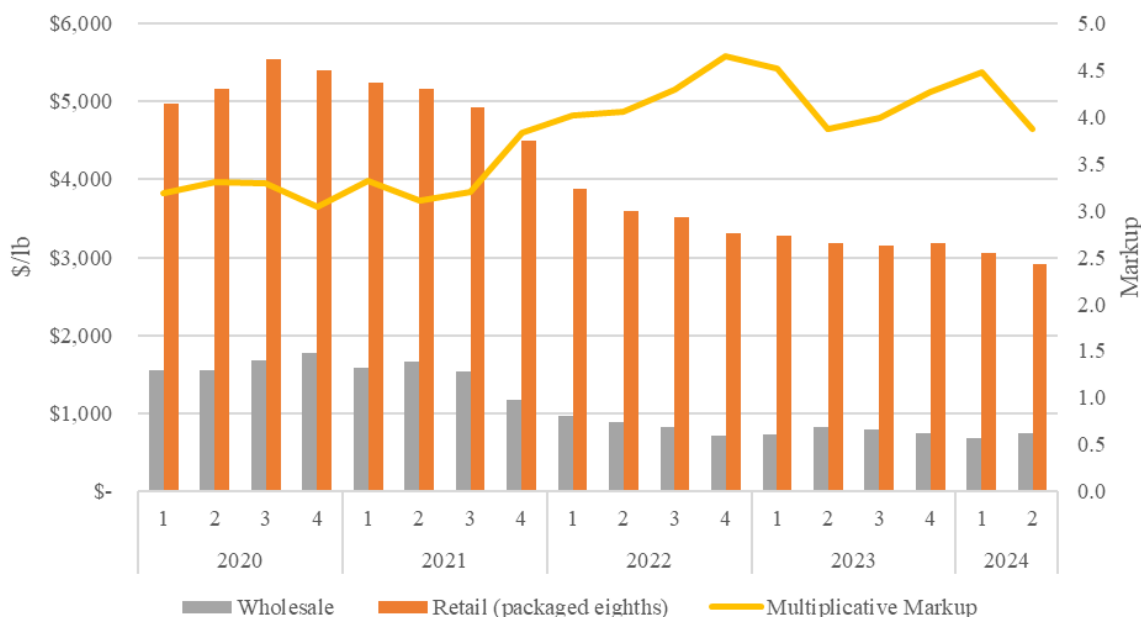


Figure 12 shows the average quarterly markup for wholesale flower prices to flower packaged as eighths (converted to price per pound). Both wholesale and retail prices are adjusted for inflation to Q3 2024 dollars. Wholesale price decreases are decreasing at proportionally greater rate than retail price—the average farm-to-retail multiplicative markup of flower packaged as eighths was 3.2 in Q1 2020, and it was 3.9 in Q2 2024. In absolute terms, the markup decreased from \$3,416 to \$2,156 during this period, reflecting a decrease in wholesale-to-retail margins.

Figure 12. Wholesale and Retail Prices and Markup



The data show that retail licensed cannabis prices are stabilizing after periods of significant fluctuation (decreases). Factors such as increased market maturity, improved supply chain efficiencies, and strong consumer demand have contributed to this stabilization. While there are still substantial challenges to the market, overall retail prices have shown signs of consistency, signaling a more predictable trajectory for the cannabis industry.

4.3 Market Entries and Exits

Entries and exits of businesses from the licensed market are another important indicator of the overall health of the market. The number of active DCC licenses is a good indicator of the number of businesses active in the licensed cannabis market in California (with the potential exception of cultivation licenses, as discussed later). Active cannabis licenses were consistently increasing during the first few years following implementation of MAUCRSA; however, that trend has more recently leveled-off or reversed for most license types.

4.3.1 Change in Active Cultivation Licenses

Active licenses are estimated as of the first day of each calendar quarter. This includes annual and provisional licenses. Whether or not a license is active is determined based on its reported effective date and expiration date in the data reported in the Department license database. Cultivation licenses make up the largest share of active DCC licenses.

Figure 13 summarizes active cultivation licenses over the past five years by the three primary cultivation methods – outdoor, mixed-light,¹⁶ and indoor – as well as nursery and processor licenses. Data from 2018 and early 2019 are omitted because cultivation licenses were still being issued. Active cultivation licenses dropped substantially through the end of 2023, and have continued to decline, albeit at a slower rate, in 2024. However, some of these declines, especially in 2024, are the result of consolidation. The number of licenses that are no longer active but that were part of a conversion to a Large or Medium license is also shown. After taking these into consideration, the drop in cultivation licenses is less pronounced.

¹⁶ In assessing license trends, Mixed-Light Tier 1 and Tier 2 licenses are combined.

Figure 13. Total Active Cultivation Licenses and Licenses Part of Conversions

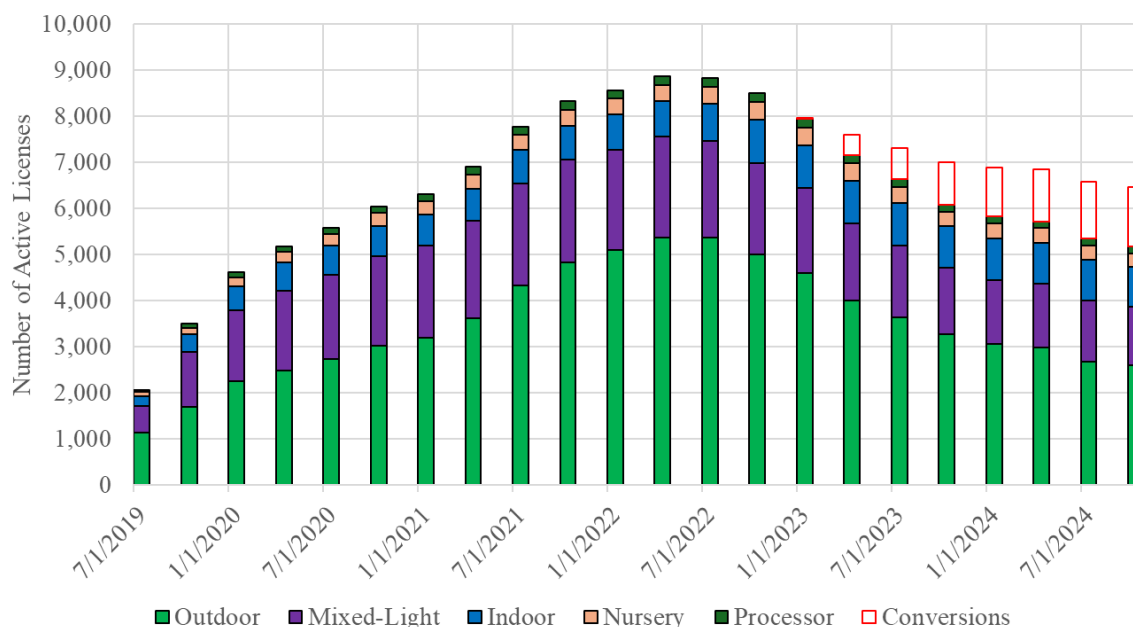


Figure 14 illustrates outdoor cultivation licenses by license size. Small is the most common size for outdoor cultivation licenses. These licenses dropped substantially (by 60 percent) between 2022 and 2024. During that period, Medium Outdoor licenses had a small net increase, and 48 Large Outdoor licenses have become active. Part of the decrease in Small licenses is explained by consolidation and conversion to Large licenses.

Figure 14. Total Active Outdoor Cultivation Licenses and Licenses Part of Conversions

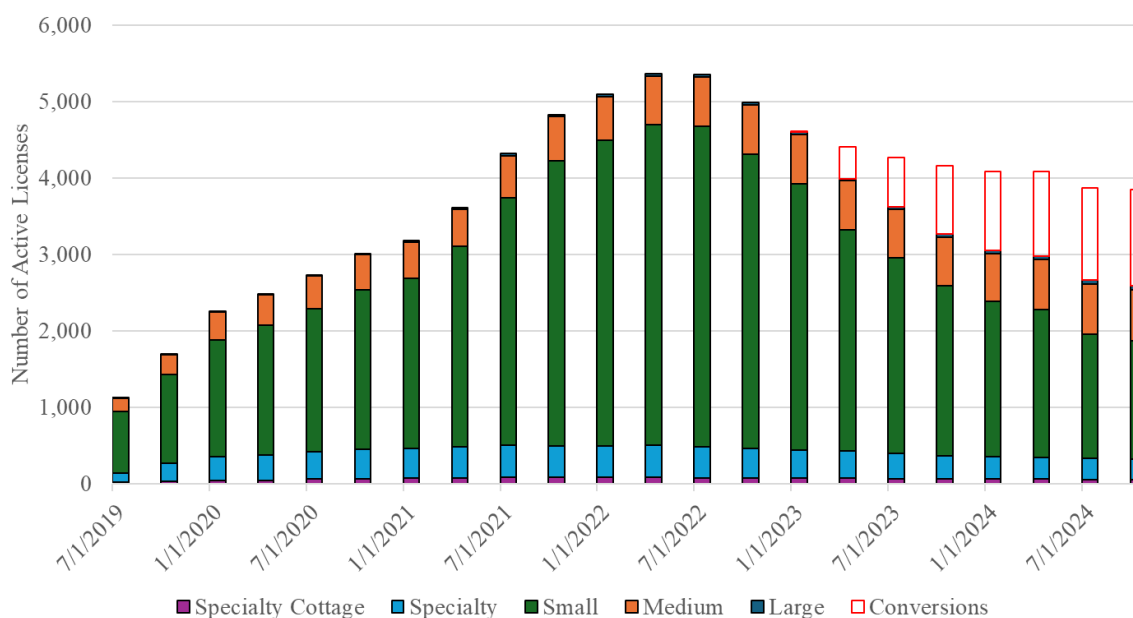


Figure 15 illustrates the change in mixed-light cultivation licenses. Similar to outdoor licenses, Small is the most common size for mixed-light cultivation licenses. These decreased substantially (by 38 percent) from October 2022 to 2024. Medium Mixed-Light licenses decreased by 27 percent over the same period and currently there are only 6 Large Mixed-Light licenses. There is less conversion of Mixed Light licenses to Large.

Figure 15. Total Active Mixed-Light Cultivation Licenses and Licenses Part of Conversions

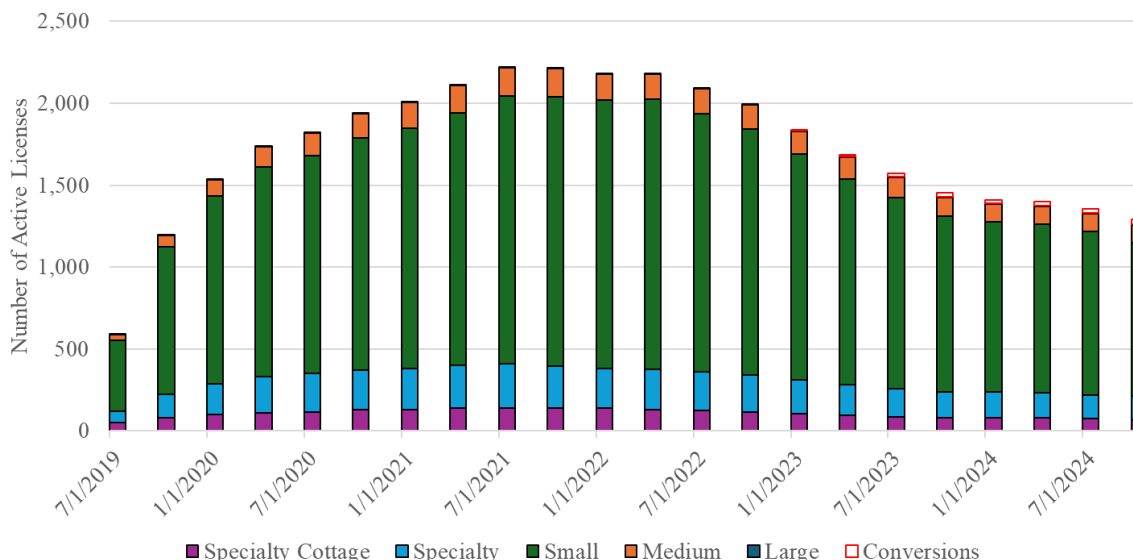
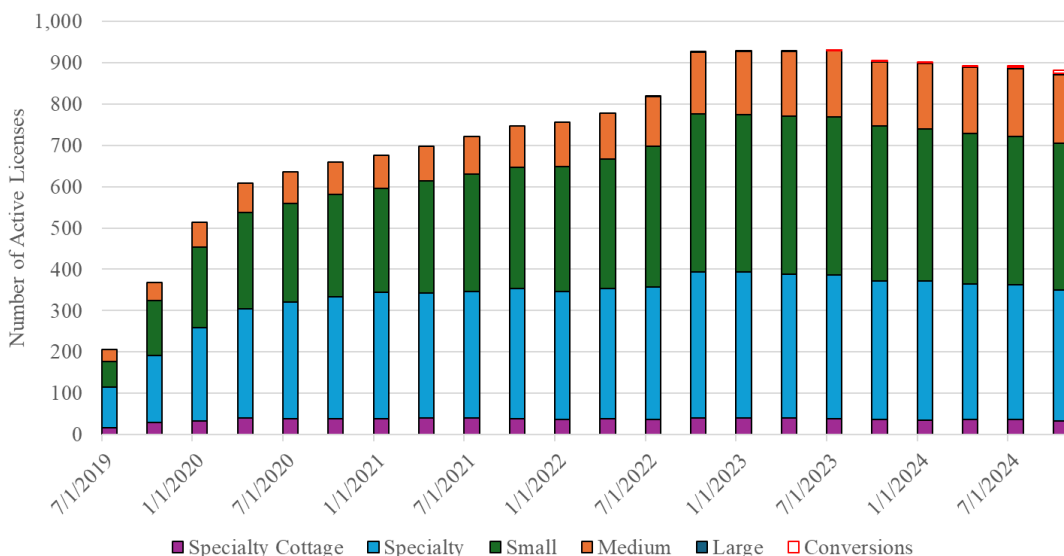


Figure 16 shows indoor cultivation licenses. Indoor licenses increased through 2023 and have remained close to same level in 2024, experiencing a less pronounced decrease than what is observed for outdoor and mixed-light licenses. Active indoor licenses decreased from 926 in October 2023 to 874 in October 2024.

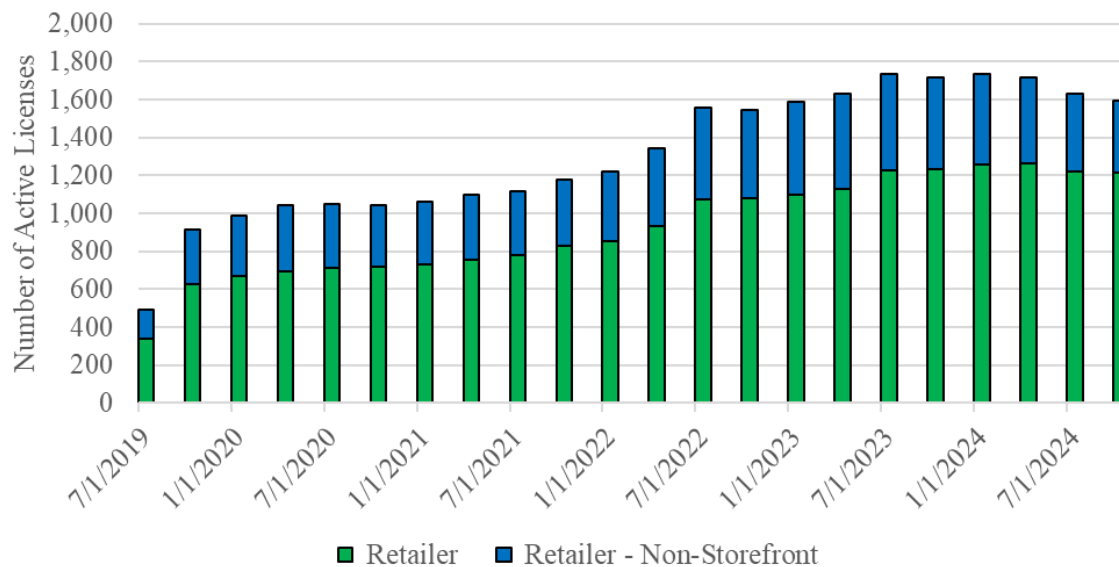
Figure 16. Total Active Indoor Cultivation Licenses and Licenses Part of Conversions



4.3.2 Change in Active Retail Licenses

Figure 17 shows the trend in retail licenses. Retail licenses had been consistently increasing through the start of 2024 but have seen a small decrease this year. This is driven by a decrease in “Retailer – Non-Storefront” licenses. Since hitting a relative peak in July 2023, active non-storefront retail licenses have dropped by 25 percent, whereas active storefront retail licenses have only dropped by 1 percent. The decrease in non-storefront retail licenses has mainly been concentrated in Los Angeles, Alameda, and Sacramento counties.

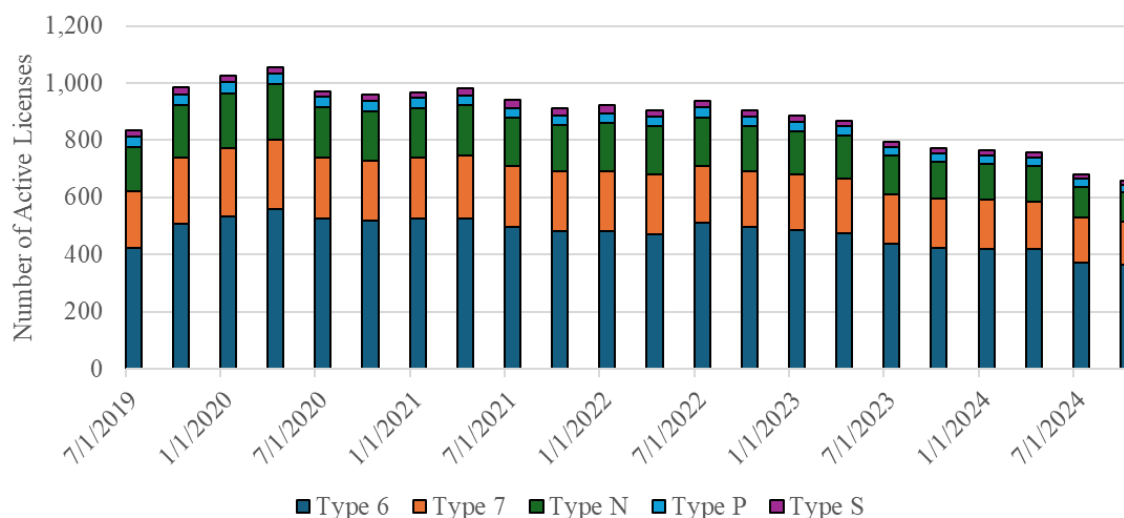
Figure 17. Total Active Retail Licenses



4.3.3 Manufacturer Licenses

Figure 18 illustrates the trend in manufacturer licenses. Manufacturer licenses have been decreasing since 2020 for all manufacturer license types. This decrease could be attributed to a range of factors, including market consolidation, increased operational costs, and evolving regulatory landscapes that may have posed challenges for smaller manufacturers.

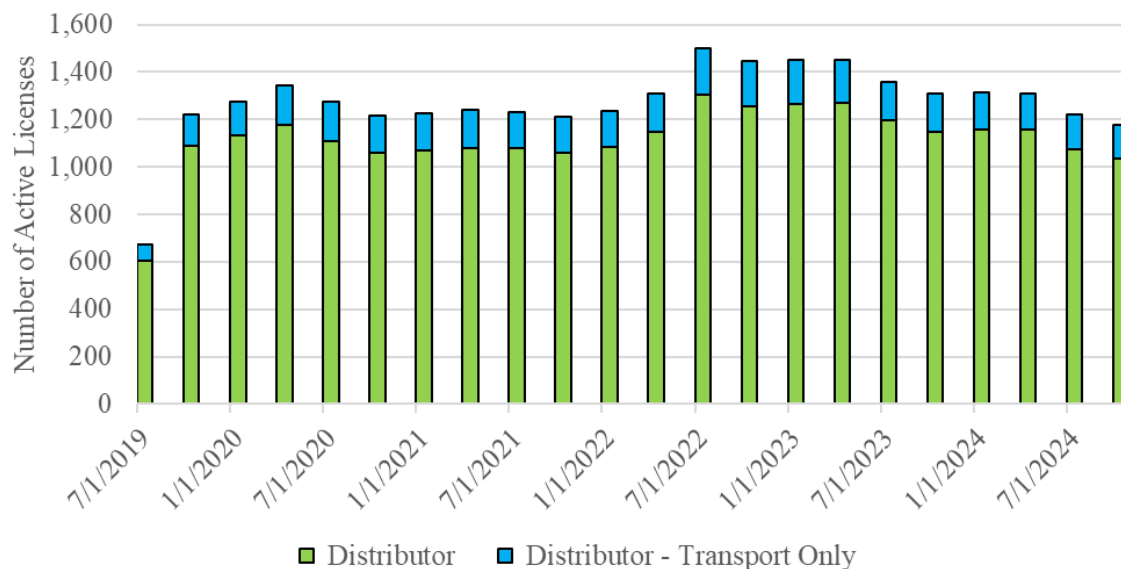
Figure 18. Total Active Manufacturer Licenses



4.3.4 Distributor Licenses

Figure 19 illustrates the trend in distributor licenses. The number of active distributor licenses has generally been stable compared to other license types. There has been a small decline in licenses since 2023.

Figure 19. Total Active Distributor Licenses



4.3.5 Other License Types

Figure 20 illustrates license trends for Microbusiness, Testing Lab, and Event licenses. There are around 375 active Microbusiness licenses. Testing lab licenses decreased from a high of 51 active licenses in July 2022 to 31 as of October 2024. Event licenses are variable. Event licenses represent a small share of total licenses and license fees for the Department.

Figure 20. Total Active Microbusiness, Testing Lab, and Event Organizer Licenses



4.3.6 Change in Businesses Holding Active Licenses

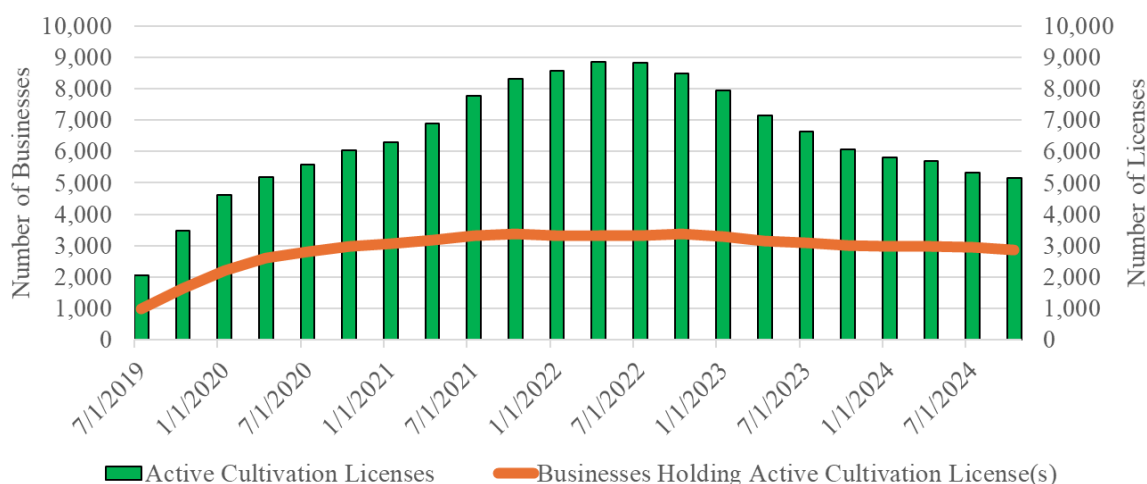
The number of active licenses is different than the number of businesses holding at least one active license, because a business may hold multiple licenses. Both statistics provide an indication of market consolidation.

In the case of retail, distributor, manufacturer, and other license types, the majority of businesses only hold one license. For cultivation license holders, however, it is far more common for businesses to hold multiple licenses. As of October 2024, 22 percent of businesses holding an active cultivation license hold multiple licenses, and those businesses hold about five active cultivation licenses on average. For cultivators, these figures were even higher in 2022 prior to the introduction of Large (Type 5) cultivation licenses.

Therefore, the number of active licenses is a good proxy for businesses entering and exiting the market for the retail, distribution, and manufacturing sectors of the cannabis industry. It can be misleading for the cultivation sector because businesses may hold multiple licenses.

Figure 21 illustrates the number of businesses holding at least one active DCC cultivation license and the number of active cultivation licenses. There has been a decrease in the number of businesses active in the cultivation sector, but it is decreasing at a slower rate than license numbers would reflect. Since peaking in 2022, the number of active DCC cultivation licenses has decreased by 42 percent (without considering license conversions), while the number of businesses holding an active DCC cultivation license has decreased by 15 percent. This is based on legal business names in the ULS database. Further analysis of ownership trends may show that there has been less of a decrease in businesses holding active cultivation licenses.

Figure 21. Total Businesses with an Active DCC Cultivation License



Cultivation license trends in the California cannabis sector have generally been consistent with those observed in other states with established adult-use licensed cannabis markets.

4.4 Hemp Market Conditions

The California State Legislature introduced new legislation for the industrial hemp industry in California Assembly Bill (AB) 2223. AB 2223 was ultimately tabled. The bill would have incorporated hemp into the cannabis supply chain, granting regulatory authority to the Department and other state agencies. One reason for integrating hemp into the cannabis supply chain is to regulate cannabinoids derived from hemp. The 2018 Farm Bill legalized hemp-derived products containing less than 0.3% delta 9 THC on a dry weight basis, sparking a surge in the production and use of CBD. Producers also produced intoxicating cannabinoid products for the general commercial market by concentrating THC derived from industrial hemp. These products became widely available, were unregulated, and were therefore not subject to rigorous testing or other safety measures equivalent to those enforced by the Department.

To address public health risks from hemp-derived intoxicating cannabinoids, Governor Gavin Newsom announced emergency regulations that were promulgated by CDPH in September 2024 to prohibit the sale of industrial hemp products containing detectable levels of total THC. In December 2024, the U.S. Congress passed a one-year extension of the Agriculture Improvement Act of 2018 (the 2018 Farm Bill) which does not change how hemp or hemp-derived cannabinoids are regulated by the federal government.

This section provides an overview of California’s regulatory changes and provides an overview of hemp and the California cannabis industry.

4.4.1 Regulatory Changes Overview

The CDPH emergency regulations address three key aspects of industrial hemp products:

1. Prohibits Intoxicating Cannabinoids in Final Form Hemp Products
 - a. Establishes a prohibition on intoxicating cannabinoids, such that “there shall be no detectable amount of total THC in each serving size and package of industrial hemp final form food products intended for human consumption including food, food additives, beverages, and dietary supplements.”
 - b. Adds additional intoxicating and potentially harmful cannabinoids to the definition of THC or comparable cannabinoid.
2. Age Gating Requirement
 - a. Establishes a requirement that purchasers of industrial hemp extract and other final form hemp products are 21 years old.
3. Serving Size Limits
 - a. Requires each serving in a package to have no detectable amount of total THC.
 - b. Requires each package to have no more than five servings.

- c. Requires serving and package sizes to conform to federal standards for non-industrial hemp food products.

4.4.2 Hemp Market Overview

This section provides a preliminary overview of the current market for hemp products in California and the U.S., including cultivation, manufacturing, and retail market conditions. Like cannabis, market conditions have generally been unfavorable for hemp over the last few years. Following a boom after the 2018 Farm Bill wholesale prices have been steadily declining.

4.4.2.1 Cultivation

Hemp cultivation is generally categorized as seed, fiber, grain, or floral. Floral hemp contains cannabidiol (CBD), which can be used to manufacture non-psychoactive CBD products, or to manufacture Delta 8 THC, a psychoactive compound. In addition, hemp cultivars may contain high levels of THCA, a non-psychoactive compound which, when heated, undergoes decarboxylation and transforms into Delta 9 THC, a psychoactive component of cannabis. The use of hemp to create psychoactive products has led to higher average hemp prices and more hemp cultivation. Hemp final form products are not federally regulated, and until recently could be purchased at corner grocery stores and other retail establishments.

According to USDA data, the total amount of utilized floral hemp (total production minus lost production or own-farm uses such as seed or feed) grown in California in 2023 was about 1.67 million lbs. The total amount of floral hemp grown in the U.S. in 2023 was 8.0 million pounds. Therefore, California represented about 21 percent of total floral hemp production in the country in 2023. This share fluctuates over time as production increases or decreases in different states. Table 13 summarizes California and U.S. floral hemp production, average wholesale prices, and the total value of floral hemp production that entered the market in 2023.

Table 13. Floral Hemp Production, 2023

Region	Total Production	Average Price	Total Value
	<i>Pounds, Thousands</i>	<i>\$/Pound</i>	<i>\$, Millions</i>
California	1,668	\$34	\$58
U.S.	8,030	\$30	\$241

The hemp market, like the cannabis market, has had substantial price fluctuation. Floral hemp is sold in different forms (hemp flower, dried biomass, etc.). USDA only reports overall production and average prices. Therefore, higher hemp flower prices (e.g., for THCA production), which are closer to average prices of cannabis flower, are averaged into the USDA estimates and increase the weighted-average price per pound (i.e., the price for hemp for production of CBD only is less than \$34 per lb.). California hemp prices are slightly higher on average than the rest of the U.S., and this price difference is likely driven in part by cultivation of hemp for intoxicating cannabinoids.

ERA estimated the quantities of floral hemp biomass (including high THCA hemp flower). Using an average CBD content of 6.5% and price of \$0.50 per pound per percent CBD, the average price of CBD biomass is \$3.75 per pound. High THCA hemp flower is a close substitute for cannabis flower, and prices for the two are similar—average price of outdoor cannabis flower was \$475 per pound in 2023. Based on these prices, roughly 1,558 thousand pounds of hemp biomass (and around 110 thousand pounds of high THCA flower) were harvested in California in 2023.

4.4.2.2 Manufacturing

Hemp manufacturing includes both extracting cannabinoids from hemp flower and biomass and converting the extracted cannabinoids (typically in the form of distillate or isolate) into final form products such as oils, capsules, and edibles. Isolate is the most refined form of hemp extract. The isolation process removes all other cannabinoids and terpenes, resulting in an extract that can be more than 99 percent pure. CBD isolate generally sells in the range of \$100 to \$1,000 per kg. Wholesale prices of final form products vary by category.

Manufacturers generally pay for hemp biomass based on CBD content, with quoted prices ranging from \$0.25 to \$1.00 per pound per percent CBD. Like cannabis flower, hemp flower has a higher concentration of cannabinoids than general plant biomass. Wholesale hemp flower prices can be nearly as high as cannabis flower prices. High THCA flower is used to produce inhalable hemp products as well as manufactured products such as oils, capsules, and edibles. CDPH emergency regulations and the 2024 Farm Bill prohibit the manufacture and sale of inhalable hemp products and any products with detectable intoxicating cannabinoids.

Industry outreach with hemp manufacturers indicates that hemp grown in California and other western states are considered to be higher quality than hemp grown throughout the rest of the U.S. Manufacturers in other states contract with hemp growers in California and other states to secure a steady supply of hemp for the purpose of extracting intoxicating cannabinoids. Manufacturers also import isolate from other states and countries.

4.4.2.3 Retail

Existing estimates of the retail value of hemp/CBD products in the U.S. are inconsistent. Various industry groups report retail values of the U.S. market ranging from \$1.2 billion to forecasts of more than \$35 billion. These estimates are typically based on limited survey data. Based on observable hemp production from USDA NASS, average CBD yield and extraction efficiency, and a reconnaissance-level review of online prices in terms of dollars per mg of CBD, a conservative estimate of \$4.2 billion¹⁷ is most in line with expectations for size of the U.S. market.

¹⁷ <https://csnews.com/cbd-cannabis-categories-look-traction>

Based on reports of the retail value of CBD products, California represents between 12 and 22 percent of retail sales in the country.¹⁸

Based on a total U.S. market value of \$4.2 billion and a 22 percent retail market share for California, the California CBD market is estimated to be \$0.92 billion. Comparatively, the size of the licensed cannabis retail market in 2023 was \$5.2 billion.

CBD-dominant products represent a low share of products currently sold at DCC licensed cannabis retailers. Based on the share of products observed in CCTT testing sample data, only 3.4% of cannabis products contain more CBD than THC, and only 0.4% of cannabis products have less than 0.3% THC (i.e., meets the threshold for THC content of hemp-derived cannabinoids sold at retail).

Similar to the licensed cannabis space, prices of final products sold at retail vary widely depending on cannabinoid content and other qualities. CBD products sold at retail commonly range from around \$0.02 to \$0.06 per mg of CBD, however products often sell at considerably higher prices.

4.4.3 Cannabis Market Implications

Restricting intoxicating cannabinoids derived from hemp provides direct benefits to licensed cannabis cultivators and retailers by reducing the supply of substitute cannabis products. Consumers of hemp derived intoxicating cannabis products will be pushed to the cannabis market (both licensed and unlicensed), increasing demand for licensed cannabis and putting upward pressure on prices.

Aside from market effects, in the event intoxicating hemp products are integrated into the licensed California cannabis market, Department costs would be expected to increase to encompass regulation of a broader range of products. Enforcement, licensing, legal, and other staff are needed to ensure that any hemp-derived products entering the licensed cannabis market comply with testing, distribution, manufacturing, and retail requirements. If final form hemp products containing THC remain prohibited in California, the Department will play a significant role in enforcing this prohibition, which will also increase Department costs.

4.5 Market Conditions Summary and Outlook

The market outlook for the rest of 2024 and 2025 shows both opportunities for continued growth and potential challenges. In general, the market is more stable than in prior years. This is supported by more stable consumption trends, production, and prices.

¹⁸ <https://www.statista.com/statistics/1065838/dollar-sales-of-us-cbd-market-by-state/>

Key findings include:

- Wholesale prices of flower have been decreasing in California and other states since 2021. Inflation-adjusted prices decreased by 60 percent from Q4 2020 to Q4 2022. Since then, prices have stabilized, with Q4 2024 prices 7.2 percent higher than Q4 2022 and 2.0 percent higher than Q4 2023.
- Since the elimination of the cultivation tax in July 2022, prices at retail have decreased at roughly the same rate as wholesale prices. From Q2 2022 to Q2 2024, weighted average inflation-adjusted prices of the four top retail products decreased by 16 percent compared to a 15 percent decrease at wholesale.
- The highest wholesale prices since adult-use legalization were in 2020. Prices have decreased each year since, with outdoor prices seeing the largest price decrease. Inflation-adjusted outdoor flower prices are 74 percent lower in Q4 2024 compared to Q4 2020. Indoor prices decreased by 46 percent mixed-light prices decreased by 60 percent during this period.
- Indoor prices are on average 2.1 times higher than outdoor prices and 1.5 times higher than mixed-light prices. The premium for indoor relative to outdoor has been increasing, with Q4 2024 indoor flower prices 4.7 times higher than outdoor flower prices.
- Wholesale prices of indoor and mixed-light flower have rebounded in 2024. Although inflation-adjusted prices in Q4 2024 of outdoor flower are down 36 percent year-over-year, indoor flower prices have decreased by only 0.3 percent and mixed-light prices have increased by only 4.5 percent.
- Inflation-adjusted prices of flower, vape cartridges, and edibles decreased from Q1 2020 through Q2 2024: the average price of eighths of flower decreased by 42 percent, the average price of vape cartridges decreased by 44 percent, and the average price of edible packages decreased by 36 percent.
- The number of businesses exiting the cannabis market increased modestly in 2024. This can be seen in decreasing license numbers, especially cultivation licenses. However, the data also show that the number of businesses holding cultivation licenses has been decreasing at a slower rate than total licenses, suggesting consolidation, especially with Medium and Large license conversions.
- CDPH regulations aim to ban intoxicating cannabinoids derived from hemp. Restricting access to products containing intoxicating hemp-derived cannabinoids effectively removes a cannabis substitute from the market, putting upward pressure on cannabis prices and demand.
- The prevalence of intoxicating hemp products sold in California is unknown. ERA's preliminary assessment suggests that the market could be as large as 8 percent of the licensed cannabis market. However, based on industry outreach, California hemp and

intoxicating hemp products are believed to be primarily export goods (as is the case with unlicensed cannabis). Considering the share of California cannabis that is distributed within the state's unlicensed market or exported, it is possible that the licensed market for intoxicating hemp products in California is less than 1 percent of the licensed cannabis market (in terms of quantity of cannabis dry-flower equivalents).

5 Market Outlook

Licensed cannabis businesses in California have continued to face challenging market conditions the past few years. Inflation-adjusted wholesale cannabis prices as of Q4 2024 are down 57 percent compared to average prices in Q4 2020. Indoor prices are down 46 percent, outdoor prices down 74 percent, and mixed-light prices down 60 percent during this period. Retail prices have also continued to decrease through the first half of 2024.

Markets will continue to adjust to revised regulations, statutes, and taxes throughout 2025 and beyond. As described throughout this report, the economic analysis shows that markets have already adjusted in response to some of these changes.

Total licensed cannabis production in California increased in 2024. This is reflected in analysis of CDTFA cultivation tax revenues and CCTT retail and harvest data. It is difficult to determine annual changes in illicit production, but analysis of eradication data suggests that unlicensed production post-legalization is similar to pre-legalization levels. In short, the licensed market is growing.

The total change in cannabis cultivation obscures important differences between cultivation methods and regions. Wholesale prices show considerably higher prices for indoor cannabis—this may indicate a potential area for market growth. Consolidation of licenses to a Large license have most commonly occurred for outdoor cultivators. Economies of scale from large outdoor production sites may allow licensed producers to better compete with unlicensed producers in the low-price, outdoor cannabis market segment. Eradications of unlicensed cannabis have reflected a relative increase in indoor production, and conversations with county sheriff's offices confirm this finding. The considerable price spread between indoor and outdoor cannabis likely contributes to this trend. However, enforcement efforts vary greatly from county to county and this information is only anecdotal.

Despite annual increases in cultivation volumes and consumption, retail sales of licensed cannabis have been decreasing since 2022. This trend is being driven by lower retail prices. Although the value of sales has decreased, the quantity of cannabis sold has increased. This is partially driven by demand for more manufactured cannabis products, such as vape cartridges. There is a loss of THC and other cannabinoids during the manufacturing process, and therefore more plant material is required to produce an equivalent amount of THC in the final product relative to raw unprocessed flower.

The number of active storefront retail licenses has remained strong, and several counties have active retail licenses as of October 2024 that had none as of September 2022. These trends highlight the challenges with expanding access to the licensed market. Cities and counties are free to develop taxes, fees, and ordinances limiting—or banning—the number of cannabis businesses. Lowering local costs and removing restrictions can increase the number of retail

locations, which can help pull consumers into the licensed market that would have otherwise purchased from unlicensed market participants.

The market outlook for 2024/25 also includes a series of policy changes being implemented by the Department or the state in partnership with the Department that will affect businesses in the cannabis supply chain from cultivation to retail. These include:

- The Department introduced Type 5, or Large, cultivation licenses and has provided a pathway for existing stacked licenses to convert to a single Large or Medium license. This change is expected to help lower costs for larger cannabis businesses that can capitalize on economies of scale. It should also help simplify operations. These conversions have accounted for some (although not all) of the decrease in active cultivation licenses in the past year. More licenses may make this conversion in the future.
- SB 833, and the recent regulations to implement it, allow for cultivators to enter Limited Operations Status, obtain a Reduced-Size Cultivation License, and/or change the renewal dates of their cultivation licenses. An initial analysis of the regulations (and corresponding statute) shows that utilization of the Limited Operations Status is expected to result in a decrease in cannabis production by cultivators. This, in turn, would have an upward effect on price, and benefit all cultivators, including those not using the Limited Operations Status. Some Limited Operations Status licenses have been issued and the effect of these licenses will continue to be monitored.
- The state cultivation tax was suspended as of July 1, 2022, and the responsibility for collecting and remitting taxes was shifted to retailers. This is consistent with how most other industries charge and collect taxes. Although cultivators do not appear to benefit from higher margins, the lower costs would allow licensed cultivators to be more competitive with unlicensed cultivators. Changes in retail prices suggest that cost savings are at least partially passed through to consumers. Changes to the cannabis excise tax rate beginning January 1, 2025, may offset benefits from eliminating the cultivation tax.
- The Department is considering restructuring license fees. Any fee restructuring creates the opportunity to shift fees away from cultivators and small businesses to large businesses and retailers, manufacturers, and distributors. There is also a possibility to provide fee relief by funding enforcement efforts via the Cannabis Tax Fund instead of license fees.
- Upcoming potential policy/regulation changes help improve the safety of cannabis products, protect the environment, and eventually lead to long-run benefits to cultivators. This includes changes to cultivation regulations. Other policy changes (e.g., introducing animal products) may also support additional demand for licensed cannabis. However, these changes will also lead to increased management costs for the Department.

- Regulations prohibit intoxicating cannabinoids derived from hemp. Restricting access to products containing intoxicating hemp-derived cannabinoids effectively removes a legal substitute to cannabis from the market, putting upward pressure on cannabis prices and demand.

Trends in California wholesale prices are similar to prices in Colorado, Oregon, and Washington. Colorado and Oregon each saw wholesale prices drop by about \$1,000 per pound during their third and fourth years of legalization, compared with California experiencing a drop of about \$400 per pound on average. Prices in these states have converged, and statistical analysis shows that the markets are linked. Without any legal interstate trade, this is strong evidence that the states' distinct legal markets are connected via the national illegal market. Prices will likely continue to converge and trend down as additional states legalize adult-use cannabis and licensed cannabis becomes more competitive with the unlicensed market.

In summary, the California cannabis industry is experiencing some short-run adjustments to policy changes, as well as long-run adjustments as California and other states approach a competitive equilibrium with unlicensed markets. Production growth is slowing, and some licensed businesses have exited the market, which should help further stabilize wholesale prices in 2025. Consumer demand trends in California show that more adults are purchasing cannabis, demand is shifting towards manufactured products such as vape cartridges, and that the growth rate of demand is similar to the growth rate of the licensed market. Substantial retail price decreases have caused sales revenue to decrease, but quantities sold of the most popular products have continued to increase. There are some indications that prices could stabilize through 2025 as demand is expected to continue to increase, and efforts to enforce the unlicensed market, prohibit intoxicating hemp products, and regulate cannabis products for animals will push more consumers towards the licensed cannabis market.

5.1 Summary State of the Market

The next year is expected to be a period of continued adjustments for the licensed cannabis market in California. Short-term adjustments are expected in response to suspension of the cultivation taxes and changes to local taxes, licensing regulations, and potential changes to the current licensing fee structure, cultivator requirements, CCTT requirements, and hemp regulations. Long-term adjustments are expected as other states implement licensed cannabis markets and the linkage across separate licensed markets strengthens due to the shared national unlicensed market.

This report provides an overview of how licensed and unlicensed supply and demand interact to affect current market conditions. These findings are used to draw some preliminary conclusions about likely conditions in 2025 and can be summarized as follows:

- Production (supply)

- Licensed cannabis production in California has been increasing, from about 839 thousand pounds (dry-flower equivalent) in 2020 to approximately 1,429 thousand pounds in 2024. This indicates the licensed market is growing.
- Starting in late 2021 and continuing through 2024, there have been fewer active cultivation licenses. This appears to be due, in part, to businesses leaving the market, while also a result of (especially more recently) smaller licenses being converted into Large or Medium licenses.
- Unlicensed production was estimated using eradication data. Post-legalization unlicensed production is similar to pre-legalization levels, and most unlicensed production is exported to other states. Eradication efforts vary substantially across the state.
- Elimination of the cultivation tax, as well as tax reductions in some local jurisdictions, have lowered average production costs for cultivators.
- Introduction of the Limited Operations Status and Reduced-Size Cultivation Licenses are likely to cause some cultivators to reduce production in 2025. This is expected to help stabilize wholesale prices, all else equal, while continuing to encourage cultivators to remain in the licensed market.
- Potential regulatory changes that would have mixed effects on cannabis production include:
 - Licensing fees may be restructured to shift the financial burden away from small businesses and cultivators to large businesses, retailers, manufacturers, and distributors. Shifting fees downstream is consistent with other industries that put taxes/fees close to the final consumer (retail) to allow prices to adjust according to market conditions. This generally increases retail price and reduces direct costs (fees) to cultivators, thereby making them more competitive with illicit market producers.
 - The Department is in the pre-rulemaking phase to consider new requirements for cultivators and CCTT reporting. These changes would potentially increase the regulatory burden for licensees but would improve human and environmental safety as well as aid in deterring diversions to the illicit market.
- Consumption (demand)
 - Total California cannabis consumption is estimated to equal 3.8 million pounds in 2024, about 56 grams per capita. This average estimate is subject to reporting error from survey data and statistical error from using an econometric model to predict consumption. The 95 percent confidence interval for total cannabis consumption is 2.6 million to 5.0 million pounds.

- Since 2012, prevalence of cannabis use in California has been increasing. Adjusting for underreporting of cannabis consumption in surveys, and the effect of legalization on underreporting, per capita consumption has also continued to increase.
- The share of cannabis consumed in California that is purchased in the licensed market appears to have increased. The average estimated licensed market share increased from 25 percent in 2019 to 37 percent in 2021. This includes both licensed adult-use and medicinal cultivation but excludes personal (homegrown) production. The average estimate of licensed market share has remained steady at just under 40 percent since 2021.
- Retail sales decreased from a peak of \$5.35 billion in 2021 to \$4.97 billion in 2023, and sales in the first half of 2024 were down to \$2.39 billion compared to \$2.50 billion in the first half of 2023.
- The downward trend in retail sales is driven entirely by prices—quantity sold, in terms of flower weight and units of edibles and vape cartridges, has continued to increase. The licensed market is growing even as retail revenues decrease.
- Total weight of flower sold and units sold of edibles, vape cartridges, and pre-rolls has continued to increase quarterly through the first half of 2024. Increased demand for manufactured cannabis products relative to raw flower is contributing to the overall increase in demand for cannabis.
- Sales revenue from all packaged flower (excluding pre-rolls) decreased from a peak of \$615 million in Q2 2021 to \$391 million Q2 2024. During this same period, sales of vape products increased from \$309 to \$354 million, and sales of pre-rolls increased from \$137 to \$200 million.
- From 2020 to 2023, total units sold of edibles increased by 43.4 percent, from 28.3 to 40.6 million; ounces of flower sold increased by 49.6 percent, from 7.3 to 11.0 million; vape cartridges sold increased by 102.4 percent, from 25.5 to 51.7 million; and pre-rolls sold increased by 69.6 percent from 32.0 to 54.4 million.
- Prices and Market Entries/Exits
 - Average California wholesale prices have decreased every year since 2020. Identical trends are observed in Colorado, Oregon, and Washington—other states that were early to legalize adult-use cannabis.
 - Wholesale prices in these states are converging, and statistical analysis provides evidence that prices in licensed markets are related. This suggests that these markets are connected via the illicit market.
 - Overall, increasing or steady demand coupled with cultivators exiting the market should eventually result in upward pressure on wholesale prices.

- Recent regulatory changes and potential forthcoming changes aimed at reducing production costs for cultivators would help licensees adjust to difficult market conditions. It will take time to implement these changes and additional time for them to be reflected in the market.
- Suspending the cultivation tax caused a significant decrease in California wholesale prices. The price effect is similar in magnitude to the tax decrease, suggesting cultivators likely did not see increased margins as a result. However, retail price decreases provide evidence that cost savings are partially passed to consumers. Any increase in the excise tax in 2025 would offset some of this effect and could result in additional price impacts.
- Retail prices of flower, vape cartridges, and edibles have been decreasing from 2020 through Q2 2024. Prices are decreasing despite increasing demand because of increasing licensed production and competition with unlicensed products (and to a lesser extent, hemp-derived cannabinoids).
- Decreasing cannabis prices at retail have led to lower total annual retail sales. This is despite an increase in the volume or weight of cannabis sold at retail.
- Active DCC licenses are down for most license categories, especially cultivator, distributor, and manufacturer licenses. Retail licenses, especially storefront retail licenses, have remained strong. For retail, distributor, and manufacturer licenses, changes in license counts closely relate to the total number of businesses in the market. For cultivators, the decrease in businesses active in the market appears to be less substantial than the decrease in active licenses. Part of the reason for this is stacked cultivation licenses being converted to Medium or Large licenses.
- Regulation of intoxicating cannabinoids from hemp would put upward pressure on licensed cannabis prices, although the expected magnitude of this price effect has not yet been evaluated.

Overall, the licensed cannabis market in California is in a transitional period, in which it is adjusting to new regulations/policy and competing with the unlicensed/illicit market. The Department has implemented changes that help cultivators during this transitional period and help shift unlicensed production and consumption to the licensed market. In the short run, tax and licensing fee changes are expected to improve the health of the licensed market, although a potential increase in the state excise tax in 2025 would mute some of these effects. In the long run, prices are expected to converge in California and other states with adult-use markets as the licensed and unlicensed markets approach a competitive equilibrium. However, as long as interstate trade remains federally illegal, licensed market participants are at a competitive disadvantage relative to illicit market participants who distribute across state borders.

5.2 Recommendations and Next Steps

This report was prepared by ERA for the Department to assess market health based on the best available data at the time the report was developed. As more data become available and sources such as CCTT are cleaned for better accuracy, updates and expansions to these findings can be streamlined. ERA is continuing to conduct industry outreach to address data gaps and expand the industry cost analysis. This will improve the analysis of the market outlook. Some important next steps include:

- Ongoing outreach efforts with cultivators to update producer data.
- Evaluating the hemp market for intoxicating cannabinoids from cultivation to manufacturing and retail. Like the cannabis market, there is limited data for this industry. ERA is continuing to review and compile information to inform future policy questions. Currently, hemp production is less expensive than cannabis production because hemp is not subject to the same regulations.
- Continuing to review and refine estimates of licensed cannabis production. This requires establishing a single metric to measure production and applying appropriate adjustments to it. Current CCTT harvest data are prone to data entry errors, and total cultivation volumes are an order of magnitude higher than expected cultivation volumes based on CDTFA data and CCTT retail data. Changes to cultivation volumes will be monitored following implementation of potential CCTT unit of measurement reporting requirements.
- Continuing to review and refine estimates of unlicensed/illicit production. Efforts to collect eradication data from counties and state agencies are ongoing. A standardized method of reporting eradications is necessary to accurately identify eradications by county and for the state without double-counting collaborative efforts between local, state, and federal agencies. GIS-based estimates of unlicensed production are out of date and subject to identification errors.
- Preparing additional analysis of factors driving differences in production and prices. Analysis in this report focused on differences in wholesale prices across cultivation methods, wholesale price response to the cultivation tax change, and the relationship between average prices across states. A more robust and current database of production and prices from CCTT would allow for a careful economic analysis of the factors driving local production and prices within California.
- Preparing additional analysis of factors driving differences in consumption across counties and states. Formal econometric analysis was used to estimate the effects of legalization on consumption, but survey data are only available through 2022 and only at the state-level. A more robust and current database of county-level cannabis consumption

could be used to identify factors driving demand. This could support future policy recommendations.

- Further assessing license and business ownership links to better understand how changes in active licenses are related to businesses entering or exiting the market.
- Preparing additional analysis of cannabis retail sales. Aggregated CCTT sales have clear data entry issues. Prices and unit counts appear to be consistent, but sales by weight and volume show inaccuracies. A major source of this error is misidentifying units (e.g., the volume of a vape cartridge may be erroneously recorded as 1-ounce instead of 1-gram).
- Lastly, other recommended analyses are described throughout sections of this report. These were not completed due to data or time limitations for this report. These can be considered and developed.

Based on the findings in this report and proposed next steps, ERA has developed some specific policy recommendations for the Department and State to consider. These recommendations follow from prior reports and have been updated to reflect regulatory changes from the past year:

- Continue to help the licensed market compete with the illicit market. This can be done by: (i) lowering costs for licenses businesses, (ii) increasing costs for illicit operations, and (iii) increasing demand for licensed cannabis. The Department is making good progress in these areas (e.g., animal products, hemp market regulations, other regulations). Enforcement actions to increase illicit market costs are essential. Currently these efforts are funded through Department license fees. To sustain enforcement activities and cover other Department expenses, revenue must increase, either through higher fees or an alternative funding sources. Funding enforcement by fees alone creates a challenging paradox: **while enforcement supports the licensed market by curbing illicit operations, relying on license fees to fund these efforts raises costs for legitimate businesses.** Tapping alternative funding sources is essential for eliminating illicit cannabis operations in the long-run.
- Improve cultivator data. Recurring producer surveys, similar to the USDA Agricultural Census, could be administered to collect data such as yield, acreage/square footage, consumption, and producer prices. Collecting these data would improve estimates of total production and capacity utilization and evaluate market health/trends. Consumer surveys could be used to identify factors driving demand for licensed and unlicensed cannabis and would support policy recommendations.
- Improve market intermediary data. Manufacturers could also be surveyed. Specifically, data on total inputs in terms of weight of dry or wet flower, trim/leaves, and whole plants, and outputs in terms of weight or THC content of value-added products (e.g., vape cartridges or edibles) could be collected. This would allow for more accurate conversions of cultivated flower to valued-added products.

- Create a standardized database of unlicensed cannabis eradication statistics. Local, state, and federal agencies conduct eradication efforts independently and jointly. Efforts involving local agencies may or may not be reflected in state or federal eradication totals depending on the source of funding for the and lead agency of each operation. Standardizing how eradications are tracked, and requiring reporting of these statistics, would improve understanding of the state of the unlicensed market.
- Encourage local municipalities to lower restrictions, taxes, and fees for cannabis businesses. These are additional costs to cannabis businesses that affect decisions on where to locate and how resilient businesses are to down years in the market. Recent state-level changes have eased the regulatory burden for producers, but local regulations create additional barriers for licensed producers. These barriers to entry create advantages for unlicensed businesses.
- Continue to identify other ways to reduce compliance costs. While taxes and fees are necessary for the Department and other agencies to operate, cannabis businesses incur other regulatory costs related to compliance, such as administrative time. These costs can be especially burdensome to smaller businesses as they may represent a more substantial share of their operations' overhead. Recent Department regulatory changes help with reducing compliance costs that would help businesses.
 - Additional opportunities to do this could come from simplifying CCTT data entry and reducing documentation requirements. Reducing the number of Metrc tags required (i.e., allowing batch tagging) could also reduce these costs.
 - Shifting enforcement costs the Cannabis Tax Fund would allow for reduced license fees, as well as expanded enforcement efforts focused on the unlicensed market.

Legalizing cannabis at the federal level would help the licensed market. An analysis of wholesale prices in distinct, state-level licensed markets shows that prices in these markets are converging and following a similar downward trend. This suggests a linkage between these markets, and with the absence of a federally licensed market, this implies that they are linked through the unlicensed market. Federal legalization of cannabis and facilitation of trade between different states with licensed markets would dissuade illicit trade of cannabis and could lead to more stable prices in California and other states.

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