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**North Coast Regional Water Quality Control Board**

**Report of Observations from Sept. 17, 2015 Overflight  
Daniel Franklin Property  
1-00NTMP-019 MEN/LAK  
Lake and Mendocino Counties  
WDID No. 1B13159CNME**

Date: October 13, 2015

To: Diana Henriouille – Senior Water Resource Control Engineer  
Shin Roei-Li - Assistant Executive Officer

From: Stormer Feiler, Environmental Scientist

Subject: September 17, 2015 overflight

Landowner: Daniel Franklin- Charles A. Franklin and Julia F. Franklin Trust  
Physical Site: 17777 Eel River Road  
APN: 171-260-06

Mailing Address: Daniel Franklin, 27860 Poppy Drive, Willits, Ca. 95490

Mailing Address: (Tax Bill Address) Olive Franklin c/o Muckle Hill Farm  
SPA Common North Walsham, Norfolk, NR28985, England

Watershed: Main Stem Eel River, Upper Eel River watershed

**Flight Attendance September 17, 2015**

Stormer Feiler- North Coast Regional Water Quality Control Board (NCRWQCB)  
Steve Crawl- Department of Fish and Wildlife Warden  
Jeff Veal- Department of Fish and Wildlife Warden and pilot

**Introduction**

On September 17, 2015, at approximately 1300 hours, I met with Department of Fish and Wildlife wardens Crawl and Veal at the Ukiah airport and we flew in a single engine plane to Potter Valley and the Eel River. While in flight, we passed over the parcel located at 17777 Eel River Road (parcel) at approximately 300 feet in elevation. I observed 4 discrete outdoor cannabis cultivation areas; the plants were clearly visible from the air with the

naked eye. To photograph these areas we made several passes over the parcel and surrounding areas. The following photographs provide evidence of these observations. During the flight, I took 15 photographs. I observed additional cannabis cultivation sites on adjoining properties. Responsible party(ies) associated with these cultivation areas are unknown.

### **Flight Photographs**

#### **September 17, 2013 Observations**

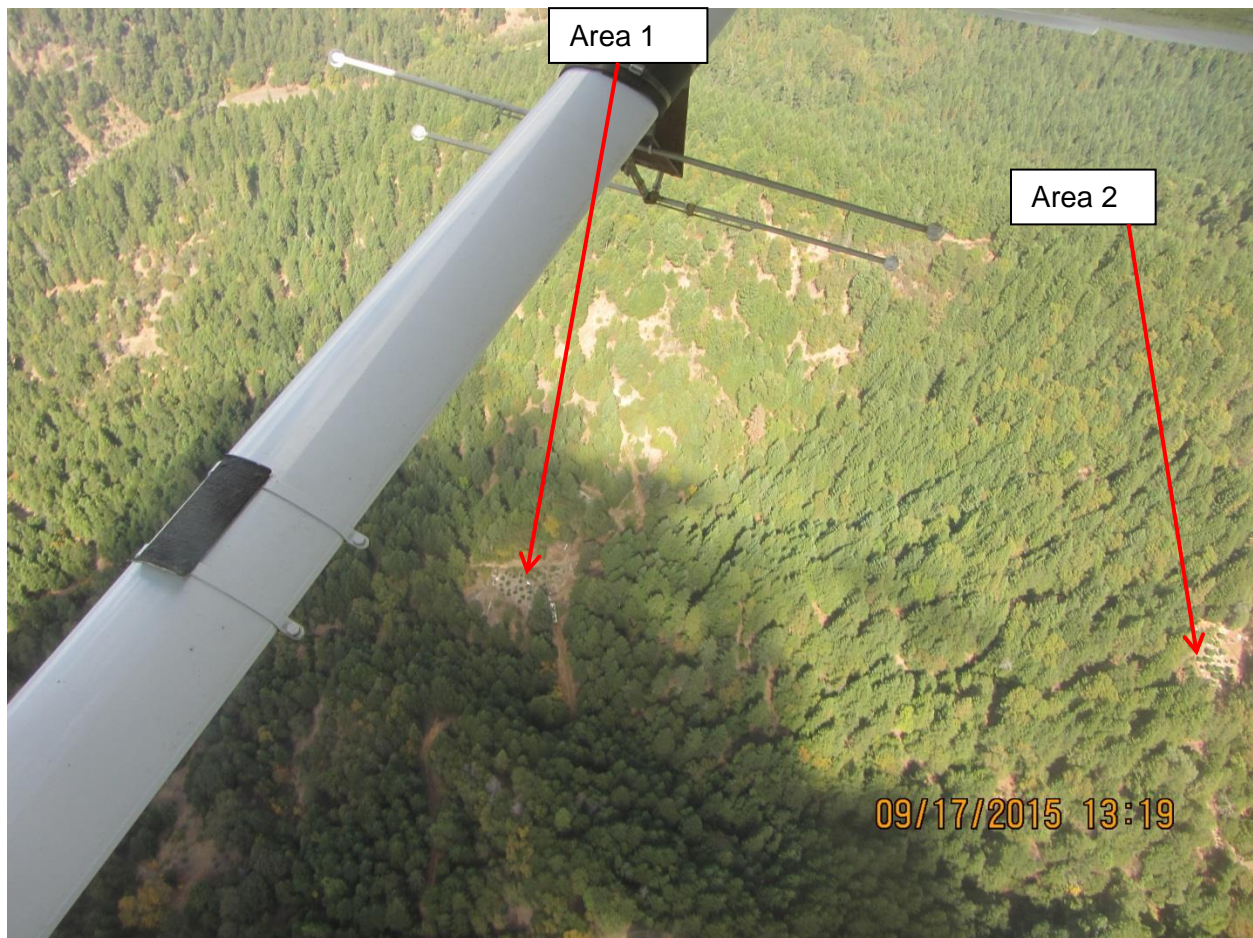


Image 1- shows two areas where marijuana plants appear to be growing on the Franklin Trust property. (Photo 0186)



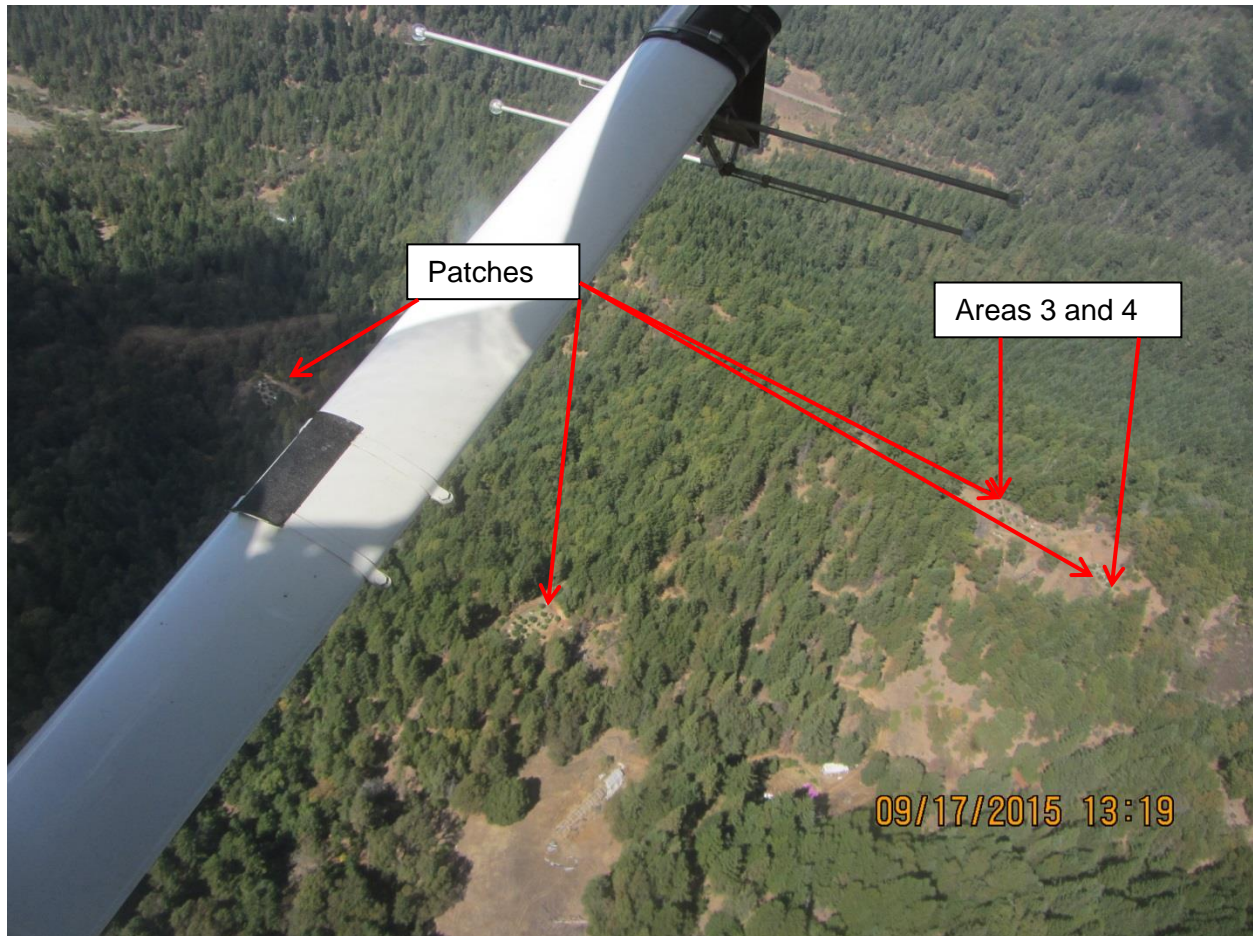


Image 2 shows from right to left four discrete locations where cultivation is occurring on the Franklin Trust property. (Photo 0185)

### **Conclusion**

After analyzing the images I took on September 17, 2015, I conclude that there are approximately 97 marijuana plants growing on outdoor cultivation areas on the subject parcel. Specifically, I counted 47 plants on the patch identified as Area 1 on Image 2, above, 15 plants on Area 2, 15 plants on Area 3, and 20 plants on Area 4. There may be additional marijuana plants growing on individual outdoor cultivation areas or on other parts of the parcel, as tree canopy may impede visibility from the air, and photographic imagery I collected did not include full views of any of the four observable cultivation areas.

15091717777 Eel River Road Overflight data-

Franklin Trust									
Compliance Action (Determine the actions required to have prevented the violation)	One-Time Nondepreciable Expenditure			Annual Cost		Cost Index for Inflation <sup>3</sup>	Non-Compliance Date	Compliance or Hearing Date	Benefit of Non-compliance
	Amount	Date <sup>1</sup>	Delayed? <sup>2</sup>	Amount	Date <sup>1</sup>				
1 - Apply for water rights permit from Division of Water Rights	\$250	12/23/2014	n			ECI	4/1/2011	12/15/2016	\$205
2 - Division of Water Rights Renewal Fee				\$20	12/23/2014	ECI	4/1/2011	12/15/2016	\$75
3 - Install storage tanks (ten 50-gallon tanks) <sup>5</sup> lab analysis, production of the report.	\$51,500	12/23/2014	n			CCI	4/1/2011	12/15/2016	\$41,017
4 - Maintain storage tanks and pump				\$1,000	12/23/2014	ECI	4/1/2011	12/15/2016	\$3,773
5 - Permit from Mendocino County for grading	\$3,000	12/23/2014	n			ECI	4/1/2011	12/15/2016	\$2,461
6 - Permit from DFW for diversion	\$1,750	12/23/2014	n			ECI	4/1/2011	12/15/2016	\$1,435
Totals	\$56,500			\$1,020					\$48,966

Date of run:	10/28/2016 14:19
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Penalty Payment Date:	12/15/2016
Income Tax Schedule <sup>4</sup>	For-Profit

Source: USEPA BEN Model:	Version 5.6.0
Analyst submitting to OE:	MM Ransom

Status:

<sup>1</sup> This is the Date of the cost estimate. When was the cost estimate made?
<sup>2</sup> Enter "y" if delayed, and "n" if avoided.
<sup>3</sup> Economist chooses the most appropriate index to use.
<sup>4</sup> Choose the type of entity from the following list: Not-for-profit, Municipality, C-Corporation, For-profit (not a C-Corporation), or Federal Facility. Consult the economist, Madalene.Ransom@Waterboards.ca.gov, when you have a question about which one to choose.
<sup>5</sup> Includes porject plan (survey, design, etc.)

**Daniel Franklin Cultivation Operations, Estimated Market Value & Costs**  
**November 3, 2016**

<b>Years (1)</b>	<b>Year 2011</b>	<b>Year 2012</b>	<b>Year 2013</b>	<b>Year 2015</b>
<b>Estimated Market Value</b>				
Number of Plants, Min (2)	63	34	123	97
Number of Plants, Max (2)	63	50	148	97
Number of Plants used in analysis (3)	63	42	136	97
Number of Plants in old holes (2)			40	97
Number of Plants in new holes (2)			83	
Yield Pounds per plant, Min	Place Saver			
Yield Pounds per plant, Max	Place Saver			
Pounds of Buds per Plant (4)	1.5	2	1	1
Total Harvest Pounds, Min	Place Saver			
Total Harvest Pounds, Max	Place Saver			
Total Harvest Pounds (5)	95	84	136	97
Market Value, Min, \$/lb (6)	\$1,500	\$1,200	\$1,700	\$1,400
Market Value, Max, \$/lb (6)	\$2,000	\$1,600	\$2,200	\$1,700
Market Value, Min Harvest, Min Market Value	Place Saver			
Market Value, Min Harvest, Max Market Value	Place Saver			
Market Value, Max Harvest, Min Market Value	Place Saver			
Market Value, Max Harvest, Max Market Value	Place Saver			
Total Market Value, Min Market Value, \$ (7)	\$141,750	\$100,800	\$230,350	\$135,800
Total Market Value, Max Market Value, \$ (7)	\$189,000	\$134,400	\$298,100	\$164,900
<b>Estimated Production Cost, Annual (8)</b>				
Purchase clones, price each (9)	\$10	\$10	\$10	\$10
Total Clone Cost (10)	\$630	\$420	\$1,360	\$970
Soil amendments, Price per Bag (11)	\$20	\$20	\$20	\$20
Soil Amendment, Bags per New Hole (12)			5	
Soil Amendment, Bags per Old Hole (12)			3	
Soil Amendment, Bags per Average Hole (13)	4	3	4	3
Total Soil Amendment Cost (14)	\$5,040	\$2,520	\$10,840	\$5,820
Repair Water System (15)		\$500	\$500	\$500
Total Annual Production Cost (16)	\$5,670	\$3,440	\$12,700	\$7,290

## Daniel Franklin Cultivation Operations, Estimated Market Value & Costs

### November 3, 2016

	Year 2011	Year 2012	Year 2013	Year 2015
<b>Estimated Production Cost, Capital (17, 18)</b>				
Water, Tank, 3,000 gal, number of tanks (19)	4	4	4	4
Water, Tank, Price each (20)	\$1,500	\$0	\$0	\$0
Total Tank Cost (21)	\$6,000	\$0	\$0	\$0
Water, Pump, number (22)	1	1	1	1
Water, Pump, Price (23)	\$500	\$0	\$0	\$0
Total Pump Cost (24)	\$500	\$0	\$0	\$0
Water, Bladder, 50 K gallon (25)	\$20,445	\$0	\$0	\$0
Total Capital Costs (26)	\$26,945	\$0	\$0	\$0
Capital Financing Period, years (27)	Place Saver			
Interest Rate on Loan for Capital (27)	Place Saver			
Average Annual Capital Costs	Place Saver			
Total Capital Cost (28)	\$26,945	\$0	\$0	\$0
<b>Net Market Value, Minimum</b>	<b>\$114,805</b>	<b>\$100,800</b>	<b>\$230,350</b>	<b>\$135,800</b>
<b>Net Market Value, Maximum</b>	<b>\$162,055</b>	<b>\$134,400</b>	<b>\$298,100</b>	<b>\$164,900</b>

#### Data Notes & Sources:

(1) Cultivation did not occur in the year 2014.
(2) Google Earth imagery analysis in years by Stormer Feiler. 2011, 2012, 2013, 2015.
(3) Average of the Minimum and Maximum
(4) Professional Judgement based upon aerial imagery analysis, Stormer Feiler, Env. Scientist
(5) Number of Plants * Pounds per Plant
(6) Various publications such as <a href="https://www.cannabisbenchmarks.com/special-reports.html">https://www.cannabisbenchmarks.com/special-reports.html</a> (Exhibit 4.G) and note from Hezekiah Allen (Exhibit 4.E).
(7) Total Harvest Pounds * Price per Pound: There are two prices, minimum and maximum.
(8) Typically annual costs include items such as property taxes, insurance, farm labor, etc. However, there is no evidence that Daniel Franklin has paid these costs, thus these cost categories are not included.
(9) Local information from buyers and sellers in the Mendocino and southern Humboldt areas. Price does vary according to quality. Price given here is an average.
(10) Price per Clone * Total Number of Plants (plants come from clones).
(11) Range = \$10/bag to \$30/bag, \$20 is the average used in the analysis. Pricing sheets, Spare Time Supply, Willits CA Nursery.

## Daniel Franklin Cultivation Operations, Estimated Market Value & Costs

### November 3, 2016

(12) Stormer Feiler, Environmental Scientist, Region 1
(13) The average was given for years 2011, 2012, and 2015. 2013 data were averaged for new holes and existing holes.
(14) Number Bags/Average Hole * Number of Plants * Price/Bag. Note: Number of Plants is the number of holes.
(15) This varies depending on how they manage water systems at the diversion point. Could require replacing the water line because of, for example, bear damage or diversion during low flows.
(16) Total Clone Cost + Total Soil Amendment Cost + Repair Water System
(17) Typically capital costs include items such as property mortgage, farm equipment, buildings, etc. However, there is no evidence that Daniel Franklin has paid these costs, thus these cost categories are not included. There may be a capital cost in 2014-15 due to replacing the water bladder that failed.
(18) Daniel Franklin's capital costs were all incurred in 2011. According to a conversation, purchases were made with cash. There was no financing. Therefore, capital costs only appear in 2011.
(19) Google Earth imagery. 2011, 2012, 2013, 2015.
(20) <a href="http://www.tank-depot.com/p-3430/ukiah-water-tanks">http://www.tank-depot.com/p-3430/ukiah-water-tanks</a> Tank Depot, 3460 N. State St, Ukiah, CA 95482 For the year 2015, assume the 2013 tank is functional and did not need replacing.
(21) Number of Tanks * Price/Tank
(22) Field observation and description of discharger operating diversions.
(23) Pump price varies ranging from \$288 to approximately \$1,399 for a Honda. Honda is the most popular pump Stormer Feiler sees in the woods. For the year 2015, assume the 2013 pump is functional and did not need replacing.
(24) Number of Pumps * Price/Pump
(25) Checked with the following website: <a href="http://www.water-storage-tank.com/large-water-tanks.html">http://www.water-storage-tank.com/large-water-tanks.html</a> and revised to \$20,445.
(26) Total Tank Cost + Total Pump Cost + Bladder Cost
(27) There is no evidence that any capital costs were financed.

**Daniel Franklin Cultivation Operations, Estimated Market Value & Costs**  
**November 3, 2016**

<b>Estimated Surplus Marijuana</b>				
Medical Average Dose, Smoked or Vaporized, lb/year (28)	6.63			
Number of Members in The Collective	7			
	<b>Year 2011</b>	<b>Year 2012</b>	<b>Year 2013</b>	<b>Year 2015</b>
Estimated Harvest, lb	95	84	136	97
Allocated to Each Collective Member, lb	13.5	12.0	19.4	13.9
Medical Consumption, Average, Each Member, lb/year	6.6	6.6	6.6	6.6
<b>Surplus Marijuana, Average, Each Member, lb/year</b>	<b>6.9</b>	<b>5.4</b>	<b>12.7</b>	<b>7.2</b>

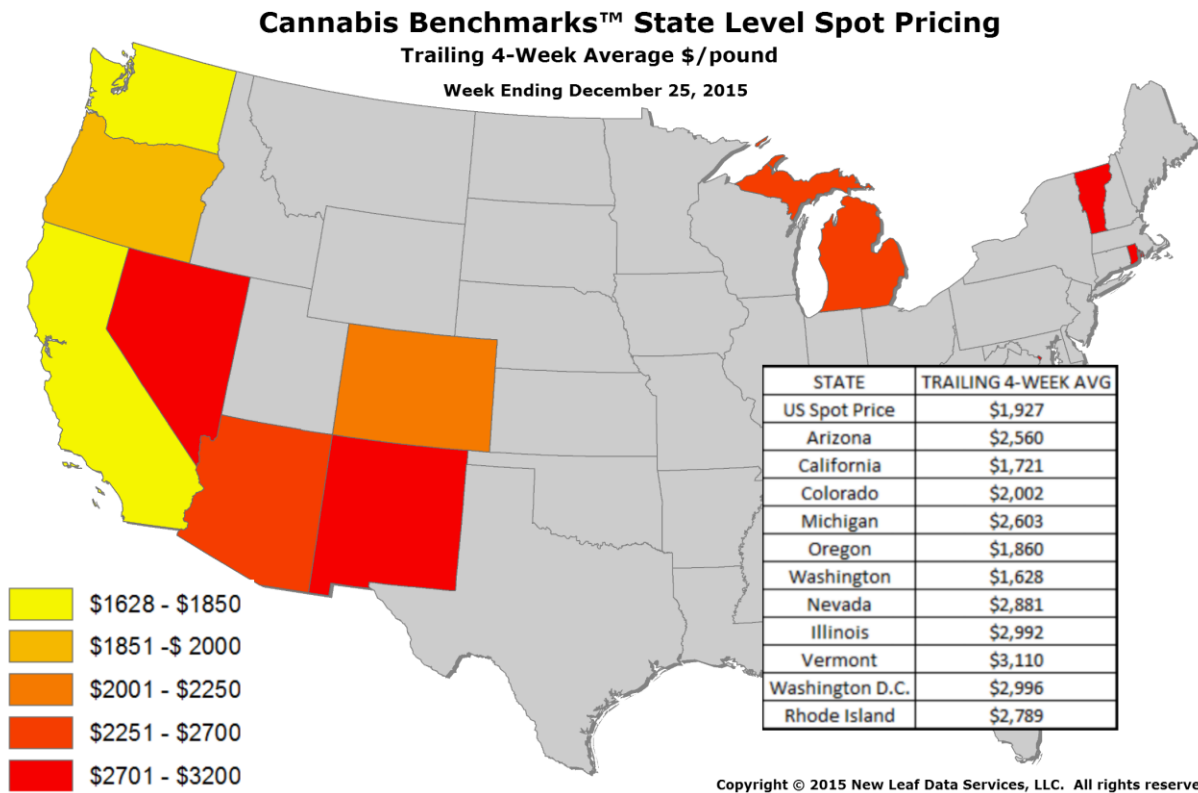
**Data Notes & Sources:**

(28) "Dosing Medical Marijuana: Rational Guidelines on Trial in Washington State",  
 MedGenMed 2007: 9(3): 52, page 5 of 7. [www.ncbi.nlm.nih.gov/pmc/articles/PMC2100129](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2100129)

Note: This dosage is for people who are extremely ill (multiple congenital cartilaginous exostoses, nail-patella syndrome and other grave illnesses). Although the doseages are very high values, they are the only professional medical information that could be found in the time available.

I, Stormer Feiler, support the information contained within this analysis and declare based upon my work history with the Regional Water Board and my 40 years of experience with Mendocino County residency and community interactions that the above costs are representative of the norms in the industry in its current state. The approach applied assesses the potential economic benefits inherent in cultivating a black market crop.

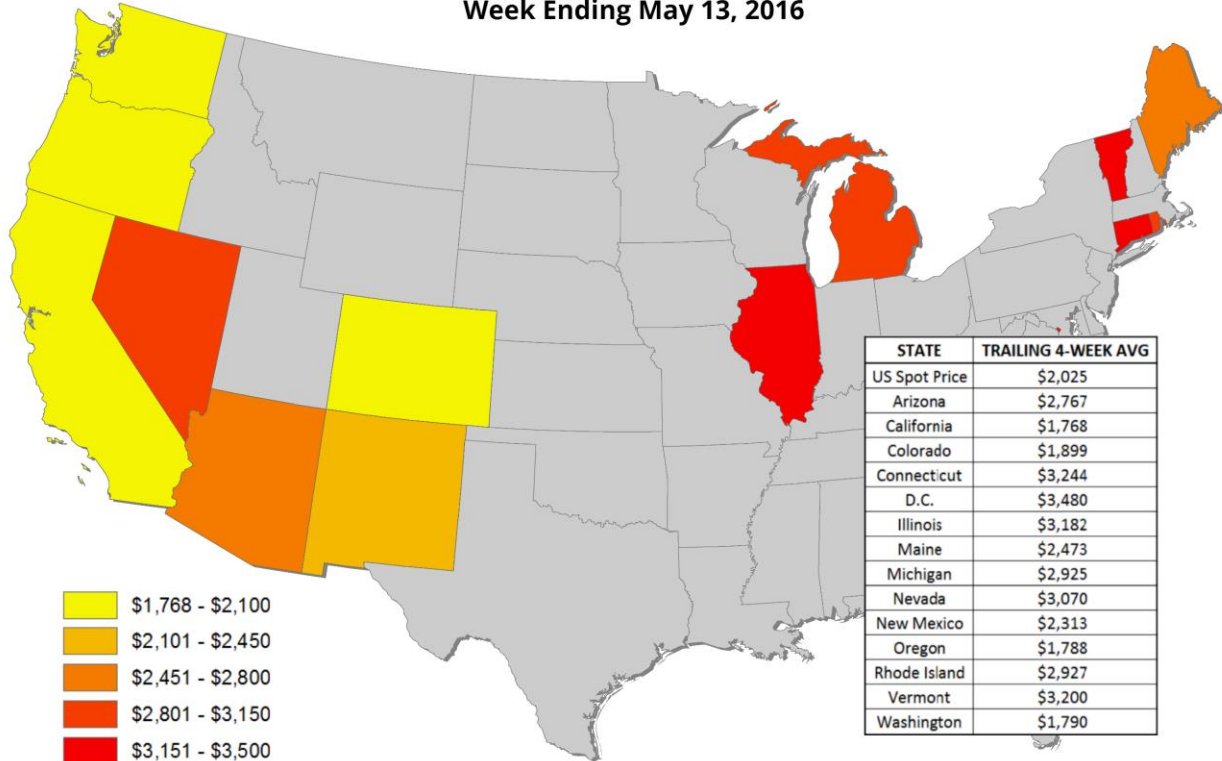




## Cannabis Benchmarks® State Level Wholesale Spot Pricing

### Trailing 4-Week Average \$/pound

Week Ending May 13, 2016



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## Feiler, Stormer@Waterboards

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**From:** Anthony V. Silvaggio <Anthony.Silvaggio@humboldt.edu>  
**Sent:** Thursday, February 12, 2015 10:02 AM  
**To:** Feiler, Stormer@Waterboards  
**Subject:** Re: Board of Forestry Presentation 2013

Hi Stormer,

yes, you are correct. This was the outdoor price, not the indoor.

Tony

On Tue, Feb 10, 2015 at 5:15 PM, Feiler, Stormer@Waterboards <[Stormer.Feiler@waterboards.ca.gov](mailto:Stormer.Feiler@waterboards.ca.gov)> wrote:

Professor's Tony and Josh:

I have in my notes for the Board of Forestry Presentation that you stated marijuana was selling on the wholesale market in 2012 for around 1200-1600 per pound and in 2013 the price had raised to 1700-2200 per pound. Am I quoting this correctly? I would like to use your quote as a reference in an enforcement case to justify the ability of a discharger to pay. As such your presentation and discussion would be a reference in the case.

Please let me know if this is Ok with you and if I am accurately representing the information. If you have any idea of the price per pound of wholesale marijuana in 2011 I would appreciate that info as well.

Thanks for your assistance and have a nice day,

Stormer

Stormer Feiler : Environmental Scientist

Office: [\(707\) 543-7128](tel:(707)543-7128)

Cell: [\(707\) 328-7639](tel:(707)328-7639)

[sfeiler@waterboards.ca.gov](mailto:sfeiler@waterboards.ca.gov)

North Coast Regional Water Quality Control Board

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Humboldt State University  
Arcata, CA 95521  
707.826.3142  
[avs1@humboldt.edu](mailto:avs1@humboldt.edu)

May 13, 2015

RE: Estimates regarding the price of cannabis as a primary agricultural product in CA

This memo is intended to provide insight on the economics of cannabis farming in CA. It should be noted that this memo is a synthesis of several sources including: anecdotes, survey data, and general knowledge of the industry. This information is presented in good faith as a “best guess.”

### Basic Market Realities

- CA is the largest producer of cannabis in the United States
- The crop is extremely lucrative, by many estimates it is the largest cash crop in the state
- The state consumes a significant amount of the product but certainly an equally significant percentage of the product is leaving the state
- The cannabis industry in California is not regulated at a statewide level. This lack of comprehensive regulations is creating a “gray marketplace” where accurate and comprehensive data regarding pricing and market arrangements can be difficult

### From Access to BMP's: Market Forces can Drive Sustainability

The prices outlined below are indexed primarily by quality. However, market access is often the most important factor determining the compensation to the farmer. Lack of standards, regulations, and full protection in the eyes of the law, make it very difficult for farmers, especially small farmers, to command a fair price for their product in today's marketplace.

Though current market conditions arbitrarily favor farms based on their access to markets, I am hopeful that as regulation moves forward, public and private forces shall work together in concert to favor BMP's and collaboration.

### A diverse and volatile marketplace

The cannabis industry is largely unregulated in CA, though there is a multi-faceted effort underway to change that. Different policies outcomes will have dramatic impacts on pricing market conditions, so expect the above numbers to change and expect other perspectives on these numbers.

The prices above index price primarily by quality. However, market access is often the most important factor determining the compensation to the farmer. Lack of standards, regulations, and full protection in the eyes of the law, it is very difficult for farmers, especially small farmers to command a fair price for their product in today's marketplace.

One of our goals with regulation is to help create a marketplace where BMP's and quality are rewarded. This will be achieved through a regulated marketplace where farmers can develop brands and compete as specialty cultivators.

### Estimates

Prices (in dollars) range from 700 to 2500 for a pound of outdoor cannabis.

Commercial: 700 to 1100: low to medium quality, bulk, and commercial grade outdoor. This probably ends up out of state or in manufactured products. I estimate this makes up more than 75% of the cannabis produced in CA. It is often grown on the larger farms and cultivation sites.

Craft: 1200 to 1800: medium to high quality, I estimate most of this stays in state; I estimate this makes up about 20% of the cannabis produced in CA.

Specialty: 1800 to 2500: generally reserved for “SunGrown,” that is “outdoor” that is on par in terms of quality and potency with “lamp grown.” I estimate this makes up less than 5% of the total cannabis produced in CA.

### Contact:

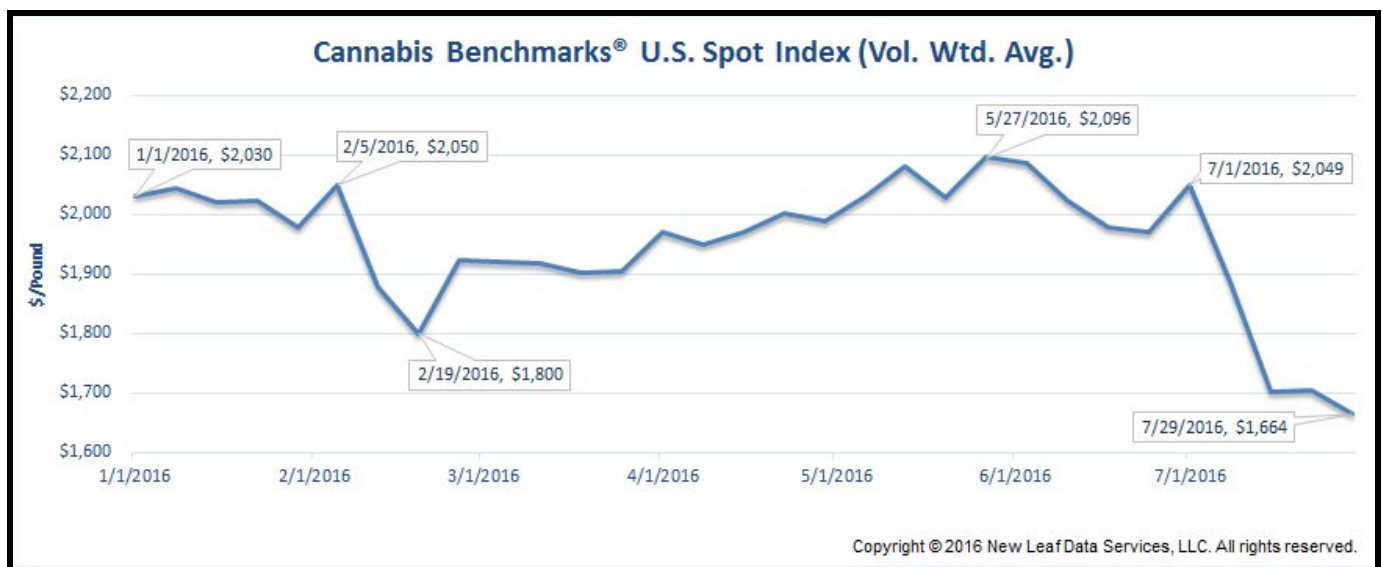
Feel free to follow up with any questions: Hezekiah Allen, 916 879 5063, [hezekiah@emeraldgrowers.org](mailto:hezekiah@emeraldgrowers.org)



# CANNABIS BENCHMARKS®

## 2016 Mid-Year Review & Outlook -- A Publication Special

In this **Mid-Year Review & Outlook**, we report on the mounting evidence that supply fundamentals are shifting in a way that is having a material impact on wholesale cannabis prices in the major markets of Colorado, California, Oregon and Washington. The increased supply of lower-cost outdoor and greenhouse production - and the ability of producers to spread the sale of their inventory across the year - is clearly impacting the seasonality of wholesale prices and volumes that we have seen historically. In this publication special, we highlight how these trends are playing out in the marketplace, and the effect of this shift on buyers and sellers.



After closing at \$2,001 the last week of 2015, the U.S. Spot Index began 2016 at \$2,030 per pound and reached \$2,050 in early February. It then declined 12% over two weeks to \$1,800 as large volumes of outdoor grown supplies from the west coast - combined with a general supply glut in Washington State - skewed the national price lower. Prices then began a slow upward climb through mid-winter and into late spring, considered typical price behavior over the past few years. What was unexpected was the pace and volume with which new supplies came to market, interrupting the upward price climb that normally continues until the first outdoor harvests in September. As will be discussed in detail below, a glut of supply drove down the U.S. Spot Index in July, typically a period of scarcity and relatively high prices. Considering these novel market conditions, it remains to be seen whether we have already observed this year's price peak - which to this point occurred on May 27th, as illustrated above. Last year's highest weekly volume weighted price occurred on September 11th, when the U.S. Spot Index reached \$2,133 per pound. Also unexpected was better supply planning this year, with market

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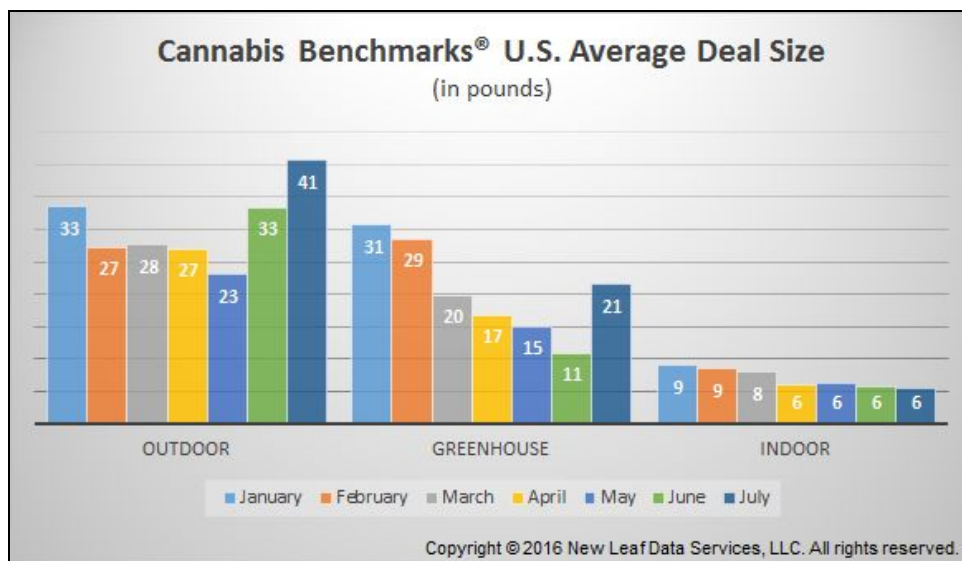
## 2016 Mid-Year Review & Outlook -- A Publication Special

participants avoiding the holiday-related price spikes experienced in 2015 ahead of both 4/20 and the 4th of July. Year-to-date (from January through July), the U.S. Spot Index is off \$366 per pound, or 18%. Prices decreased more frequently than prices increased, and the largest price drops were 3% to 4% greater than the largest price rises (8-10% versus 4-6%, respectively).

### *Year-to-Date Market Highlights*

	Low - value	Low - date	High - value	High - date
<b>U.S. Spot Index</b>	\$1,664	July 29	\$2,096	May 27
<b>Outdoor Spot</b>	\$1,233	July 29	\$1,798	May 27
<b>Greenhouse Spot</b>	\$1,425	July 15	\$2,069	June 17
<b>Indoor Spot</b>	\$1,955	July 22	\$2,408	January 22
<b>Average Deal Size</b>	7 pounds	June 3	16 pounds	January 22

Much of the supply story can be communicated by the chart at right, which illustrates average deal size each month - by type of cultivation - over the past half year. The three primary methods of cultivation - outdoor, greenhouse and indoor - have different production profiles. Outdoor cultivators produce one harvest per year in the fall, whereas indoor



cultivators produce year-round and can generate between 4 and 6 harvests per year. Greenhouse cultivators combine elements of both - exploiting natural light, while leveraging infrastructure and technology - to produce between 1 and 4 harvests per year, though sophisticated, well-equipped greenhouses can run year-round on schedules analogous to indoor production. The result of this mix of cultivation methods is that growers approach the market differently at different times of the year. Since outdoor cultivators produce one large harvest in the fall, which drives prices down, they tend to release product into the market in a controlled manner - selling

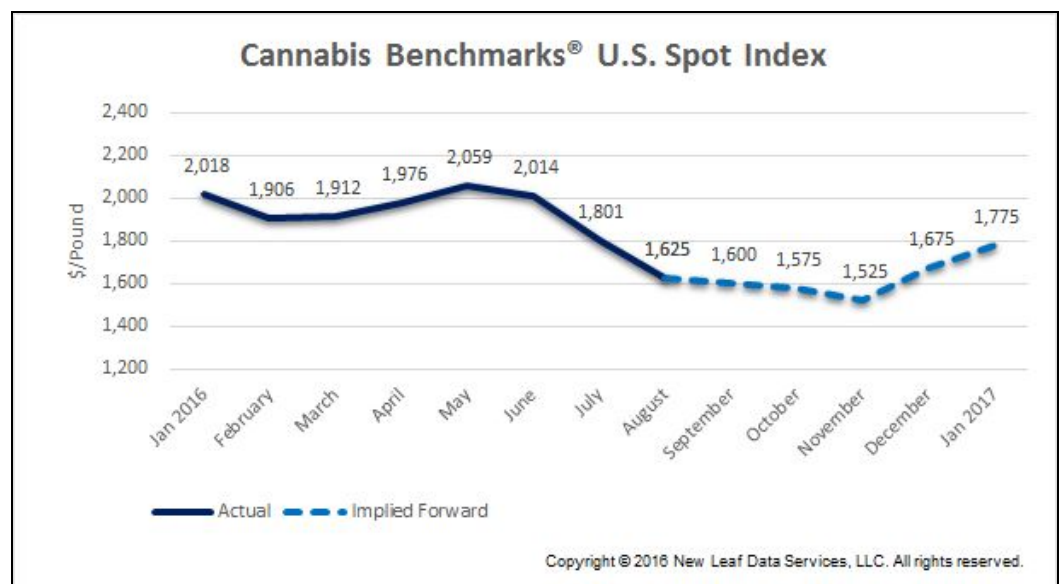
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enough in the fall to generate cash flow to cover expenses, but holding back inventory to release later in the year as prices rise. Thus, outdoor cultivators - in general - are price setters in the fall and price takers in late spring and early summer. As noted in the chart, sellers of outdoor grown flower sold lots averaging 33 pounds in January as they were recouping expenses, and then reduced lot sizes to optimize revenue ahead of the next outdoor harvest. What happened next was not characteristic of prior years, and changed the status-quo. Outdoor growers - encumbered with more inventory than in years past - began to sell larger quantities in June and July, as it became apparent that large quantities of greenhouse grown flower from the first light deprived harvests would be coming to market, potentially creating an oversupply situation. While it remains to be seen if last year's fall harvest has been fully liquidated, the race by outdoor cultivators to preserve value drove prices down as the first light-deprivation harvests of the year hit the market; the average greenhouse deal size nearly doubled from June to July. The average deal size for indoor growers appears to reflect the conventional experience of reduced yields in the late spring and summer, as cooling and humidity control costs increase and growers shutter portions of their operations until conditions for 100% capacity utilization return, generally in September.

Our **U.S. Cannabis Implied Forward Curve** is a six-month benchmark price assessment reflecting the national wholesale price that buyers are paying, agreeing to pay, or are willing to pay cultivators today for delivery at a date in the future. The graph below shows the actual monthly average for the U.S. Spot Index for January through July, appended with the six-month Implied Forward Curve, reflecting the market's expectations for wholesale prices for the remainder of the

year. As noted in the graph, the market is currently expecting wholesale prices to begin 2017 roughly \$250 per pound less that they started 2016. Despite increased demand across nearly every market and demographic, the influx of capital and commercial scale

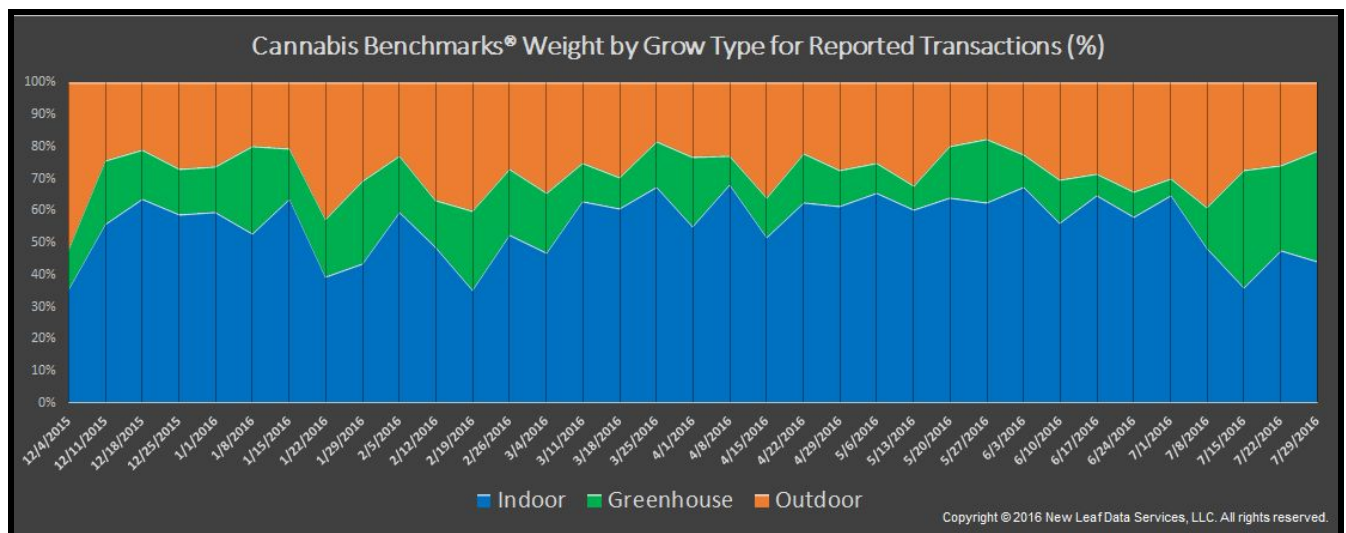


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operations is anticipated to continue increasing supplies while lowering the cost of production and wholesale prices.

**New greenhouse operations, combined with the proliferation of light-deprivation approaches on the West Coast, are disrupting established seasonal price trends of the U.S. cannabis market and mark the beginning of a fundamental shift in the cultivation landscape.** In past years, summer has typically been a season of scarce supply; indoor cultivators continue to produce, of course, but struggle with heat and humidity while awaiting the flood of outdoor and full-term greenhouse product to reach market in late fall and winter. However, over the course of the past few years, light deprivation in greenhouses has become a popular approach on the West Coast as a way to hedge against total crop loss due to pests or raids, as well as take advantage of summer's higher prices. Meanwhile, in Colorado, the state's predominantly indoor production landscape has been shifting out of warehouses and into well-equipped, sometimes quite sizeable greenhouses, which are generally also capable of light deprivation and achieving multiple harvests per year. Existing indoor operators have also expanded their facilities while implementing new methods and technology to increase their efficiency and productivity.

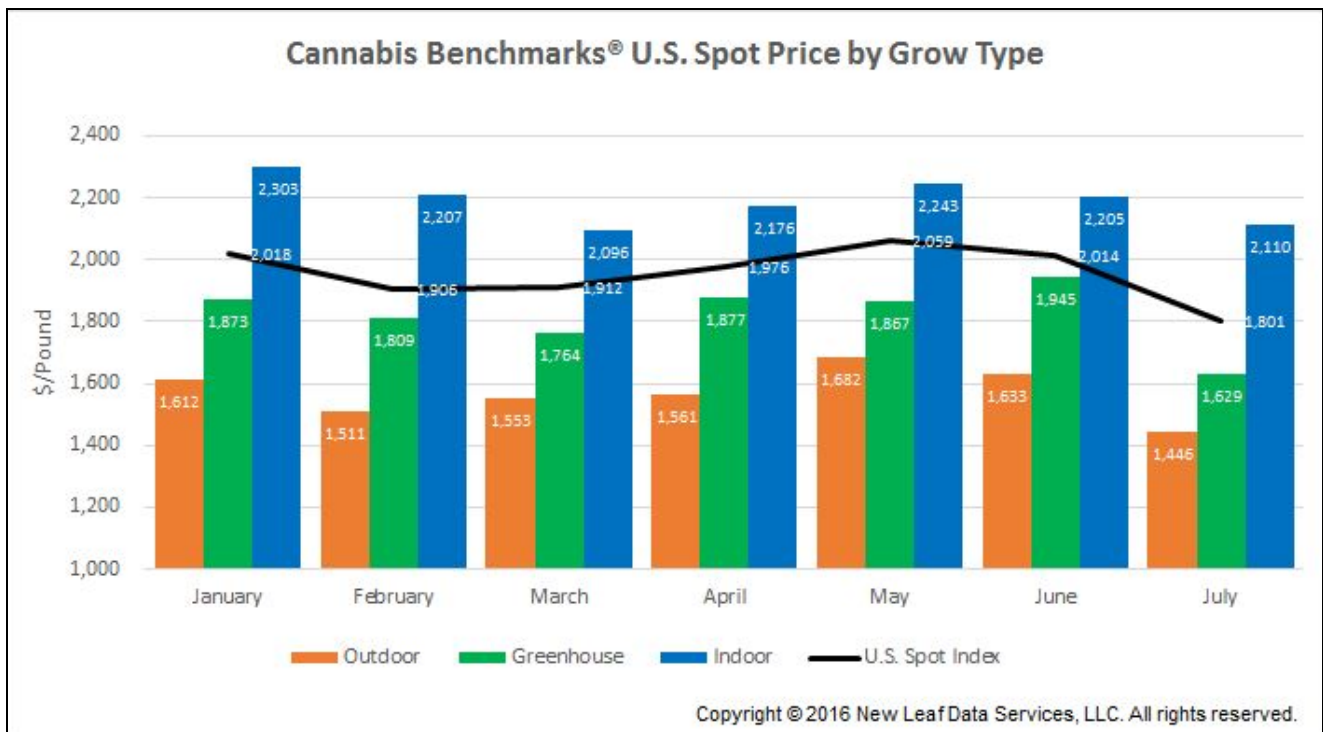


These shifts have resulted in a recent flood of supply, beginning in late June, from greenhouse producers in various states. After representing 9% of all observed sales volume in June, greenhouse grown flower expanded - nearly tripling - to 26% of market volume in the month of July. (For reference, the average greenhouse contribution for January through through June was 15%.) This phenomenon will be repeated at numerous later points this summer to varying degrees, depending on the particular schedules of growers in different regions. As noted above,

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outdoor farmers parceling out last year's harvest, and then attempting to preserve value in the face of the season's first mass greenhouse harvests, has compounded the current oversupply, driving prices down significantly in the West Coast states where outdoor production is more prevalent. Colorado's recent price drop has been driven completely by general oversupply from the state's indoor and greenhouse cultivators, but can expect to be influenced by fall harvests in the months ahead, which will be the largest in the state's short history of legal cannabis, as producers in the southern part of the state have spent the past two years establishing outdoor operations and optimizing their sites. The prospect of a Colorado market crash due to overproduction has loomed over that state's industry since the inception of the legal adult-use market and it appears this is the year that it will come to fruition in conjunction with similar price drops in the other major western states.



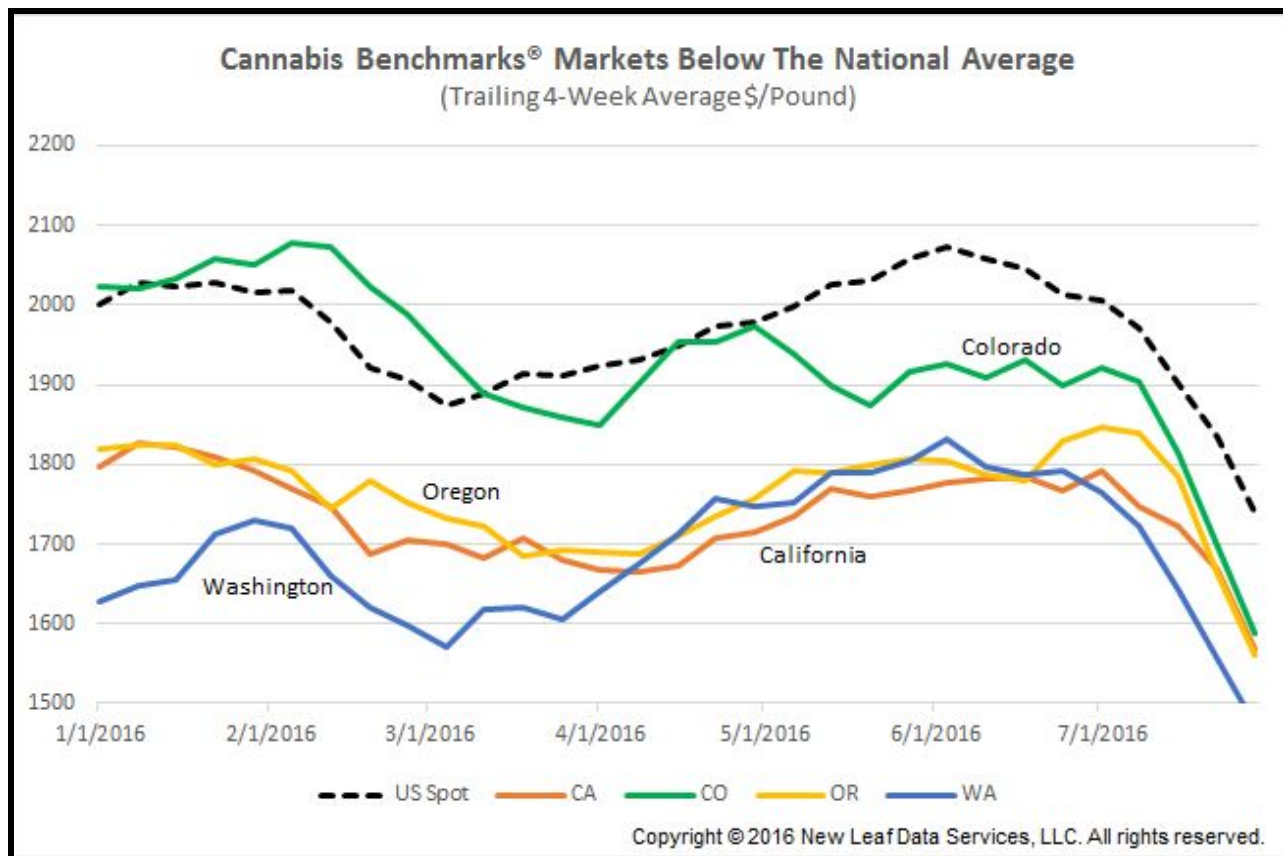
Overall, this year presages the demise of the dominance of indoor, warehouse cultivation and the move by the majority of the market to farming under natural light. Outdoor models lend themselves well to supplying extractors and processors, while “small-batch” greenhouse operations can supply connoisseur-quality flower to those who prefer it over newer products. Only the most efficient indoor producers that have established themselves securely in their state's markets will be able to continue to operate in the long run.



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2016 Mid-Year Review & Outlook -- A Publication Special

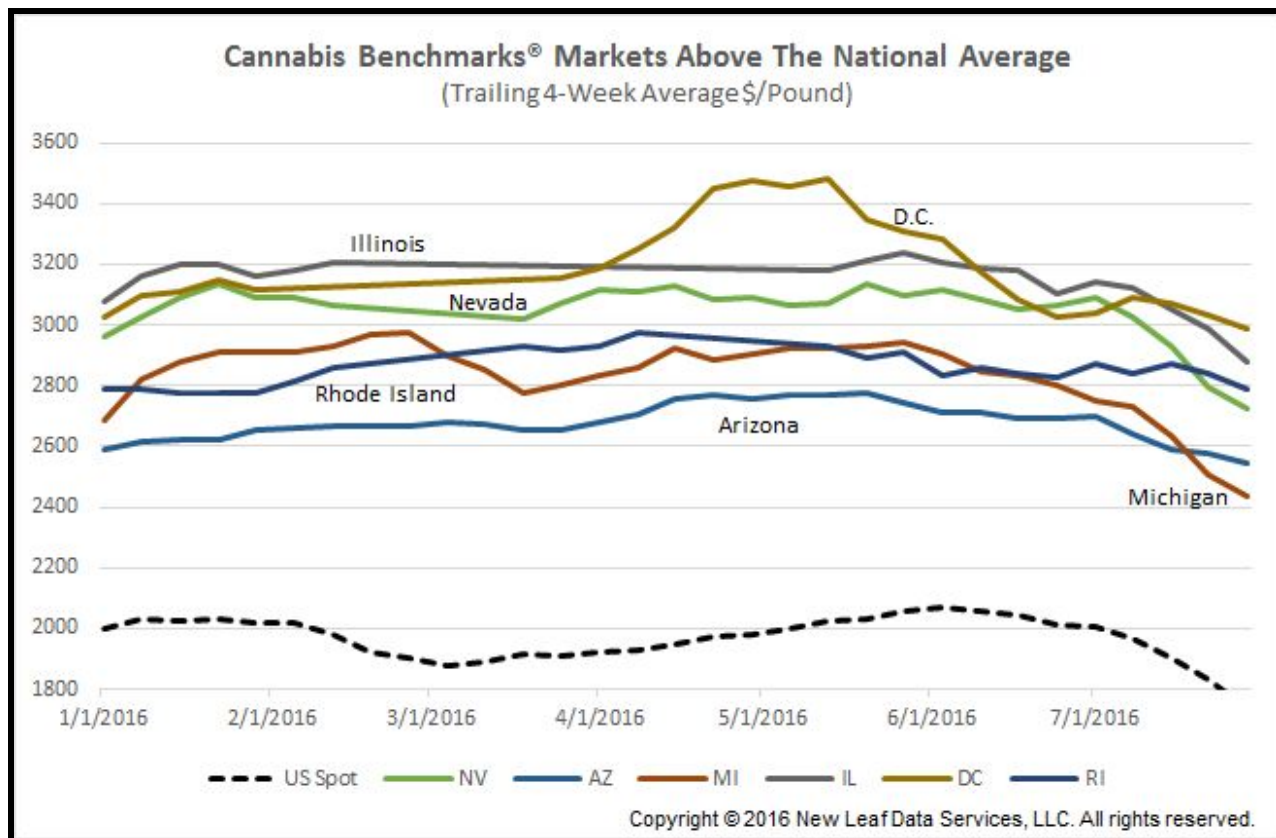
**Tighter regulation in new and existing markets can be both a burden and a blessing for cannabis business operators.** Compliance is a major cost for cannabis businesses, manifesting itself primarily in security requirements, taxes and licensing fees, as well as record keeping and reporting, among numerous other stipulations. The significant - and increasing - compliance burden on operators in legal states strains smaller businesses in particular, providing opportunities for companies with scale to consolidate markets by acquiring smaller players, or simply driving them out of business through competitive pricing that small producers and retailers cannot match. Additionally, state and local governments are limiting market size in most new markets, as well as some existing ones (most significantly in Denver), often via caps on the number of licenses issued. This shelters established operators in those locales from competition that could otherwise put pressure on their businesses. Still, as described above, a frenzy of production in the four major western states has exceeded fast-growing demand and overcome any protectionist measures enacted on a state or local level, causing prices to drop steeply in the four major western markets, along with the national average, as illustrated in the graph below.



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The fact that legal cannabis cannot cross state lines has also protected operators outside of the four major western states, which could likely supply the entire country with less expensive product if interstate transport were to be allowed, undercutting sellers in high-priced markets, particularly those that are compelled by law to grow indoors. The graph below illustrates the very different pricing relative to the national average that takes place in more tightly regulated, medical-only states. It should be noted that exceptions to that characterization include Washington, D.C. and Michigan. Cannabis is legal for adult-use in the nation's capital, but district officials have been blocked by Congress from implementing a regulated system of commercial production and sales. Such a program, albeit a limited one, is in place for medical cannabis. Michigan's high prices relative to the national average are largely a result of the lack of regulation of the state's sizeable medical program combined with arbitrary enforcement and prosecution of market participants. This situation attaches a "risk premium" to doing business in the state, not unlike conditions in areas where cannabis remains illegal.



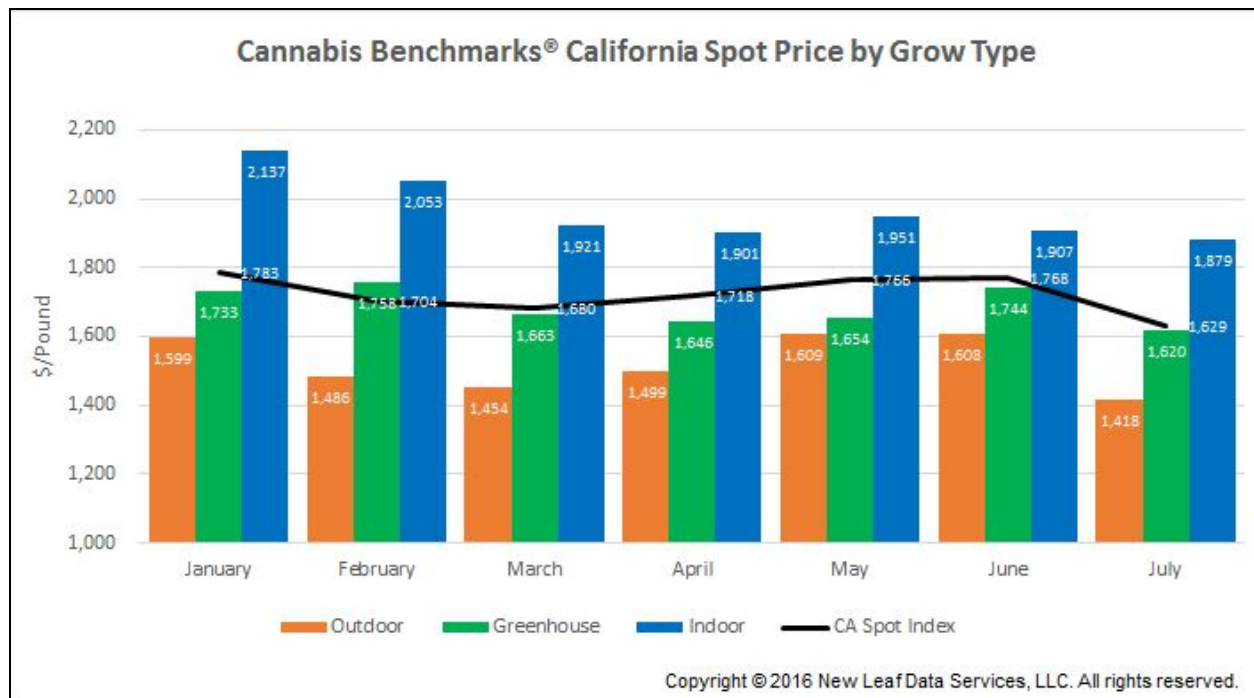
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## CALIFORNIA

### Year-to-Date Market Highlights

	Low - value	Low - date	High - value	High - date
<b>CA Spot Index</b>	\$1,480	July 29	\$1,876	January 8
<b>Outdoor Spot</b>	\$1,197	July 29	\$1,707	May 27
<b>Greenhouse Spot</b>	\$1,423	July 8	\$1,928	February 12
<b>Indoor Spot</b>	\$1,715	July 29	\$2,305	January 29
<b>Average Deal Size</b>	9 pounds	June 3	31 pounds	January 22



**As California constructs its regulatory structure, existing operators may be left out in the cold as speculators descend upon the state to establish large commercial production sites.** The development of statewide rules remains in the early stages, and the possibility that California's adult-use legalization measure will be approved prior to the medical industry being fully regulated is looming. On a municipal level, some local governments have put in place

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affirmative regulations for commercial cannabis activity, but the majority have maintained bans or have not explicitly addressed the subject. This has prompted speculators to rush to those municipalities with regulatory clarity. Certain local governments - particularly Humboldt and Mendocino Counties - have attempted to put measures in place to protect existing operators, but the longstanding undocumented nature of the state's market means that many will likely not come out into the light and therefore remain illicit or get lost in the shuffle. With the exception of the current flood of greenhouse-grown supply that will continue intermittently throughout the remainder of the summer, market dynamics will hold largely to their established patterns this year. Less risk of federal intervention means that a bountiful fall harvest should be able to make its way to market mostly unhindered by major eradication efforts, especially as cultivation activity has increased generally in recent years, driven by exploding interest in and demand for cannabis, as well as the heretofore unregulated nature of California's market.

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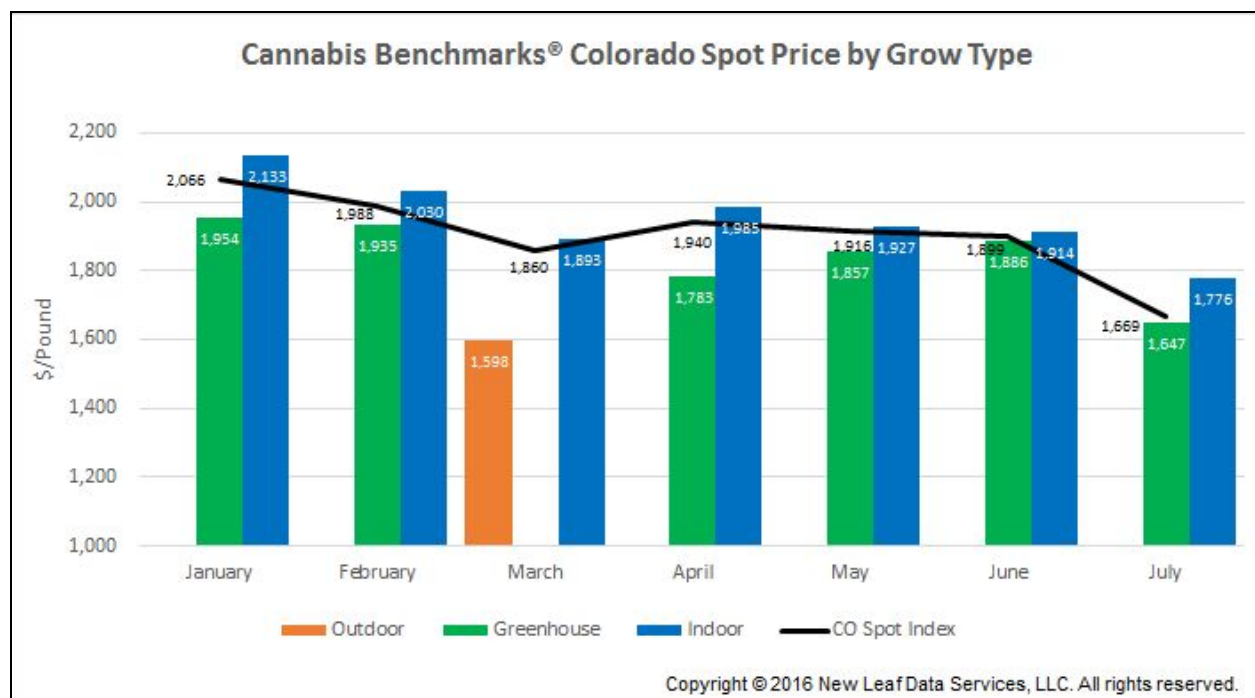
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## COLORADO

### Year-to-Date Market Highlights

	Low - value	Low - date	High - value	High - date
<b>CO Spot Index</b>	\$1,453	July 22	\$2,151	January 22
<b>Outdoor Spot</b>	\$1,512	July 22	\$2,260	January 29
<b>Greenhouse Spot</b>	\$1,363	July 15	\$2,065	January 22
<b>Indoor Spot</b>	\$1,512	July 22	\$2,260	January 29
<b>Average Deal Size</b>	3 pounds	April 1	21 pounds	February 12



**Colorado's previously indoor-dominated cultivation landscape is changing and the state's long-awaited market shake-out could come to fruition this year.** Since the inception of the adult-use market, cannabis business operators in Colorado have been wary of a crash brought on by oversupply, as the state does not possess a statewide licensing cap. The current supply glut is largely a result of greenhouse operations coming online in the southern part of the state, but will be accentuated in the fall when outdoor harvests are brought in as well. Additionally, indoor



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producers have spent the past years expanding their operations. Despite continually increasing sales in the adult-use sector, the aforementioned factors coalesced this summer to drag prices down to levels not seen since early in 2015, when new and expanded indoor operations hit their stride in serving the state's adult-use market, but prior to the beginning of the pesticide fracas. On that note, the implementation of comprehensive testing in the future could put a dent in the state's supply, but it does not appear that such regulatory shifts will take place this year. In any case, the fact that producers can still provide their own samples and the introduction of process validation as an option for growers and manufacturers will undermine any enhanced screening requirements, allowing producers to bring products to market with little risk of it being seized and destroyed by regulators.

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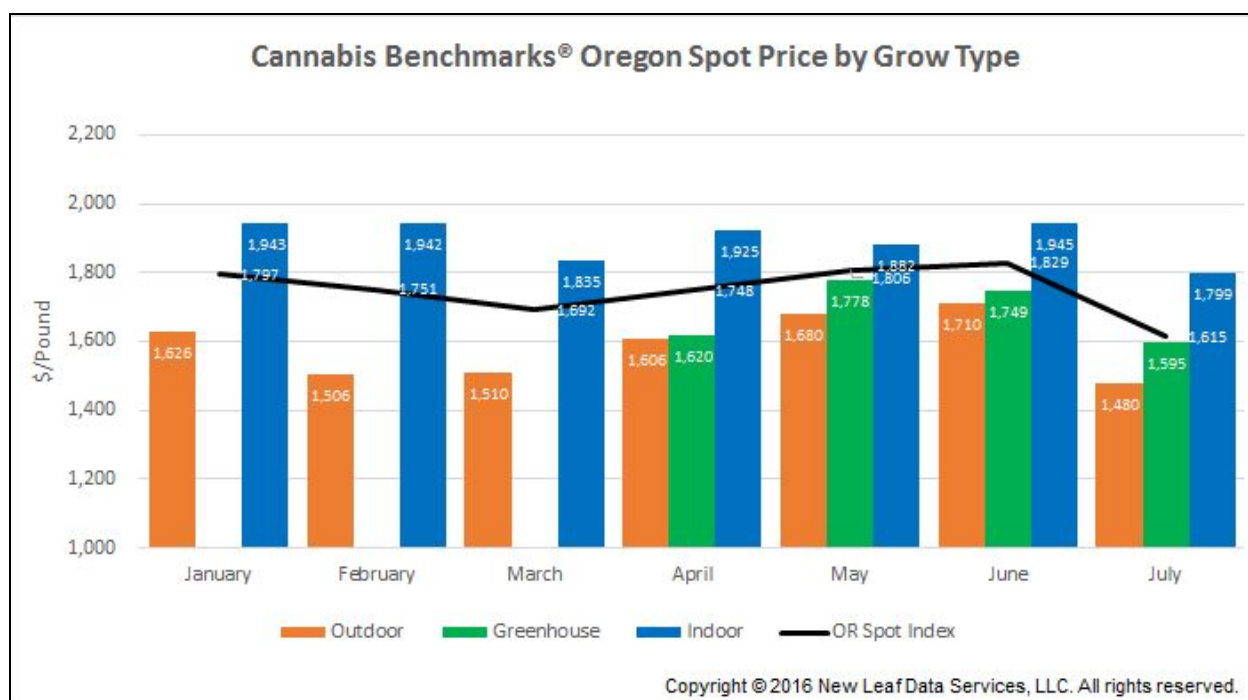
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## OREGON

### Year-to-Date Market Highlights

	Low - value	Low - date	High - value	High - date
<b>OR Spot Index</b>	\$1,426	July 29	\$2,027	June 24
<b>Outdoor Spot</b>	\$1,272	July 29	\$1,829	April 15
<b>Greenhouse Spot</b>	\$1,310	April 15	\$1,913	June 17
<b>Indoor Spot</b>	\$1,664	July 29	\$2,182	February 19
<b>Average Deal Size</b>	3 pounds	June 24	20 pounds	January 1



**Oregon's early rollout of adult-use sales has gone smoothly to this point, but numerous moving parts make initial market conditions uncertain for OLCC-licensed operators.**

Despite relatively strict purchase limits, Oregon's adult-use sales through medical dispensaries, which began in October of last year, have proceeded smoothly, with the state collecting tax revenues much larger than anticipated. All told, the state's medical dispensaries moved roughly \$60 million worth of product to general consumers in the first five months of 2016, and the pace

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of sales has accelerated with adults over 21 allowed to purchase low-dose edibles, extracts, and topical products beginning in June.

Meanwhile, the state Liquor Control Commission (OLCC), which oversees the licensed adult-use system, has made good on its intention to license outdoor producers in order to ensure that supply will be available to serve the market in the fall, when storefronts, testing labs, and other aspects of the supply chain are expected to be up and running. However, the state has to this point received only a handful of applicants for testing labs, causing concern that there will not be enough to be able to screen the product generated by hundreds of producers (132 producers have received license approval as of July 13th). In Oregon's under-construction testing regime, discussed briefly above, product is technically not to be transferred to a retail outlet without being subject to required screenings, which are to be more stringent and frequent than those in other states with adult-use legalization. A lack of certified labs could mean a supply bottleneck, as OLCC officials have stated firmly to this point that product will not be allowed to reach market until tested and confirmed clean.

While there will undoubtedly be growing pains and unexpected hurdles, Oregon's dedicated adult-use system will likely come online later this year with more than adequate supply from the state's fall harvest, while medical producers and dispensaries can continue to serve the general public through the end of the year, helping to facilitate a smooth rollout of the recreational program, if also contributing to general oversupply in the state. Additionally, Oregon's newly-relaxed laws on out-of-state investment and ownership are considered the most open in the country, which should allow its industry to grow relatively quickly in 2017 as established operators from Colorado and elsewhere seek to plant a flag in a relatively business-friendly state.

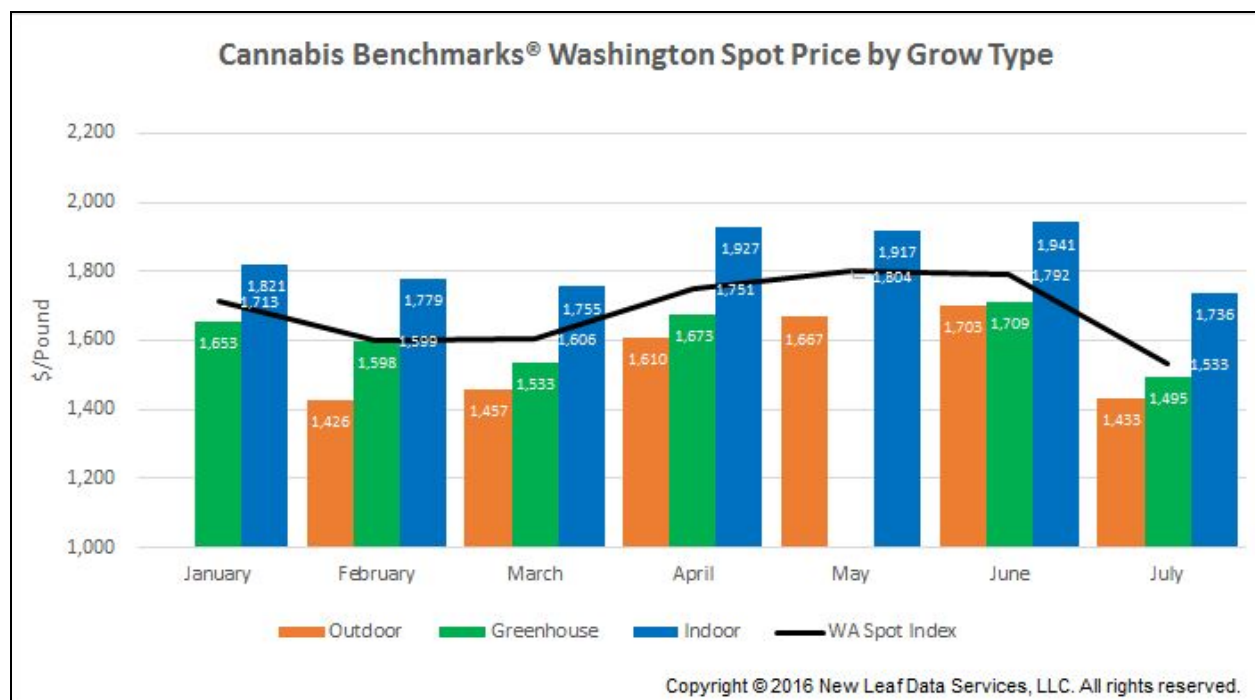
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## WASHINGTON

### Year-to-Date Market Highlights

	Low - value	Low - date	High - value	High - date
<b>WA Spot Index</b>	\$1,381	July 15	\$1,918	May 13
<b>Outdoor Spot</b>	\$1,217	July 29	\$1,764	June 24
<b>Greenhouse Spot</b>	\$1,305	July 15	\$1,867	May 6
<b>Indoor Spot</b>	\$1,625	July 22	\$2,078	May 13
<b>Average Deal Size</b>	5 pounds	April 8	43 pounds	July 15



**The outcome of Washington's merger of its adult-use and medical markets remains hazy, while the state's producers will likely see rock-bottom prices at year's end.** On July 1st, Washington's medical dispensaries - which some estimate numbered as many as 1,500 at their peak - were to shut their doors if they had not gained a license in the state's new, consolidated system. Due to the undocumented nature of Washington's medical market, it will ultimately be impossible to determine definitively how much of it will be captured by the licensed system, as

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well as how many consumers will resort to informal or illicit channels to obtain product. Still, state sales data shows that significant amounts of traffic are migrating to the licensed marketplace, as monthly sales figures have increased consistently throughout this year. We initially expected that the increased demand and shelf space available to the state's producers would help to give prices a boost in the wake of two consecutive winters in which Washington's outdoor farmers flooded the market, causing prices to crash.

However, what did not become apparent until this year was the significant amount of last year's fall harvest that was held back for sale this spring and summer, which, as in California and Oregon to lesser extents, has combined with the first light-deprivation harvests of the season and resulted in an atypical summer supply flood. With Washington's outdoor harvests likely to be even larger this year than last, the state's farmers will be forced to invent new strategies in an effort to garner profitable rates for their product, which will likely move for very low prices despite the fact that as many as 556 licensed shops will be looking to stock their shelves, compared to the less than 200 that were open at the end of 2015. As in Colorado and Oregon, the specter of more stringent required testing looms over Washington's industry, but timelines for new regulations in that regard are unclear and are not likely to affect the market this year.

### NATIONAL TRENDS TO WATCH

**Uncertainty and inaction on the federal level in regard to cannabis continues to dramatically impact the bottom line of businesses in legal states.** Some legal protections for operators of medical cannabis businesses have been affirmed and upheld, lessening significantly the explicit threat of federal prosecution, as well as forcing the U.S. Department of Justice (DOJ) to withdraw a number of longstanding cases against California dispensaries. Additionally, the possibility that the federal government could reschedule cannabis has piqued the interest of high-profile corporations from established industries, of which Microsoft is currently the most notable. However, as the first half of the year has come and gone, cannabis industry stakeholders and other interested parties are still awaiting a decision from the DEA, with no concrete information as to when one will be forthcoming. The threat of federal intervention has to this point prompted major investors and established companies from related industries to keep cannabis at arm's length, a situation that is starting to change. The entrance into the industry of established corporations with extensive resources will help cannabis businesses to increase further the efficiency of their operations.



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However, cannabis businesses continue to feel the pinch of Section 280E of the Internal Revenue Code come tax season, in addition to the high cost of - or lack of access to - banking, with little potential relief on the immediate horizon. Due to the presidential election, there is not likely to be significant movement on cannabis policy at the federal level this year, meaning that taxes, accounting, and cash-handling costs will continue to encompass a significant portion of the revenues of businesses in the industry. Many companies have struggled to maintain profitability prior to the current price drop. Now, the current and projected market landscape, combined with the financial burdens that come with dealing in a Schedule I controlled substance, could mean that smaller, inefficient, and poorly capitalized operations will go under in the coming years.

**Increased investment capital is interested in, and flowing into, the cannabis industry while states with legal markets have made regulatory changes to facilitate greater investment.**

Oregon, Colorado, Washington all changed their laws in recent months to allow outside investment - and sometimes ownership, in the case of the first two states listed - to various extents. High net worth individuals, family offices, VC & PE firms, and other investors are interested in and in some cases have invested funds in new and expanding markets, with institutional investors beginning to show interest as well. If the adult-use legalization initiatives to be voted on in November are successful, then what began in 2014 as a trickle of investment into a new and risky industry will become a full-fledged flood. This is particularly true of California, where an adult-use legalization measure is expected to pass, and where speculators have already been buying up land and preparing business plans in an attempt to capitalize on what is by far the nation's largest cannabis market.

The allowance and availability of investment capital is a significant shift for the cannabis industry, where in the early years producers had to rely largely on funding their own operations through revenues or loans from friends and family.

**Quality Assurance and safety testing standards for cannabis are moving toward becoming more stringent and unified, but the process is a gradual one that cannot be completed overnight.** Numerous investigative reports carried out by various outlets and individuals in 2015 found flaws in cannabis testing procedures that led to issues such as product contaminated with pesticide residues reaching market, infused products that did not contain their labeled cannabinoid concentrations, as well as cases in which labs appeared to provide inaccurate results for the producer's benefit. These reports called attention to gaps in the quality assurance and safety testing systems as they were currently constructed and put pressure on labs and regulators to ensure that product reaching market was contaminant-free and accurately labeled.

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We predicted at the beginning of the year that cannabis testing standards would become more unified and, at the time, we expected standardization to come from state regulatory departments. Nevada implemented a testing program in which lab employees pull samples, rather than producers themselves, which is customary in most other states with legal cannabis. Oregon last year passed measures that stipulated all labs must be certified to the same standards, as well as having lab representatives pull samples for required screenings. Colorado's medical market was to become subject to required testing for potency, microbial contaminants, and residual solvents by July 1st of this year, but the fact that labs are not yet subject to proficiency testing by the state has pushed back the implementation of testing in the medical sector of the state's industry.

As the first half of the year has expired, it has become clear that the implementation of required testing in legal cannabis markets faces a number of hurdles and, while steps are being made toward unification of standards, there is still a significant distance to travel. Though all legal states are moving toward tightening testing restrictions generally, the lack of concrete scientific research regarding the interaction of pesticides with cannabis, as well as on consumption patterns, means that regulators and scientists have little basis from which to determine what may or may not be safe or acceptable levels of various contaminants. As such, states have or are in the process of implementing conflicting standards for screenings; for example, Oregon will test for nearly 60 pesticides once its program is in place, while Colorado has identified 13 pesticidal chemicals for which it will screen. It should also be noted that licensed cannabis testing labs are private entities in all states under discussion and often employ different equipment, methods, and standards to meet broader state requirements.

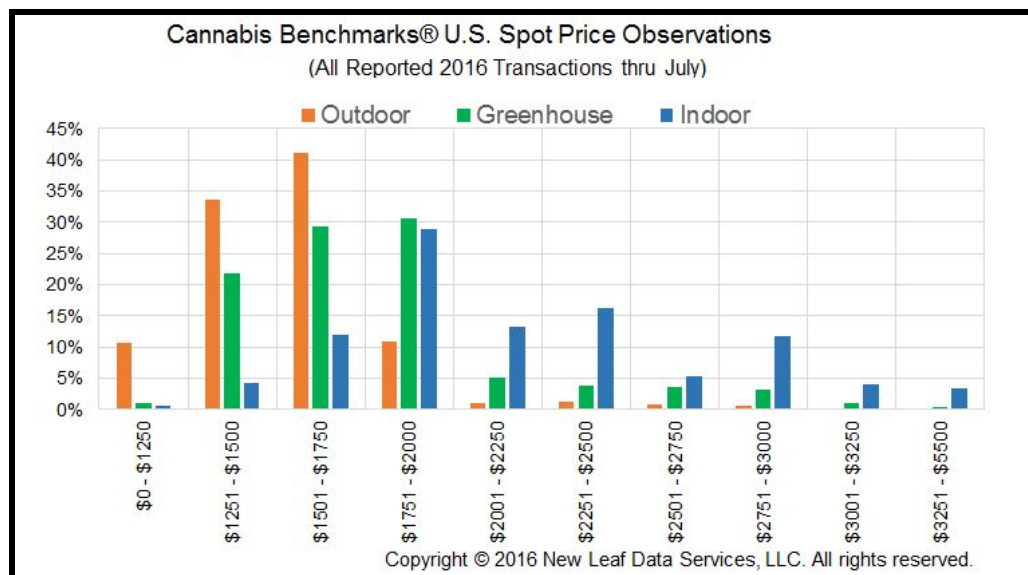
In the midst of this diversity, however, groups such as Emerald Scientific and the American Oil Chemists Society (AOCS) are facilitating interstate Inter-Laboratory Comparison and Proficiency Testing (ILC/PT) that allows labs in different states to gauge their performance against that of their peers in a controlled manner. Third-party certifications, such as those offered by Clean Green in numerous states and the Organic Cannabis Association in Colorado, are allowing cultivators to voluntarily subject themselves to inspections and screenings modeled after the U.S. Department of Agriculture's (USDA) organic certification program, which remains off-limits to cannabis and hemp growers. As the threat of federal intervention in the industry dwindles, numerous individual companies that offer laboratory accreditation, as well as equipment, supplies, and other services to labs in traditional fields are turning their attention to the cannabis industry, giving lab operators increased access to tools and services that can help them dial in their operations.

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The liberalization of out-of-state investment and ownership in cannabis businesses will allow operators to expand their businesses to multiple states, a trend that was already underway before markets were opened up officially. As such, companies holding licenses in multiple states will likely push regulators to further standardize currently dissonant rules for quality assurance and safety testing. In such a scenario, private accreditation and certification groups could hold leadership roles and embed aspects of their programs into regulations, if they can first gain enough traction with interstate operators and the market. However, for the remainder of 2016, the slow pace of testing reform will allow product to come to market in Washington and Colorado without significant risk of removal from circulation due to contamination issues, barring some ad hoc emergency enforcement measures. As noted above, Nevada's stringent testing program has sought to fill the gaps exposed by those of other states, but is dealing currently with a small-scale medical market. Oregon's testing program will be one to watch this fall and winter, as it could potentially have significant impacts on supply in the state's nascent adult-use system, a topic discussed above in more detail.

**Industrial hemp cultivation for CBD extraction is a growing trend, but regulatory adjustments are required to facilitate legal commerce and grow the market for cannabis' low-THC relative.** Farmers in states with legal hemp programs are expanding their operations rapidly. For example, in Colorado, the amount of acreage devoted to hemp cultivation increased from about 200 to roughly 2,000 between 2014 and 2015, according to an April report from the Denver Post. The report also noted one company that stated an intention to plant as many as 2,500 acres this year, indicating further rapid expansion. On the West Coast, Oregon last year modified their hemp program to accommodate producers cultivating for the purpose of extracting CBD, in addition to creating a pathway by which such products could be integrated into the state's licensed cannabis market, something that does not yet exist in Colorado or any other state with a legal cannabis program. The regulatory



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exclusion of hemp from the cannabis market in Colorado is exacerbated by the lack of sufficient infrastructure available to process the harvested plant material, a situation that is being addressed gradually by private entities looking to develop solutions for the industrial hemp sphere. If accommodations are made for the overlapping markets of hemp-derived and cannabis-derived cannabinoid products to mingle in the future, it is reasonable to expect that wholesale prices for hemp would track closely with those of greenhouse and outdoor cannabis, as the cultivation methods and approaches - and therefore costs - are comparable. However, if demand for CBD-rich plant material remains high, then sun-grown industrial hemp of certain varieties could conceivably command a higher price than the currently common high-THC flower and leaves.

On a federal level, the FDA has warned numerous hemp companies on a couple of occasions that their products and practices are on precarious legal footing. The FDA's intervention was largely due to interstate commerce in hemp products, as well as the fact that companies were making health claims and in some cases were selling mislabeled products. However, some companies continue to do brisk business manufacturing and selling hemp-derived CBD products nationally, regardless of FDA warnings. Within individual states, hemp programs continue to gain steam, with Kentucky and Colorado leading the way currently. Still, it will likely be at least another year until the proper regulatory adjustments are made to foster regulated markets for hemp-derived cannabinoid products, as well as the various other materials that can be made from the plant, which would be a boon to the nation's nascent industrial hemp industry.

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