

Average Market Rate Recommendations – July 1, 2017

Executive Summary:

The Office of Research and Analysis (ORA) recommends the following Average Market Rates (AMRs) for use by the Department of Revenue (Department) in levying the excise tax on the sale or transfer of Retail Marijuana from a Retail Marijuana Cultivation Facility¹:

	Flower Rate (\$/lb)	Trim Rate (\$/lb)	Immature Plant Rate (\$/ea)	Wet Whole Plant Rate (\$/lb)	Seed Rate (\$/ea)
Average Market Rate	\$1,298	\$426	\$4	\$227	\$3

The AMRs were calculated based on retail marijuana transactions recorded from November 1, 2016 through April 30, 2017. The methodology used to calculate the AMRs has been updated since the last rate calculations. Specifically, only extreme outliers likely to be data entry errors were removed and the median was used instead of the mean.

Transactions excluded the following four types of data: 1) transfers containing processed products (e.g., PreRolls, PreRoll Cones, Joints, and Kief); 2) Medical Marijuana transfers; 3) transfers to testing facilities; 4) transfers between businesses with the same name (affiliated businesses).

Detailed information related to the methodology and estimation techniques used to arrive at these results can be found on pages 2-10 of this document.

¹ Starting August 9, 2017, the AMR is required for transfers between affiliated businesses, whereas, the contract price is required for transfers between non-affiliated businesses (see [Senate Bill 17-192](#)).

Average Market Rate Methodology

The Department's Taxation Division determined that the excise tax upon wholesale sales of Retail Marijuana can effectively be levied upon five product categories:

1. Flower (or bud, smoke-able product);
2. Trim (remaining parts of the plant that contain some amount of THC);
3. Immature Plants (plants that can be transferred to other Licensees);
4. Wet Whole Plants (plants that are cut off just above the roots and are not trimmed, dried, or cured; the plant must be weighed within 2 hours of the plant being harvested and without any further processing);
and
5. Seeds (the seeds of the marijuana plant).

In order to estimate the AMR for each of the categories and in order to comply with the rate-setting requirements of §39-28.8-101(1), C.R.S., ORA calculated the AMRs for July 1, 2017 based on wholesale transactions from November 1, 2016 through April 30, 2017 that originated from retail marijuana cultivators and were recorded by manifest numbers in the Marijuana Enforcement Tracking Reporting Compliance (METRC). Transactions excluded the following four types of data: 1) transfers containing processed products (e.g., PreRolls, PreRoll Cones, Joints, and Kief); 2) Medical Marijuana transfers; 3) transfers to testing facilities; 4) transfers between businesses with the same name (affiliated businesses).

Pursuant to §12-43.4-104, C.R.S., October 1, 2014 marked the beginning of the retail marijuana market for businesses which did not previously hold medical marijuana licenses. At that time, the Marijuana Enforcement Division updated the METRC system and required that price data be entered and recorded for wholesale marijuana transfers. Initially, price data for entire manifests containing multiple categories was entered into METRC, and as a result, category prices were not able to be calculated. However, in February 2015, the price field was revised to allow prices with multiple categories under the same manifest number. Additionally, in March 2016, the Department made modifications on the data collection in METRC by including the receiver wholesale price and item descriptions.

For the July 1, 2016 AMRs, the Department calculated rates for two new categories, Whole Wet Plants and Seeds.

For each taxable category, prices per lb/each were calculated for each individual item of the manifest. For each category, the distribution of price frequencies was assessed to identify potential outliers or data entry errors. The following tables and graphs display the raw data of all single item transfer manifests from November 1, 2016 through April 30, 2017.

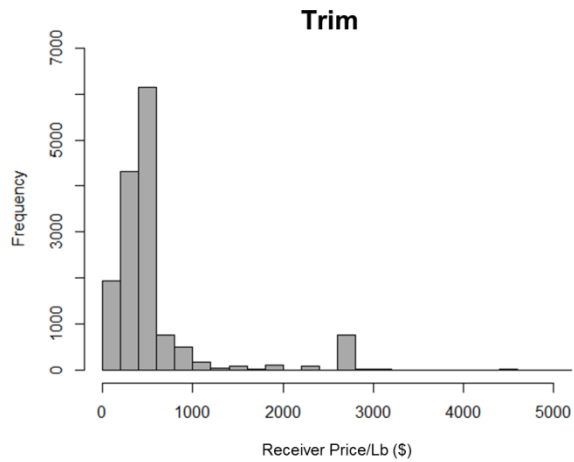
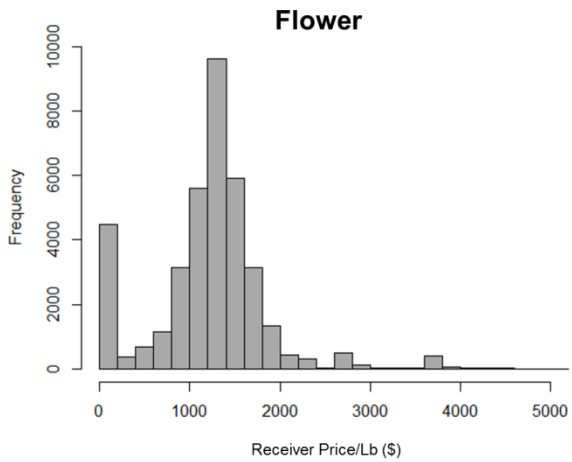
For the July 1, 2017 AMRs, to better estimate the central tendency for each of the five product categories, the median was used instead of the mean. The median was used because: 1) the median is less influenced by skewed data or outliers and 2) all product categories showed non-symmetrical or skewed data with outliers.

Raw Frequencies

Flower	
Rate (\$/lb)	Frequency
\$0 - \$200	4,474
\$201 - \$400	377
\$401 - \$600	667
\$601 - \$800	1,141
\$801 - \$1,000	3,137
\$1,001 - \$1,200	5,594
\$1,201 - \$1,400	9,612
\$1,401 - \$1,600	5,904
\$1,601 - \$1,800	3,133
\$1,801 - \$2,000	1,324
\$2,001 - \$2,200	421
\$2,201 - \$2,400	307
\$2,401 - \$2,600	20
\$2,601 - \$2,800	490
\$2,801 - \$3,000	108
\$3,001 - \$3,200	20
\$3,201 - \$3,400	11
\$3,401 - 3600	16
\$3,601 - \$3,800	403
\$3,801 - \$4,000	56
\$4,001 and over	118

Raw Frequencies

Trim	
Rate (\$/lb)	Frequency
\$0 - \$200	1,947
\$201 - \$400	4,306
\$401 - \$600	6,152
\$601 - \$800	750
\$801 - \$1,000	503
\$1,001 - \$1,200	159
\$1,201 - \$1,400	45
\$1,401 - \$1,600	87
\$1,601 - \$1,800	23
\$1,801 - \$2,000	109
\$2,001 - \$2,200	5
\$2,201 - \$2,400	88
\$2,401 - \$2,600	5
\$2,601 - \$2,800	753
\$2,801 - \$3,000	7
\$3,001 & over	64



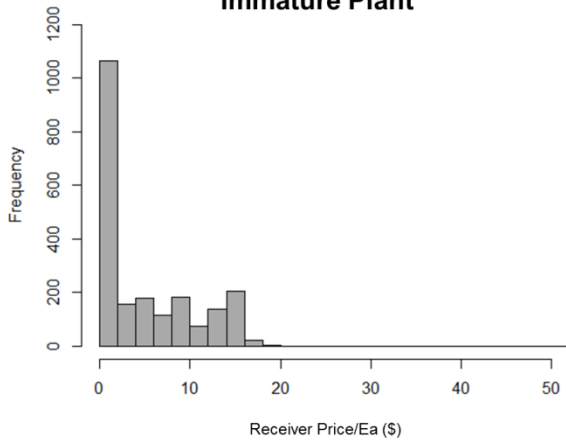
Raw Frequencies

Immature Plant	
Rate (\$/lb)	Frequency
\$0 - \$2.00	1,066
\$2.01 - \$4.00	155
\$4.01 - \$6.00	179
\$6.01 - \$8.00	116
\$8.01 - \$10.00	182
\$10.01 - \$12.00	73
\$12.01 - \$14.00	137
\$14.01 - \$16.00	206
\$16.01 - \$18.00	21
\$18.01 & over	5

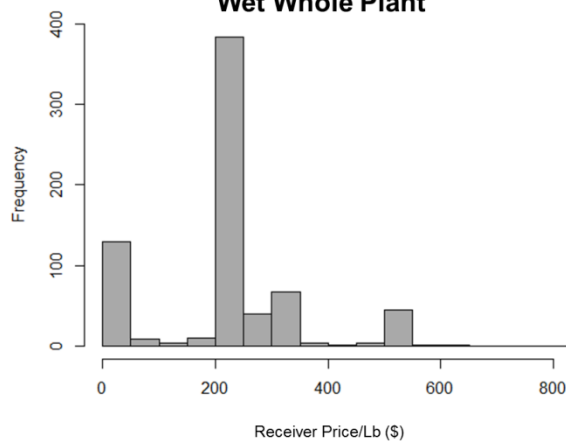
Raw Frequencies

Wet Whole Plant	
Rate (\$/lb)	Frequency
\$0 - 50	129
\$51 - \$100	8
\$101 - \$150	4
\$151 - \$200	10
\$201 - \$250	384
\$251 - \$300	39
\$301 - \$350	67
\$351 & over	60

Immature Plant

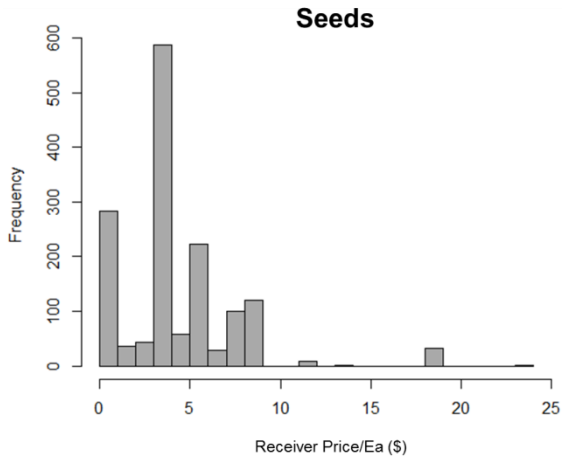


Wet Whole Plant



Raw Frequencies

Seeds	
Rate (\$/ea)	Frequency
\$0 - \$1.00	284
\$1.01 - \$2.00	37
\$2.01 - \$3.00	43
\$3.01 - \$4.00	587
\$4.01 - \$5.00	59
\$5.01 - \$6.00	222
\$6.01 - \$7.00	29
\$7.01 - \$8.00	100
\$8.01 - \$9.00	120
\$9.01 & over	44



Summary statistics (the minimum, maximum, median, mean, mode, median absolute deviation, standard deviation, skewness, and kurtosis) related to the distribution of prices in each category are shown in the tables below. The median absolute deviation is a robust measure of how spread out the values are, relative to the median. Skewness is a measure of the asymmetry of a distribution. A symmetric distribution has skewness = 0. Kurtosis is a measure of the size and shape of the distribution's tails. A normal distribution has kurtosis = 3.

Summary Statistics (Raw Data)

Descriptive Statistics					
	Flower Rate (\$/lb)	Trim Rate (\$/lb)	Immature Plant Rate (\$/ea)	Wet Whole Plant Rate (\$/lb)	Seed Rate (\$/ea)
Min	\$0	\$0	\$0	\$0	\$0
Max	\$2,004,725	\$181,437	\$186	\$1,661	\$24
Median	\$1,254	\$423	\$3	\$227	\$3
Mean	\$1,390	\$602	\$5	\$222	\$4
Mode	\$1,305	\$2,722	\$15	\$250	\$3
Median Absolute Deviation	\$367	\$133	\$4	\$27	\$3
Standard Deviation	\$15,651	\$1,918	\$7	\$154	\$3
Distribution Statistics					
Skewness	99	67	9	2	2
Kurtosis	10,568	5,698	238	19	9

We identified some extreme outliers in each product category that were likely errors.

It is ORA's recommendation that the Department should levy the excise tax using the median for each category after removing the following outliers:

- **For all product categories:** Receiver Wholesale Prices \leq \$.01

Additionally, the following outliers were removed for these four categories:

- **Flower:** Receiver Price/lb \geq \$1 million
- **Trim:** Receiver Price/lb \geq \$100,000
- **Immature Plant:** Receiver Price/ea \geq \$150
- **Wet Whole Plant:** Receiver Price/lb \geq \$1,000

The frequency tables, histograms, and summary statistics for the data excluding outliers are shown on the next pages.

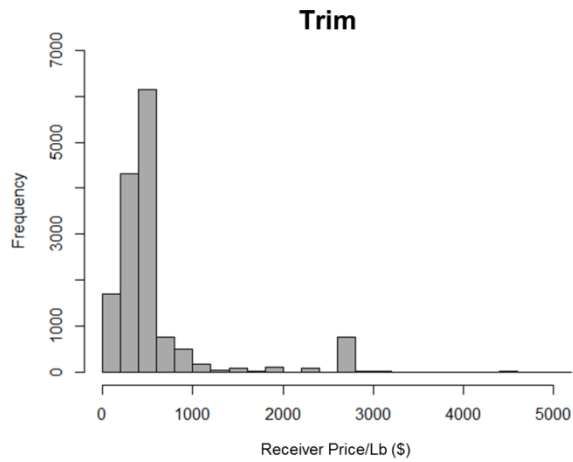
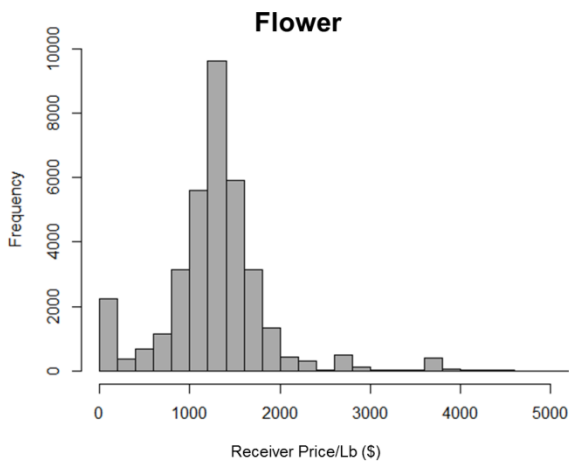
ORA recommends using the median of the data excluding outliers for each category for the July 1, 2017 AMRs.

**Excluding Outliers
Frequencies**

Flower	
Rate (\$/lb)	Frequency
\$0 - \$200	2,227
\$201 - \$400	377
\$401 - \$600	667
\$601 - \$800	1,141
\$801 - \$1,000	3,137
\$1,001 - \$1,200	5,594
\$1,201 - \$1,400	9,612
\$1,401 - \$1,600	5,904
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\$2,201 - \$2,400	307
\$2,401 - \$2,600	20
\$2,601 - \$2,800	490
\$2,801 - \$3,000	108
\$3,001 - \$3,200	20
\$3,201 - \$3,400	11
\$3,401 - 3600	16
\$3,601 - \$3,800	403
\$3,801 - \$4,000	56
\$4,001 and over	114

**Excluding Outliers
Frequencies**

Trim	
Rate (\$/lb)	Frequency
\$0 - \$200	1,700
\$201 - \$400	4,306
\$401 - \$600	6,152
\$601 - \$800	750
\$801 - \$1,000	503
\$1,001 - \$1,200	159
\$1,201 - \$1,400	45
\$1,401 - \$1,600	87
\$1,601 - \$1,800	23
\$1,801 - \$2,000	109
\$2,001 - \$2,200	5
\$2,201 - \$2,400	88
\$2,401 - \$2,600	5
\$2,601 - \$2,800	753
\$2,801 - \$3,000	7
\$3,001 & over	63

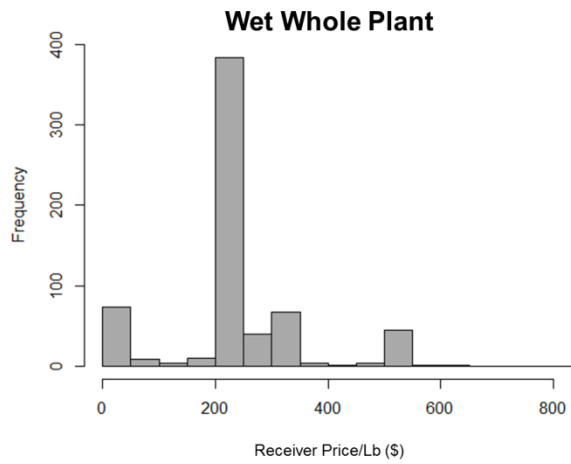
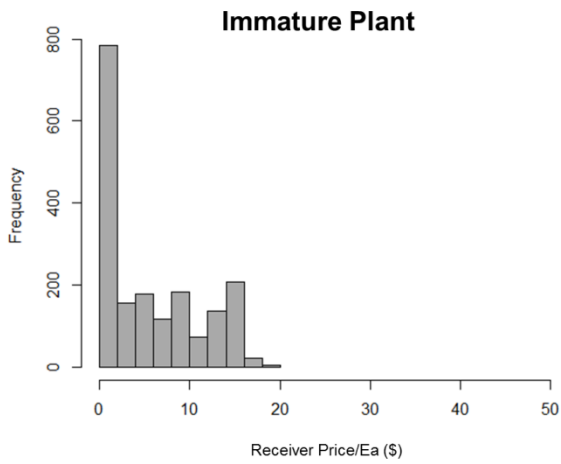


**Excluding Outliers
Frequencies**

Immature Plant	
Rate (\$/lb)	Frequency
\$0 - \$2.00	784
\$2.01 - \$4.00	155
\$4.01 - \$6.00	179
\$6.01 - \$8.00	116
\$8.01 - \$10.00	182
\$10.01 - \$12.00	73
\$12.01 - \$14.00	137
\$14.01 - \$16.00	206
\$16.01 - \$18.00	21
\$18.01 - \$20.00	4

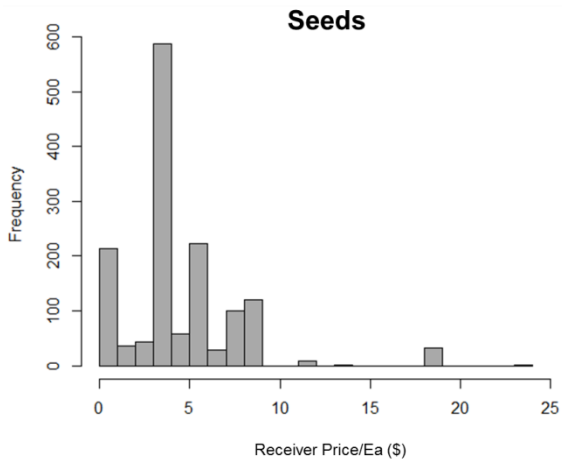
**Excluding Outliers
Frequencies**

Wet Whole Plant	
Rate (\$/lb)	Frequency
\$0 - 50	73
\$51 - \$100	8
\$101 - \$150	4
\$151 - \$200	10
\$201 - \$250	384
\$251 - \$300	39
\$301 - \$350	67
\$351 & over	56



**Excluding Outliers
Frequencies**

Seeds	
Rate (\$/ea)	Frequency
\$0 - \$1.00	213
\$1.01 - \$2.00	37
\$2.01 - \$3.00	43
\$3.01 - \$4.00	587
\$4.01 - \$5.00	59
\$5.01 - \$6.00	222
\$6.01 - \$7.00	29
\$7.01 - \$8.00	100
\$8.01 - \$9.00	120
\$9.01 & over	44



Summary Statistics (Excluding Outliers)

Descriptive Statistics					
	Flower Rate (\$/lb)	Trim Rate (\$/lb)	Immature Plant Rate (\$/ea)	Wet Whole Plant Rate (\$/lb)	Seed Rate (\$/ea)
Min	\$0	\$0	\$0	\$0	\$0
Max	\$498,951	\$90,718	\$20	\$907	\$24
Median	\$1,298	\$426	\$4	\$227	\$3
Mean	\$1,316	\$600	\$6	\$235	\$5
Mode	\$1,305	\$2,722	\$15	\$250	\$3
Median Absolute Deviation	\$310	\$129	\$6	\$5	\$3
Standard Deviation	\$3,770	\$1,232	\$6	\$120	\$3
Distribution Statistics					
Skewness	117	42	1	0	2
Kurtosis	14,624	2,577	2	6	9