



# 2021 California Almond Objective Measurement Report



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## 2021 CALIFORNIA ALMOND FORECAST DOWN 10 PERCENT

California's 2021 almond production is forecast at 2.80 billion meat pounds, down 13% from May's subjective forecast and 10% lower than last year's record crop of 3.12 billion meat pounds. The forecast is based on 1.33 million bearing acres. Production for the Nonpareil variety is forecast at 1.10 billion meat pounds, 15% percent below last year's deliveries of 1.30 billion meat pounds. The Nonpareil variety represents 39% of California's total almond production.

The 2021 almond crop started off with very dry weather in February, providing excellent bloom conditions and plenty of opportunity for pollination. A lack of rainfall continued through the spring and brought about concern for water availability. Due to low water allocations and record high temperatures in June, the crop did not develop as well as expected. Some growers have decided to save their trees by stripping nuts before harvest. Disease and pest pressure were reported to be low.

The average nut set per tree is 4,619, a decrease of 18% compared to 2020. The Nonpareil average nut set of 4,512 is 20% lower than last year. The average kernel weight for all varieties sampled was 1.46 grams, down 3% percent from the 2020 average weight. The Nonpareil average kernel weight was 1.51, down 6% from last year. A total of 99.3% of all nuts sized were sound.

## SAMPLING PROCEDURES

To determine tree set, nuts are counted along a path within a randomly selected tree. Work begins at the trunk and progresses to the end of the terminal branch. Using a random number table, one branch is selected at each forking to continue the path. A branch's probability of selection is directly proportional to its cross-sectional area.

This methodology is used because of its statistical efficiency. The method also makes it possible to end up at any one of the tree's numerous terminal branches.

Since the selected path has a probability of selection associated with it, this probability is used to expand nut counts and arrive at an estimated set for the entire tree.

Along intermediate stages (i.e., the bearing surface between forkings), every fifth nut is picked. All nuts on the terminal branch are picked. These nuts are used to determine size and weight measurements.

## FIELD SAMPLING ACTIVITIES

The survey began May 26 and sampling was completed by June 30. There were 1,828 trees sampled for the 2021 survey in 914 orchards. Additional orchards were not sampled for one of the following reasons:

- 1) Orchard had been sprayed.
- 2) Orchard had been recently irrigated and was wet.
- 3) Orchard had been pulled.
- 4) Grower would not grant permission or could not be contacted.

The Objective Measurement Survey is funded by the Almond Board of California.

## DATA RELIABILITY

The 80 percent confidence interval is from 2,530 million meat pounds to 3,070 million meat pounds. This means that the results of our sampling procedures will encompass the true mean 80 percent of the time.

**TABLE 1: OBJECTIVE MEASUREMENT SURVEY COUNTS; COMPARISON OF NUT ESTIMATES AND ORCHARDS SAMPLED  
BY REGION AND VARIETY, 2017-2021**

District and Variety	2017		2018		2019		2020		2021	
	Nuts per tree	Orchards sampled	Nuts per tree	Orchards sampled	Nuts per tree	Orchards sampled	Nuts per tree	Orchards sampled	Nuts per tree	Orchards sampled
<b>ALL REGIONS</b> (All Varieties)	5,714	852	5,677	853	4,667	817	5,645	909	4,619	914
<b>BY REGION</b> <sup>1</sup>										
North	5,583	118	5,015	117	4,401	103	7,369	115	3,906	113
Central	5,704	293	6,181	302	4,739	297	6,549	312	5,456	325
South	5,756	441	5,506	434	4,682	417	4,648	482	4,216	476
<b>BY VARIETIES</b>										
Butte	6,574	97	5,989	91	5,261	78	5,923	81	4,793	81
Carmel	5,456	95	6,353	91	4,865	83	5,797	51	5,469	37
Independence	4,032	12	4,762	38	3,718	41	3,948	80	4,389	92
Monterey	4,655	137	5,362	138	4,426	145	4,719	166	4,324	166
Nonpareil	5,717	343	4,924	333	4,429	324	5,621	358	4,512	368
Padre	7,168	65	6,732	63	4,928	56	8,137	54	5,214	51
Other <sup>2</sup>	5,818	103	7,423	99	5,488	90	6,761	119	4,899	119

<sup>1</sup> North includes Butte, Colusa, Glenn, Solano, Sutter, Tehama, Yolo, and Yuba counties.

Central includes Merced, San Joaquin, and Stanislaus counties.

South includes Fresno, Kern, Kings, Madera, and Tulare counties.

<sup>2</sup> For 2021, Other includes Aldrich, Bennett, Fritz, Mission, Price Cluster, Shasta, Sonora, Supareil, Winters, and Wood Colony.

**TABLE 2: WEIGHT, SIZE AND GRADE OF AVERAGE ALMOND SAMPLE, 2017-2021**

District and variety	Year	Kernel weight (grams)	Kernel size (millimeters)			Grade (percent of nuts) <sup>1 2</sup>						
			Length	Width	Thickness	Edible nuts		Insect damage	Shrivel	Natural gum	Blank	Other
						Singles	Doubles					
<b>ALL REGIONS</b> (All Varieties)	2017	1.57	22.50	12.83	10.40	92.2	6.2	--	1.5	0.1	--	--
	2018	1.54	21.32	12.79	10.37	90.9	7.9	--	1.0	--	--	0.1
	2019	1.54	22.89	12.86	9.93	92.7	6.0	--	1.2	--	--	--
	2020	1.51	21.79	12.60	10.12	95.5	3.0	--	1.2	0.1	--	0.2
	<b>2021</b>	<b>1.46</b>	<b>22.33</b>	<b>12.73</b>	<b>9.68</b>	<b>94.6</b>	<b>4.7</b>	--	<b>0.7</b>	--	--	--
<b>BY REGION <sup>3</sup></b>												
<b>North</b>	2017	1.69	23.85	13.59	10.46	88.3	9.1	--	2.3	0.3	--	--
	2018	1.61	20.91	13.26	10.45	91.6	7.4	--	0.8	--	--	0.2
	2019	1.56	23.44	13.42	9.70	89.8	8.8	--	1.4	--	--	--
	2020	1.51	21.62	12.88	9.92	94.5	4.0	--	1.1	--	--	0.3
	<b>2021</b>	<b>1.40</b>	<b>22.03</b>	<b>13.17</b>	<b>9.09</b>	<b>96.2</b>	<b>2.9</b>	--	<b>0.7</b>	--	--	<b>0.2</b>
<b>Central</b>	2017	1.61	22.75	12.72	10.53	91.6	7.4	--	0.9	0.1	--	--
	2018	1.62	21.96	12.87	10.65	89.2	10.3	--	0.5	--	--	--
	2019	1.64	22.54	12.87	10.08	92.1	6.7	--	1.0	0.1	--	--
	2020	1.52	21.74	12.47	10.16	96.2	2.8	--	0.8	0.2	--	--
	<b>2021</b>	<b>1.51</b>	<b>22.64</b>	<b>12.76</b>	<b>9.86</b>	<b>95.3</b>	<b>4.2</b>	--	<b>0.4</b>	--	--	--
<b>South</b>	2017	1.51	21.98	12.71	10.30	93.5	4.5	--	1.7	0.1	--	--
	2018	1.46	20.93	12.62	10.14	92.1	6.2	--	1.5	--	--	0.1
	2019	1.46	22.29	12.72	9.88	93.8	4.9	--	1.2	--	--	--
	2020	1.50	21.90	12.61	10.15	95.1	2.8	--	1.6	0.1	--	0.3
	<b>2021</b>	<b>1.42</b>	<b>22.14</b>	<b>12.62</b>	<b>9.66</b>	<b>93.5</b>	<b>5.5</b>	--	<b>0.9</b>	--	--	--
<b>BY VARIETY</b>												
<b>Butte</b>	2017	1.25	19.14	11.89	10.43	89.3	9.6	--	0.9	0.2	--	--
	2018	1.19	17.97	11.97	10.09	92.9	6.0	--	0.9	--	--	0.2
	2019	1.18	19.46	11.89	9.64	92.9	6.0	--	1.1	--	--	--
	2020	1.22	18.37	11.84	10.00	94.6	4.2	--	1.1	0.1	--	--
	<b>2021</b>	<b>1.20</b>	<b>19.11</b>	<b>11.92</b>	<b>9.84</b>	<b>90.9</b>	<b>8.1</b>	--	<b>0.9</b>	<b>0.1</b>	--	--
<b>Carmel</b>	2017	1.60	23.72	12.31	10.38	89.7	9.2	--	1.0	0.1	--	--
	2018	1.61	22.43	12.52	10.57	87.0	12.6	--	0.4	--	--	--
	2019	1.60	23.99	12.43	10.02	89.8	9.0	--	1.1	--	--	--
	2020	1.51	22.61	12.05	9.99	94.7	4.2	--	0.8	0.3	--	--
	<b>2021</b>	<b>1.41</b>	<b>22.29</b>	<b>11.89</b>	<b>9.71</b>	<b>94.8</b>	<b>4.6</b>	--	<b>0.6</b>	--	--	--
<b>Independence</b>	2017	1.92	25.00	13.92	10.74	92.1	4.7	--	3.2	--	--	--
	2018	1.86	23.50	14.16	10.84	92.1	6.0	--	1.7	0.2	--	--
	2019	1.88	25.38	14.43	10.30	94.2	3.7	--	1.7	--	--	0.3
	2020	1.85	24.95	14.11	10.38	96.6	1.1	--	1.1	1.0	--	0.1
	<b>2021</b>	<b>1.71</b>	<b>24.39</b>	<b>13.68</b>	<b>9.86</b>	<b>97.3</b>	<b>1.8</b>	--	<b>0.7</b>	<b>0.1</b>	--	--
<b>Monterey</b>	2017	1.83	25.20	13.06	10.64	85.4	12.8	--	1.3	0.5	--	--
	2018	1.76	23.42	12.93	10.74	83.0	16.2	--	0.8	--	--	--
	2019	1.69	24.77	12.84	10.15	86.3	12.7	--	0.8	--	--	--
	2020	1.67	24.23	12.52	10.23	91.8	6.3	--	1.2	0.2	--	0.5
	<b>2021</b>	<b>1.58</b>	<b>24.44</b>	<b>12.61</b>	<b>9.76</b>	<b>90.2</b>	<b>9.2</b>	--	<b>0.5</b>	<b>0.1</b>	--	--
<b>Nonpareil</b>	2017	1.70	23.50	13.60	10.32	95.1	3.0	--	1.8	0.1	--	--
	2018	1.70	22.36	13.66	10.37	94.0	4.8	--	1.2	--	--	--
	2019	1.63	23.46	13.48	9.85	95.4	3.2	--	1.4	--	--	--
	2020	1.60	22.29	13.26	10.14	96.4	1.9	--	1.5	--	--	0.2
	<b>2021</b>	<b>1.51</b>	<b>22.69</b>	<b>13.29</b>	<b>9.58</b>	<b>96.6</b>	<b>2.8</b>	--	<b>0.7</b>	--	--	--
<b>Padre</b>	2017	1.26	19.13	11.85	10.51	94.0	4.2	--	1.7	--	--	--
	2018	1.15	17.54	11.72	10.16	94.0	4.4	--	1.2	--	--	0.4
	2019	1.23	19.42	11.97	9.85	97.2	2.0	--	0.6	0.1	--	--
	2020	1.25	18.41	11.66	10.17	97.6	1.1	--	1.2	--	--	--
	<b>2021</b>	<b>1.15</b>	<b>18.51</b>	<b>11.47</b>	<b>9.56</b>	<b>94.3</b>	<b>4.4</b>	--	<b>1.3</b>	--	--	--
<b>Other <sup>4</sup></b>	2017	1.45	21.66	10.50	10.26	93.6	4.7	--	1.6	0.1	--	--
	2018	1.44	20.86	12.38	10.20	91.0	7.3	--	1.5	0.1	--	0.1
	2019	1.45	22.22	12.44	10.00	91.6	6.9	--	1.4	--	--	--
	2020	1.35	20.46	11.90	10.16	94.0	4.6	--	1.0	--	--	0.3
	<b>2021</b>	<b>1.37</b>	<b>21.79</b>	<b>12.41</b>	<b>9.75</b>	<b>94.5</b>	<b>4.9</b>	--	<b>0.5</b>	--	--	<b>0.1</b>

<sup>1</sup> Percentages may not add to 100 due to rounding.

<sup>2</sup> Not shown if less than 0.07 percent.

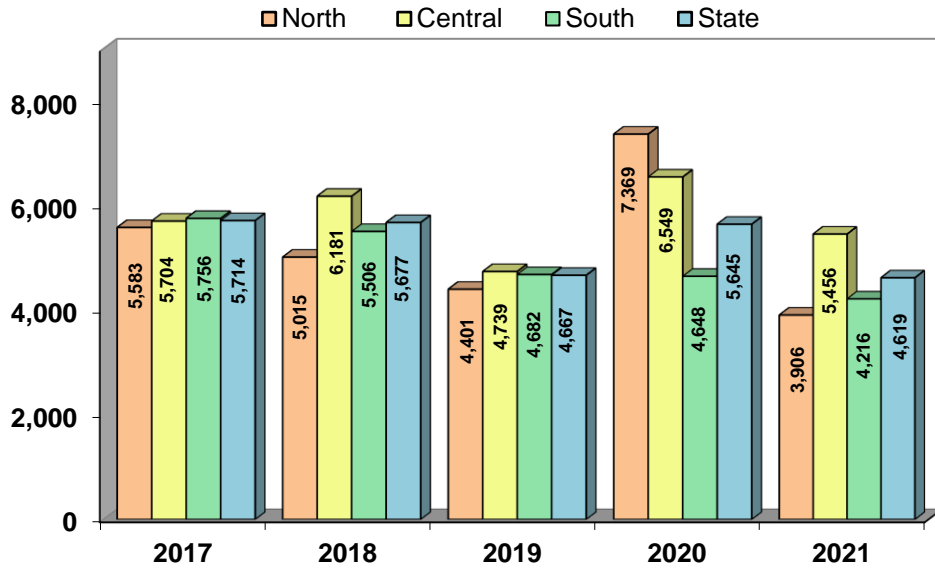
<sup>3</sup> North includes Butte, Colusa, Glenn, Solano, Sutter, Tehama, Yolo, and Yuba counties.

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South includes Fresno, Kern, Kings, Madera, and Tulare counties.

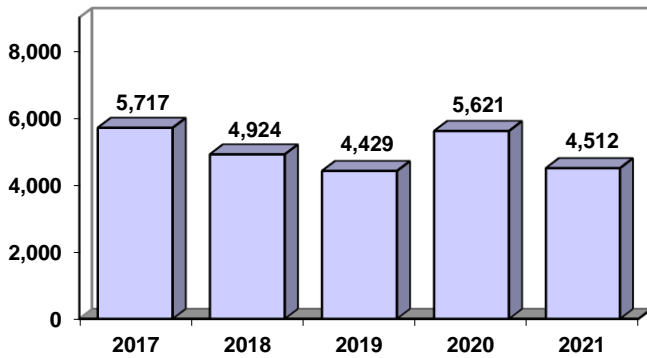
<sup>4</sup> For 2021, Other includes Aldrich, Bennett, Fritz, Mission, Price Cluster, Shasta, Sonora, Supareil, Winters, and Wood Colony.

## ALMONDS Nuts per Tree, by Region

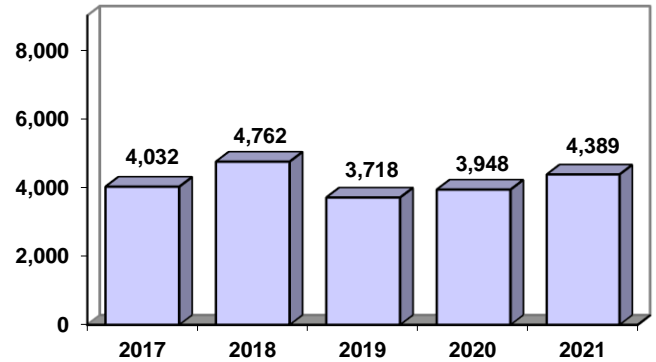


## ALMONDS BY VARIETY

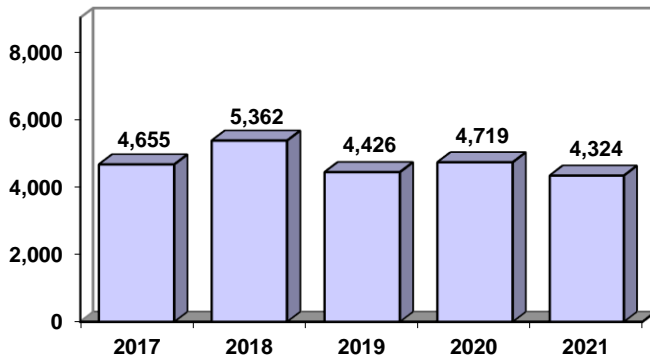
**NONPAREIL TYPE**  
Nuts per Tree



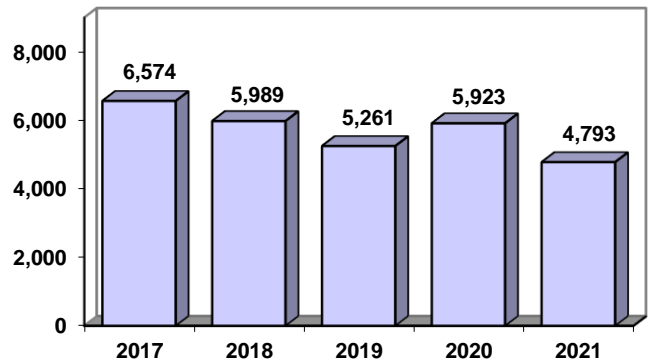
**INDEPENDENCE TYPE**  
Nuts per Tree



**MONTEREY TYPE**  
Nuts per Tree



**BUTTE TYPE**  
Nuts per Tree

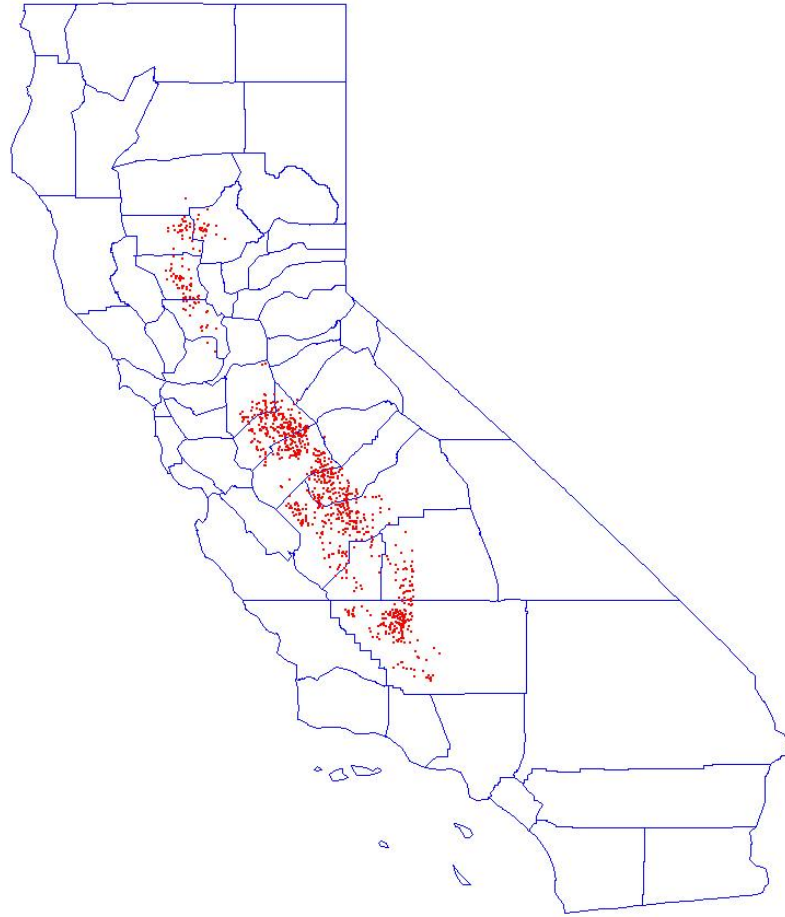


**TABLE 3: CALIFORNIA ALMOND ACREAGE, PRODUCTION AND TREES PER ACRE, 1991-2021**

Year	Bearing acres <sup>1</sup>	Trees per acre	Total Meat Production			Price per lb.	Value of production
			Metric Tons <sup>2</sup>	Million lbs.	Lbs. per acre	dollars	1,000 dollars
1991	405,000	89.6	222,000	490	1,210	1.19	564,179
1992	401,000	90.5	249,000	548	1,370	1.30	691,340
1993	413,000	92.0	222,000	490	1,190	1.94	930,618
1994	433,000	92.6	333,000	735	1,700	1.34	965,202
1995	418,000	93.7	168,000	370	885	2.48	880,896
1996	428,000	94.4	231,000	510	1,190	2.08	1,018,368
1997	442,000	95.5	344,000	759	1,720	1.56	1,160,640
1998	460,000	96.3	236,000	520	1,130	1.41	703,590
1999	485,000	97.3	378,000	833	1,720	0.86	687,742
2000	510,000	99.0	319,000	703	1,380	0.97	666,487
2001	530,000	101.0	376,000	830	1,570	0.91	740,012
2002	545,000	101.0	494,000	1,090	2,000	1.11	1,200,687
2003	550,000	103.0	472,000	1,040	1,890	1.57	1,600,144
2004	570,000	103.0	456,000	1,005	1,760	2.21	2,189,005
2005	590,000	104.0	415,000	915	1,550	2.81	2,525,909
2006	610,000	105.0	508,000	1,120	1,840	2.06	2,258,790
2007	640,000	105.0	630,000	1,390	2,170	1.75	2,401,875
2008	710,000	107.0	739,000	1,630	2,300	1.45	2,343,200
2009	750,000	108.0	640,000	1,410	1,880	1.65	2,293,500
2010	770,000	108.0	744,000	1,640	2,130	1.79	2,903,380
2011	800,000	111.0	921,000	2,030	2,540	1.99	4,007,860
2012	820,000	112.0	857,000	1,890	2,300	2.58	4,816,860
2013	880,000	112.0	912,000	2,010	2,280	3.21	6,384,690
2014	930,000	114.0	848,000	1,870	2,010	4.00	7,388,000
2015	950,000	114.0	862,000	1,900	2,000	3.13	5,868,750
2016	970,000	116.0	971,000	2,140	2,210	2.39	5,052,460
2017	1,030,000	117.0	1,030,000	2,270	2,200	2.53	5,603,950
2018	1,090,000	119.0	1,034,000	2,280	2,090	2.50	5,602,500
2019	1,180,000	122.0	1,161,000	2,560	2,170	2.45	6,169,100
2020	1,250,000	122.0	1,413,000	3,115	2,490	1.83	5,619,930
2021 <sup>3,4</sup>	1,330,000	122.0	1,270,000	2,800	2,110	—	—

<sup>1</sup> Bearing acreage is defined as plantings four years and older.<sup>2</sup> Rounded to nearest thousand, metric ton = 2,204.62 pounds.<sup>3</sup> Price and value will be available in the annual Noncitrus Fruits & Nuts publication, released in May 2022.<sup>4</sup> Preliminary estimate of bearing acres is based on the Almond Acreage Report and the Almond Nursery Sales Survey.

# 2021 ALMOND OM SAMPLE DISTRIBUTION



2021 Almond OM Sample Distribution by County and Variety

	Butte	Carmel	Independence	Monterey	Nonpareil	Padre	Other <sup>1</sup>	Total
Butte	1	0	0	1	17	0	1	<b>20</b>
Colusa	6	2	0	6	22	1	7	<b>44</b>
Fresno	11	1	21	28	47	11	33	<b>152</b>
Glenn	4	0	1	0	23	0	0	<b>28</b>
Kern	16	1	8	44	57	9	25	<b>160</b>
Kings	1	0	5	4	7	1	0	<b>18</b>
Madera	10	1	5	28	43	5	10	<b>102</b>
Merced	13	11	16	23	47	11	13	<b>134</b>
San Joaquin	5	1	10	0	28	1	3	<b>48</b>
Solano	0	0	0	0	2	0	0	<b>2</b>
Stanislaus	12	20	20	15	45	10	21	<b>143</b>
Tehama	0	0	0	0	1	0	0	<b>1</b>
Tulare	2	0	5	14	18	2	3	<b>44</b>
Yolo	0	0	1	3	11	0	3	<b>18</b>
<b>Total</b>	<b>81</b>	<b>37</b>	<b>92</b>	<b>166</b>	<b>368</b>	<b>51</b>	<b>119</b>	<b>914</b>

<sup>1</sup> Other includes Aldrich, Bennett, Fritz, Mission, Price Cluster, Shasta, Sonora, Supareil, Winters, and Wood Colony.