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### Economic Outlook for the 2019 Almond Pollination Season

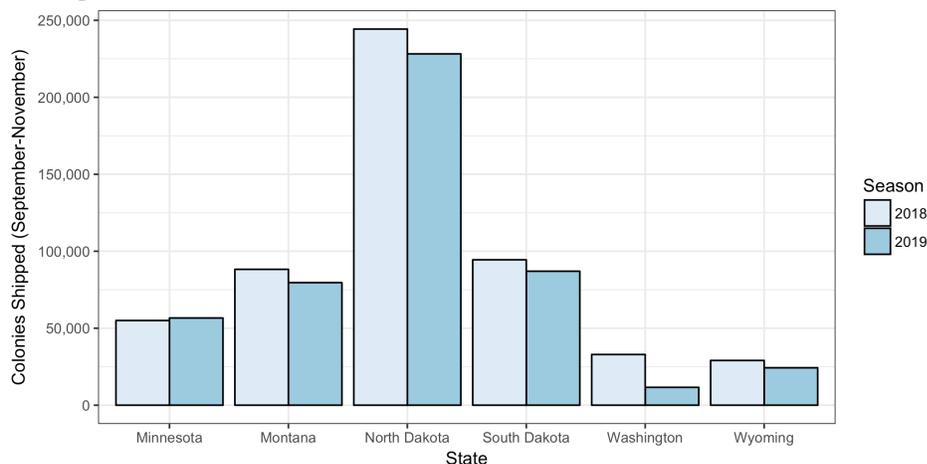
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Happy New Year! With every new year comes the realization that almond orchards will be in full bloom before long. This article summarizes some considerations for this year's almond bloom, as well as what to expect in terms of colony supplies and pollination fees in the years to come.

USDA estimates that there were 1.1 million bearing almond acres in 2018. According to the USDA Cost of Pollination Survey, 1.5 million colonies were used in almond pollination in 2017, with an average 1.6 colonies/acre. This is down from the 2016 average of 1.7 colonies/acre. These values suggest that the number of colonies demanded for almond pollination in 2019 will be close to 2 million. For some context, this is nearly three-fourths of the total U.S. honey bee colony population on January 1, 2018.

The supply of colonies for California almond pollination relies heavily on out-of-state apiary shipments which have been steadily increasing with almond acreage. According to apiary shipment numbers provided by the California Department of Food and Agriculture (CDFA), 1.8 million colonies were shipped into California for the 2018 almond pollination season. As of November 28, 2018, approximately 661,000 colonies have already been shipped into California for the 2019 almond pollination season. This is a decrease of about 2% from colony shipments that had arrived in California by November 28, 2017. Figure 1 displays colonies shipped during September through November from five states that beekeepers commonly ship colonies into California prior to the new year (mostly states with cold winters). Shipments from these states seem to be down slightly from last year, however not by a large amount.

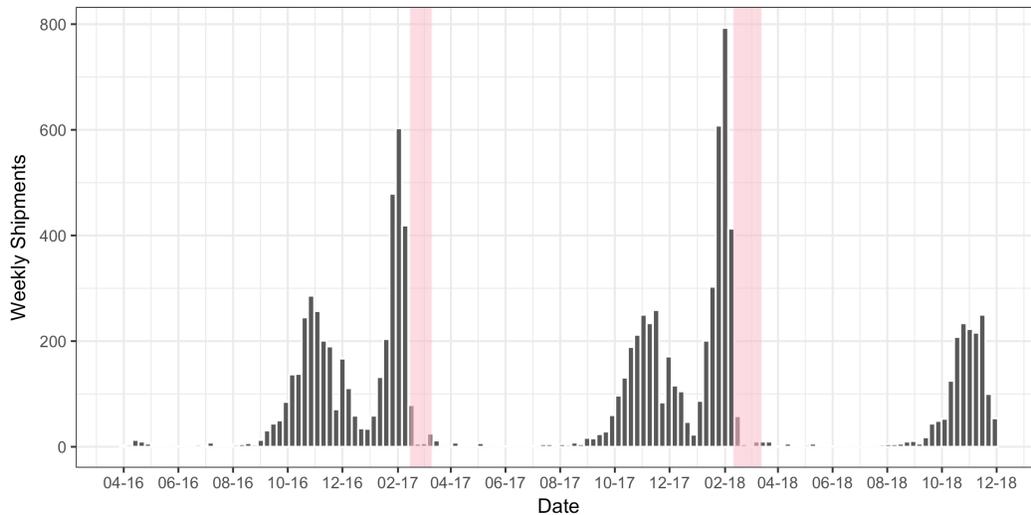
Figure 1: Honey Bee Colony Shipments into California for Almond Pollination During September through November, Almond Pollination Seasons 2018 and 2019



Source: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services

Figure 2 shows a histogram of apiary shipments into California from April 2016 through November 28, 2018. The beginning of shipments for the 2019 almond pollination season look very similar to the previous two seasons. There has been a trend of increasing colony shipments closer to almond bloom. This reflects increased colony shipments from warmer states (Texas, Florida, Georgia) where beekeepers do not have to worry as much about harsh winter weather and can wait longer to ship colonies.

Figure 2: Histogram of Weekly Apiary Shipments into California, April 2016- November 2018 (Almond Bloom Period for Central California Highlighted)

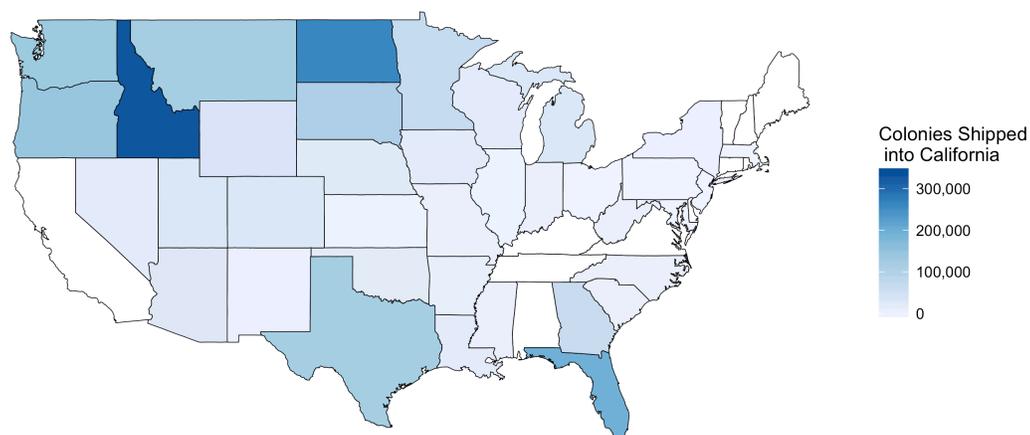


Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; Blue Diamond Grower's Crop Progress Reports

### Colony Shipments by State

Figure 3 shows a heat map of the number of colonies shipped into California for the 2018 almond bloom from each state. The top five states shipping colonies into California included Idaho, North Dakota, Washington, Florida, and Oregon. Figure 4 shows the trends in colony shipments since 2008 from some of the top supplying states.

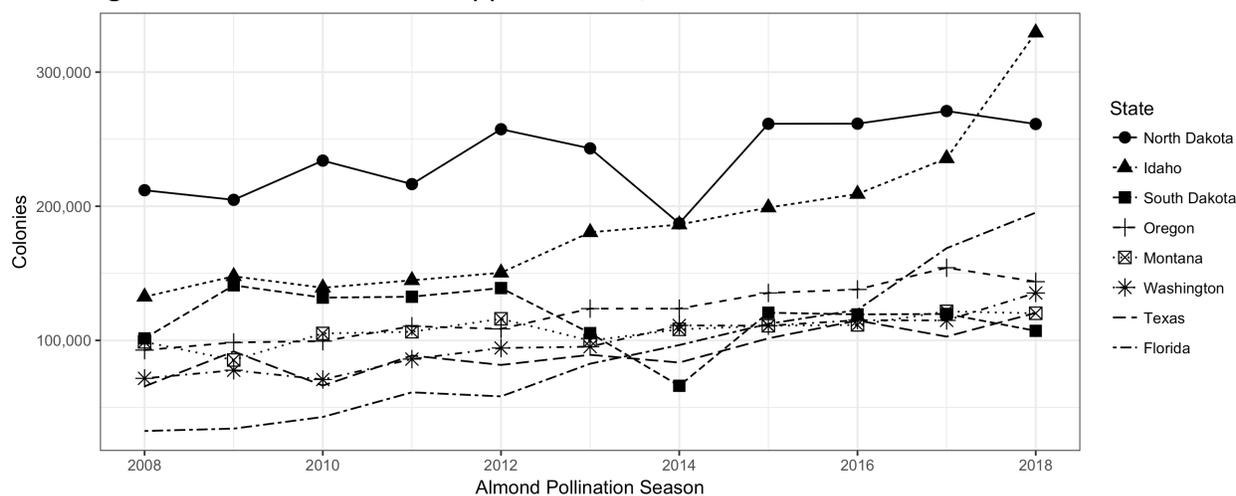
Figure 3: Honey Bee Colony Shipments into California for Almond Pollination by State of Origin, Season 2018



Source: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services

As seen in Figure 4, 2018 was the first year since pre-2008 that any state had shipped more colonies to California than North Dakota. For the 2018 almond bloom, Idaho shipped 339,000 colonies compared to North Dakota's 278,000. I have talked with a few beekeepers and pollination brokers, and I believe this is due to beekeepers in some of the colder states shipping colonies into the Pacific Northwest states prior to entering California. For example, Table 1 shows Pacific Northwest colony shipments for 2017 almond pollination compared with colony populations reported by USDA. The total number of colonies shipped is often 2-3 times the colony populations at various points during the year. I suspect some of this is due to the industry's movement towards cold storage of bee colonies, which can reduce *varroa* mite populations and decrease colony losses over the winter.

Figure 4: Honey Bee Colony Shipments into California for Almond Pollination from Eight States with Largest Number of Colonies Shipped in 2018, Seasons 2008-2018



Source: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services

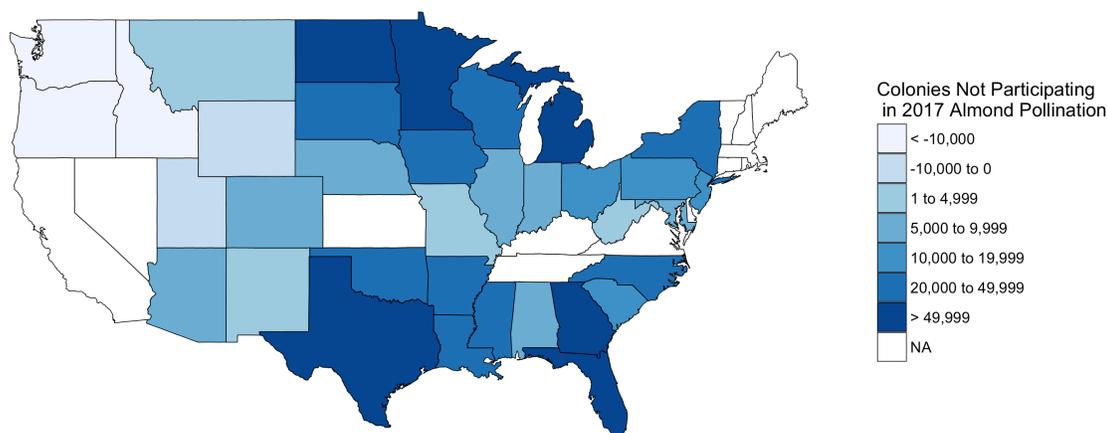
Table 1: Pacific Northwest State Colony Populations and Colony Shipments into California for the 2017 Almond Bloom

State	Shipments	Colonies Shipped	Number of Colonies		
			July 1, 2016	October 1, 2016	January 1, 2017
Idaho	560	235,695	79,000	121,000	95,000
Oregon	485	154,161	107,000	98,000	71,000
Washington	341	114,892	57,000	65,000	68,000

Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; USDA Honey Bee Colonies Report 2017

As for the future supply of almond pollination services, Figure 5 displays estimates of the number of colonies that did **not** participate in 2017 almond pollination in each state based on honey bee colony shipments compared with USDA honey bee colony populations (Note: Figure 5 does not account for any winter mortality). Most non-participating colonies are located in the eastern U.S. In some areas with a large number of available colonies, ex: Florida, Georgia and Texas, beekeepers may have opportunities for honey production during almond bloom, so it may take higher pollination fees to get those remaining colonies to participate. Now, one will notice that there seems to be a large number of colonies still available in the upper Midwest states. As I mentioned earlier, I suspect a large number of these colonies are not available in reality, and are actually being shipped through the Pacific Northwest states due to milder winters and/or cold storage.

Figure 5: State Estimates of the Number of Honey Bee Colonies that did not Participate in 2017 Almond Pollination



NAs exist for Delaware, Nevada, New Hampshire, and Rhode Island because USDA does not publish honey bee populations for these states.

Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; USDA Honey Bee Colonies Report May 2017

### Supply Issues

The primary influence on the supply of available colonies for almond pollination is colony health and populations throughout the U.S. In my research, I have found evidence that increases in state average winter mortality rates decrease the number of colonies shipped into California from that state for almond pollination.

An estimated 65-85% of commercial honey bee colonies are located in the North Dakota and South Dakota during the spring/summer months for honey production (Bond, Plattner and Hunt, 2014). Thus, weather during this time period can have an impact on honey production, as well as bee health, due to the availability of forage. In the article I wrote for Bee Culture last year, I discussed a drought in the Dakotas and Montana which likely would affect bee health and colony populations for the 2018 almond pollination season. During May through September 2018, an average of 16% of the area in Montana, North Dakota and South Dakota was in a moderate drought or worse. The equivalent number for 2017 was 53% of the area. Thus, this season is looking much better in terms of bee health coming from these major honey-producing states.

Another potential issue that could impact colony shipments was Hurricane Michael which devastated areas of Florida's panhandle in October of 2018. University of Florida Extension estimates that 50,000 colonies were located in this area, though it remains unclear how many colonies were actually affected by the hurricane. Florida supplied roughly 195,000 colonies to California almonds in 2018. Thus, the hurricane has the potential to impact up to a quarter of

those colonies. If colony shipments from the panhandle of Florida are decreased, this will require additional colonies from elsewhere in Florida or other states.

### **Almond Pollination Fees**

The average fee for the 2018 almond pollination season reported by the California State Beekeeper's Association (CSBA) was \$190 per colony. This was up by 3% from the 2017 average pollination fee of \$184. In comparison, the USDA Cost of Pollination survey reported 2017 average almond pollination fees slightly lower than CSBA at \$171 per colony. The 2018 CSBA pollination fees ranged from \$165 - \$210 per colony. The variation likely is due to differences in contracted colony strength. Colonies that average 8 or 10 active frames tend to receive a premium over those that average 6 active frames (See Goodrich and Goodhue (2016) for more information on colony strength in almond pollination contracts).

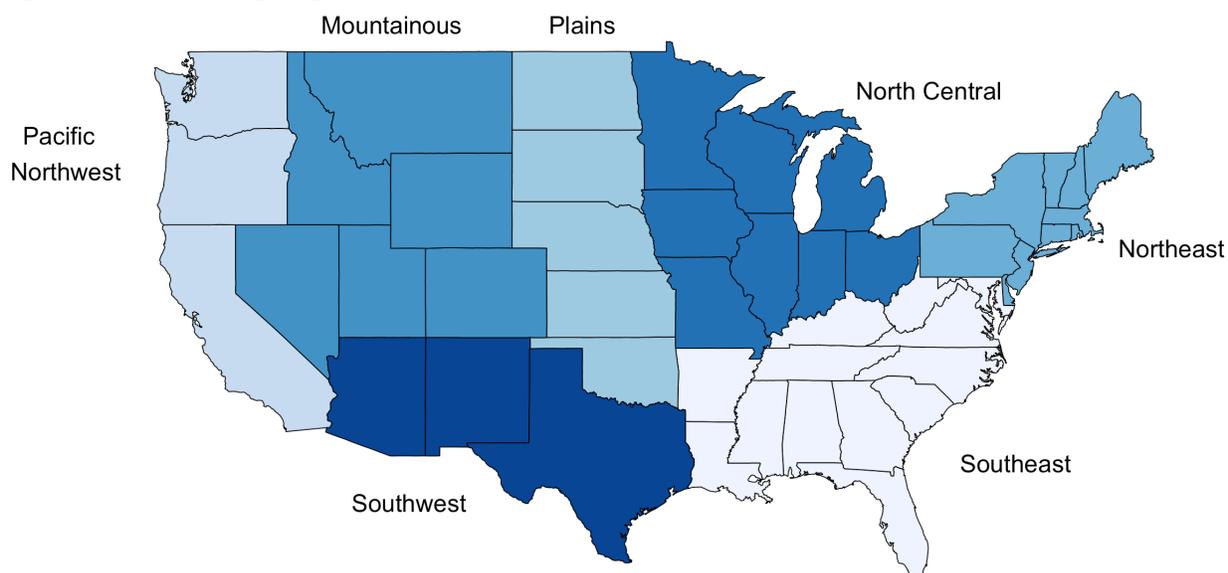
The CSBA survey respondents projected 2019 almond pollination fees to be around \$198 per colony. In some preliminary research, I explore the future demand for almond pollination services. According to the USDA Almond Acreage Reports, I estimate that 148,000 additional colonies will be needed by 2020. If that is the case, I estimate that almond pollination fees will have to increase by 7.9% over their 2017 value to increase colony shipments. This would mean an average per-colony fee of around \$200 by 2020. This estimate seems to be right on track with the CSBA projections for the upcoming season.

Many almond growers likely cringe at the thought of paying over \$200 per colony for almond pollination. So here is some information to help illustrate why prices continue creeping upwards. Table 2 shows average distances and estimated per-colony shipment costs for each region in the U.S. (Figure 6) using a shipment cost of \$3 per mile and 400 colonies per shipment. Recall from Figure 3 that colonies are now being transported from as far as the northeastern U.S. to participate in almond pollination. At a \$200 pollination fee, the beekeeper from the Northeast is receiving \$150-156 per colony once shipment costs are accounted for. This does not include any inputs to prepare colonies for almond pollination (labor, food, pest treatments) nor does it include hotel rooms and transportation costs of beekeepers and equipment. Not to mention the potential risks to honey bee colony health that almond pollination introduces. So, one can see that \$200 per-colony revenue can dwindle down pretty quickly.

Table 2: Average Distance and Round Trip Per-Colony Shipment Costs by Region

Region	Average Distance (Miles)	Minimum (\$/Colony)	Average (\$/Colony)	Maximum (\$/Colony)
Pacific Northwest	781	9.62	11.71	13.81
Mountainous	896	6.30	13.44	18.32
Southwest	1,049	10.08	15.73	22.12
Plains	1,560	22.17	23.41	25.55
North Central	2,125	27.73	31.88	36.27
Southeast	2,349	26.85	35.23	41.85
Northeast	2,960	40.68	44.40	49.16

Figure 6: Beekeeping Regions in the United States



Source: Nye, W. 1980. "Beekeeping Regions in the United States." *Beekeeping in the United States*. USDA Agriculture Handbook 335:10–15.

### Other issues for 2019 almond pollination and beyond

#### *Bee Thefts*

Bee thefts continue to be an issue for beekeepers, especially when colonies are in close proximity in remote almond orchards during bloom. Due to this threat, it may be a good idea for beekeepers and/or pollination brokers to offer a discount on the pollination fee to locate in almond orchards or holding yards that contain a locked gate. I know of some beekeepers and brokers who already do this, so keep this in mind if you know of growers with gates that lock.

#### *Bee Where Program*

Beginning January 1, 2019, both California and out-of-state beekeepers are required to register their colony locations with the county agricultural commissioner. Previously, this had been

required, however the California Agricultural Commissioners and Sealers Association had no authority to penalize non-compliance. The appropriate fine for non-compliance is still under discussion, but it could range from \$50 to \$1,000. It is my understanding that fines will not be awarded until the 2020 almond pollination season.

The registration cost is \$10 per beekeeper, no matter how many colonies. The goal of this program is to help minimize pesticide exposure for honey bee colonies by alerting beekeepers when pesticide applicators plan to apply chemicals nearby. Additionally, this will provide better information on the true causes of bee kills when pesticide exposure does occur.

I suspect most beekeepers will be given information regarding the Bee Where Program when they pass through California Border Protections Stations. Participating this year is a good idea so that beekeepers can test out the online registration and give feedback to make the process more streamlined in the future.

For more information and to register hives online visit: <https://beewherecalifornia.com/>

### **Summary**

Almond pollination can be a profitable endeavor for many beekeepers. However, it is important to enter into pollination agreements that are mutually beneficial for you and the almond grower. Give careful consideration to the colony strength requirement and number of colonies you contract so that it won't be excessively costly to you to meet your obligations. A fee of \$210 for a 10-frame average may sound great, but may not be profitable for you once the costs of inputs are considered.

The number of colonies required for almond pollination services continues to be a large percentage of the total colonies in the U.S. If demand for almond pollination services continues to increase, expect higher pollination fees in the coming years. Communication with your almond grower is key to a profitable and sustainable pollination relationship. Know what your grower intends to do if you are not able to meet colony numbers or colony strength requirements. Discussing these difficult topics in advance can alleviate the stress and potential court costs of future disputes.

Wishing you a happy, healthy and prosperous 2019!

### **References:**

Bond, J., K. Plattner, and K. Hunt. 2014. "Fruit and Tree Nuts Outlook: Economic Insight. US Pollination Services Market." USDA Economic Research Service Situation and Outlook FTS-357SA.

Goodrich, B. and R.E. Goodhue. 2016. "Honey Bee Colony Strength in the California Almond Pollination Market." ARE Update 19(4): 5-8. University of California Giannini Foundation of Agricultural Economics.