



# Economics of Establishing an Orchard and Growing Almonds

2020 North San Joaquin Valley Almond Day

January 31, 2020

Modesto, CA

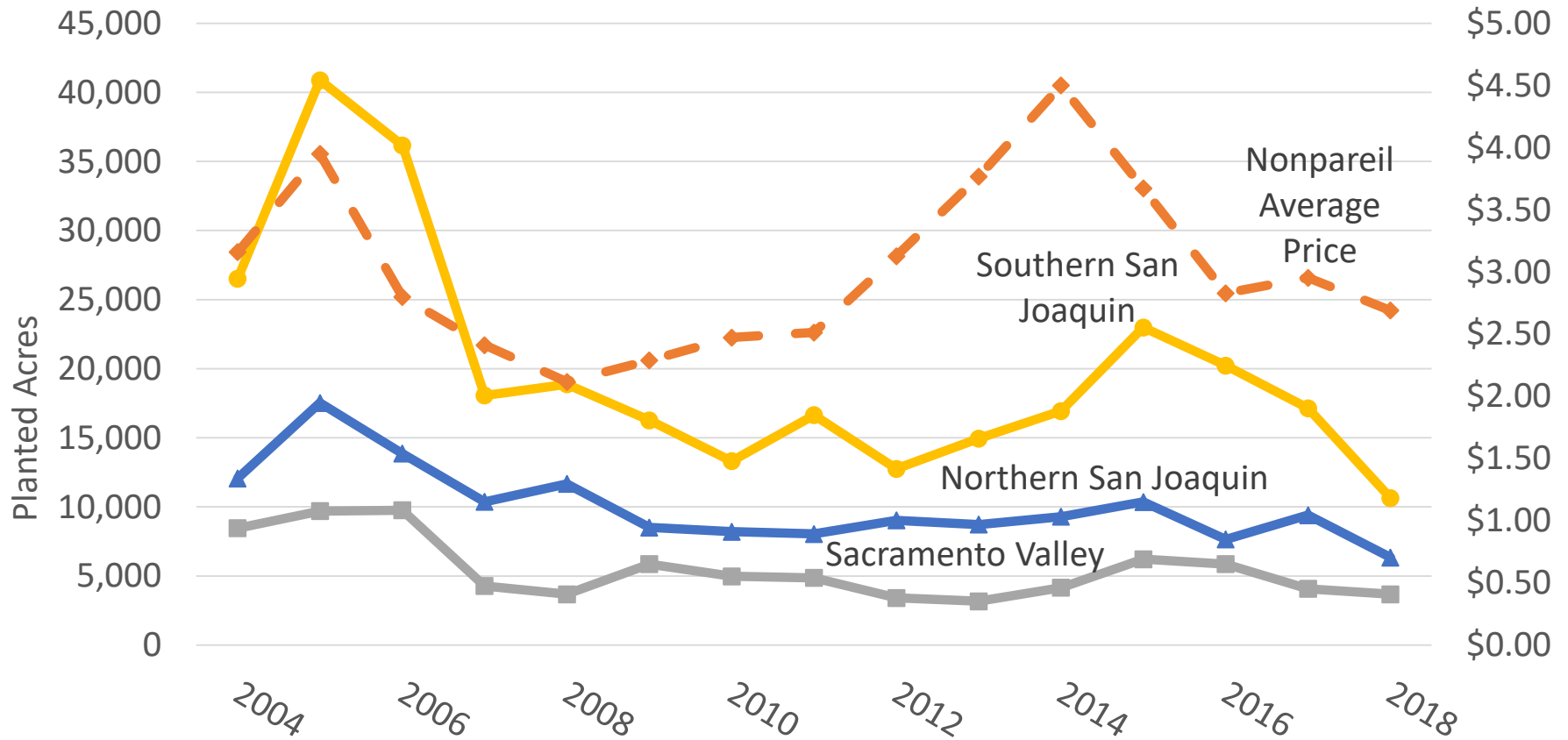
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# Regional Planted Acreage



Source: 2018 Almond Acreage Report, USDA NASS, CDFA

2019  
SAMPLE COSTS TO ESTABLISH AN ORCHARD AND PRODUCE  
**ALMONDS**



**SAN JOAQUIN VALLEY NORTH**  
Micro-Sprinkler Irrigation

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<https://coststudies.ucdavis.edu/>

# Cost Study Assumptions

- 100 acres
- Micro-sprinkler irrigation
- No specific varieties
- Planting 130 trees/acre
  - Machine planting, not staked
  - Two trees/acre replaced in year two
- Life of orchard at planting: 25 years
- Meat lbs per acre at maturity: 2200 lbs
  - \$2.50/lb
- Interest rates
  - Operating capital 5.25%
  - Long term 6%
- Land value \$25,200/acre

# SJV North-Establishment

Operation:	Meat Pounds Per Acre: @ \$2.50/lb.
Pre-Plant:	
Irrigation System Removal	89
Orchard Removal: Chip	1,200
Spread Chips	125
Rip-3' Depth (Root Removal)	285
Rip-6' Depth (Root Removal)	377
Disc & Roll 2x	130
Laser Level	75
Soil Fumigate/Tarp: Tree Row (Strip 11')	1,200
Weeds: Strip Spray	31
<b>TOTAL PRE-PLANT COSTS</b>	<b>3,512</b>
Plant:	
Survey/Mark Site	125
Plant: Top, Transplant-Mechanical (130 trees/acre)	1,645
Wrap/Irrigate (by hand)	77
Irrigation System Layout	53
Smooth/Float Between Rows	35
<b>TOTAL PLANTING COSTS</b>	<b>1,935</b>

# Total Establishment Costs

- Pre-plant and planting costs
- Accumulated net cash costs for non-bearing years (Years 1-3)
- Total Establishment costs: \$9,129/acre
  - Amortize over rest of useful life of orchard (22 years) at 6% interest
  - Annual establishment costs: \$758/acre

# Operating Costs

	Quantity/ Acre	Unit	Cost/Unit	Cost/Acre	Percentage of Total Operating Costs
<b>OPERATING COSTS</b>					
Herbicide				92	3%
Fungicide				74	3%
Insecticide				123	5%
Tree Aids				20	1%
Pollination	2	Hive	\$200	400	15%
Irrigation: Water-Pumped	44.25	AcIn	\$8.33	369	14%
Fertilizer				322	12%
Labor				414	15%
Machinery				118	4%
Harvest				454	17%
Misc				293	11%
Interest on Operating Capital @ 5.25%				38	1%
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>2,717</b>	

# Cash Overhead

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CASH OVERHEAD COSTS	Value or Cost/Acre	Percentage of Total Cash Overhead Costs
Environmental Fees SJV	10	2%
Liability Insurance	8	1%
Office Expense	60	11%
Sanitation Fee SJV	9	2%
Property Taxes	303	56%
Property Insurance	27	5%
Investment Repairs	102	19%
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>	<b>538</b>	
<b>TOTAL CASH COSTS/ACRE</b>	<b>3,256</b>	

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**Cash overhead:** various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation.

# Non-Cash Overhead

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	<b>Value or Cost/Acre</b>	<b>Percentage of Total Cash Overhead Costs</b>
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>		
Fuel Tanks 2-1,000Gal	10	0.4%
Well/Pump Refurbish	43	2%
Shop/Field Tools	11	0.4%
Irrigation System-Micro-Sprinkler	156	6%
Land SJV-North	1440	58%
Establishment Costs SJV-north	758	31%
Equipment	51	2%
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>	<b>2,469</b>	
<b>TOTAL COST/ACRE</b>	<b>5,725</b>	

**Non-cash overhead:** Capital recovery cost for equipment and other farm investment (depreciation and interest)

# Net Returns Per Acre

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TOTAL GROSS RETURNS (2200lbs @ 2.50)	5,500
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TOTAL OPERATING COSTS/ACRE	2,717
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NET RETURNS ABOVE OPERATING COSTS	2,783
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TOTAL CASH OVERHEAD COSTS/ACRE	538
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TOTAL CASH COSTS/ACRE	3,256
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NET RETURNS ABOVE CASH COSTS	2,244
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TOTAL NON-CASH OVERHEAD COSTS/ACRE	2,469
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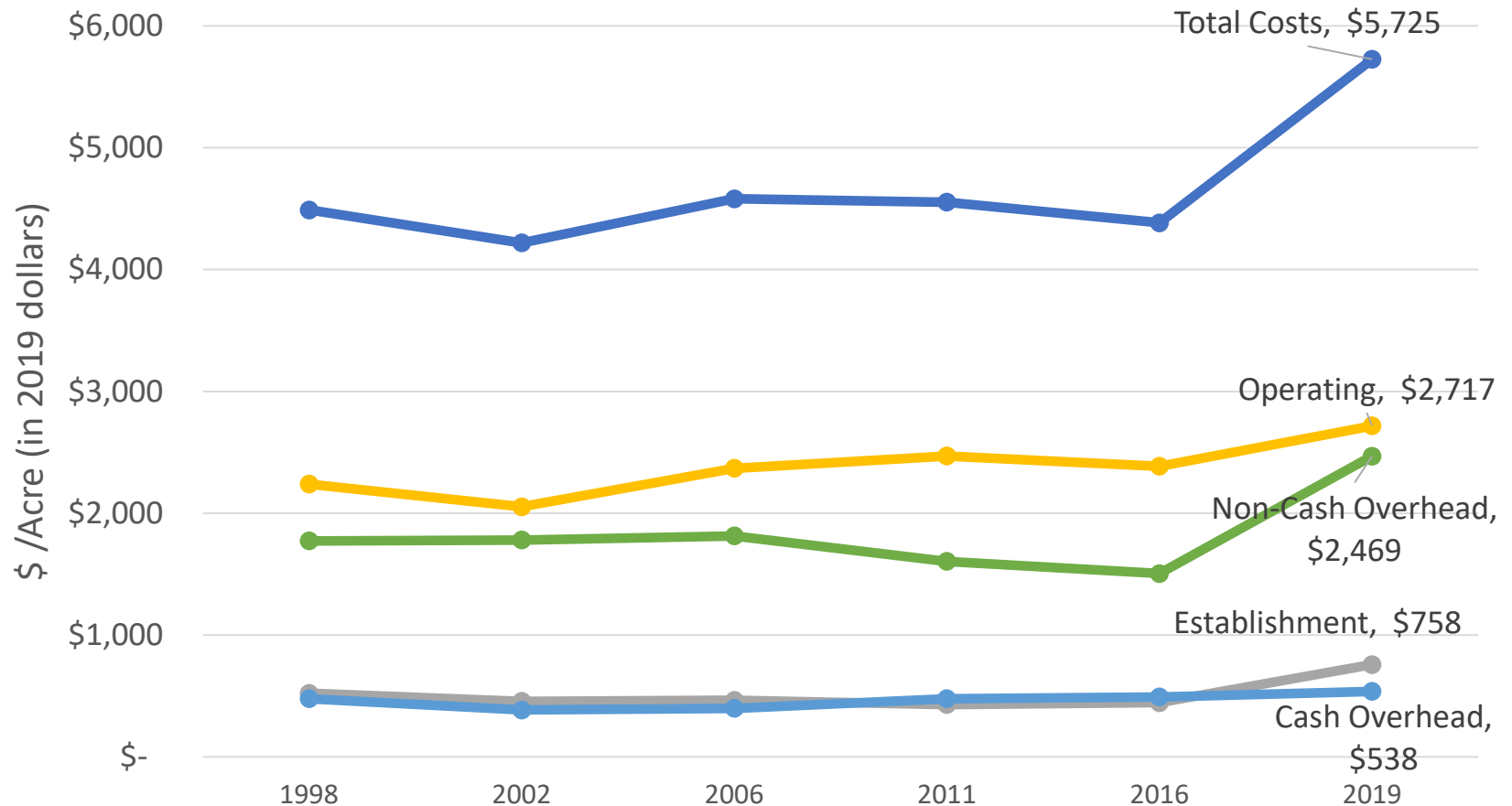
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TOTAL COST/ACRE	5,725
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NET RETURNS ABOVE TOTAL COST	-225
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# Per-Acre Costs of Almond Production, 1998-2019



Sources: University of California Agricultural Issues Center Sample Cost and Returns Studies: <https://coststudies.ucdavis.edu/>. US Bureau of Economic Analysis, GDP Price Deflator

# Costs Per Acre Varying Yields

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OPERATING COSTS/ACRE:

Cultural

Harvest

Interest on Operating Capital @ 5.25%

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TOTAL OPERATING COSTS/ACRE

TOTAL OPERATING COSTS/LB

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CASH OVERHEAD COSTS/ACRE

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TOTAL CASH COSTS/ACRE

TOTAL CASH COSTS/LB

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NON-CASH OVERHEAD COSTS/ACRE

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TOTAL COSTS/ACRE

TOTAL COSTS/LB

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CASH OVERHEAD COSTS/ACRE

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TOTAL CASH COSTS/ACRE

TOTAL CASH COSTS/LB

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NON-CASH OVERHEAD COSTS/ACRE

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TOTAL COSTS/ACRE

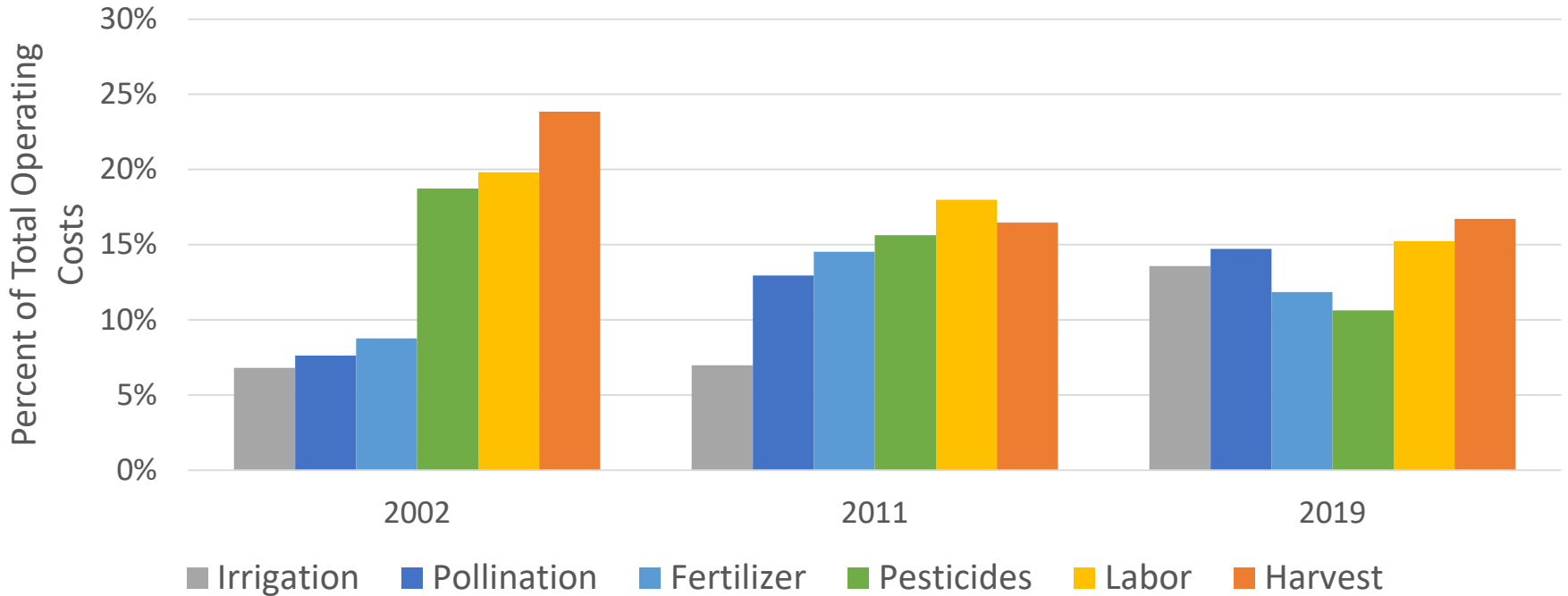
TOTAL COSTS/LB

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# Net Returns Above Total Costs

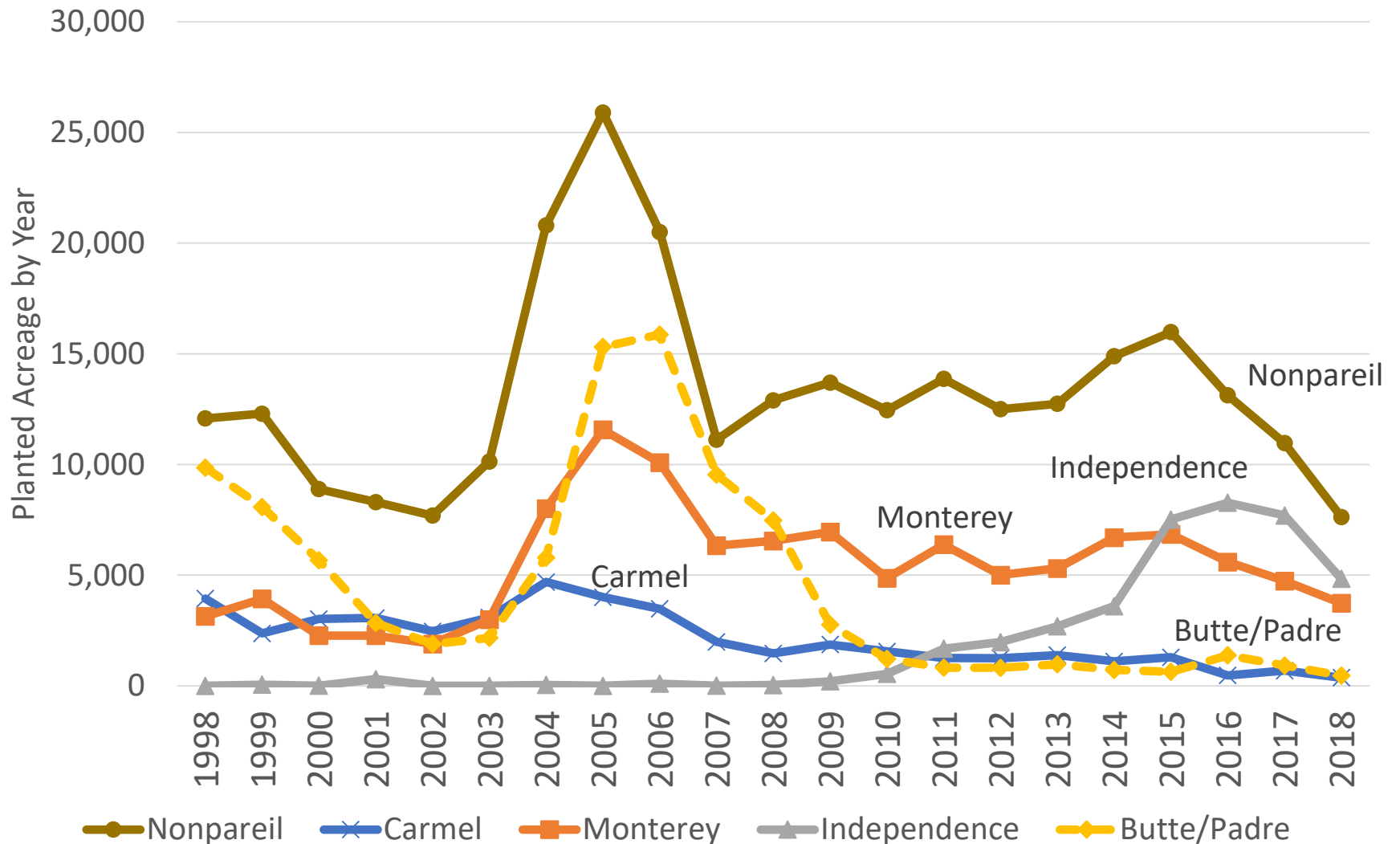
YIELD (lbs./acre)				YIELD (lbs./acre)			
1,800	2,200	2,600	3,000	1,800	2,200	2,600	3,000
				-3,843	-3,525	-3,207	-2,891
-3,843	-3,525	-3,207	-2,891	-2,943	-2,425	-1,907	-1,391
-2,943	-2,425	-1,907	-1,391	-2,043	-1,325	-607	109
-2,043	-1,325	-607	109	-1,143	-225	693	1,609
-1,143	-225	693	1,609	-243	875	1,993	3,109
-243	875	1,993	3,109	657	1,975	3,293	4,609
657	1,975	3,293	4,609	1,557	3,075	4,593	6,109
1,557	3,075	4,593	6,109				

# Operating Cost Shares



Source: University of California Cooperative Extension and UC Agricultural Issues Center Sample Cost and Returns Studies, San Joaquin Valley North Micro Sprinkler

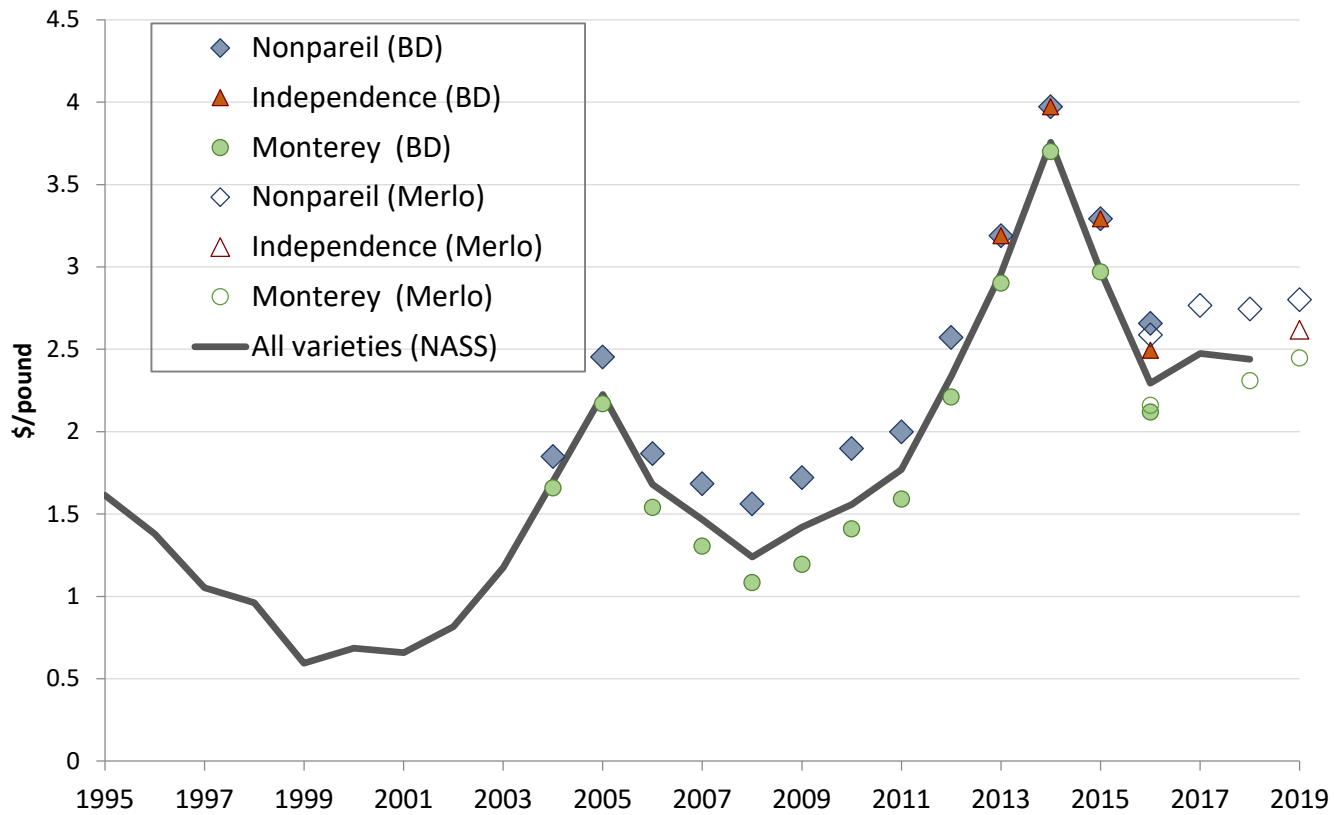
# Planted Acreage By Variety



Source: 2018 Almond Acreage Report, USDA NASS, CDFA

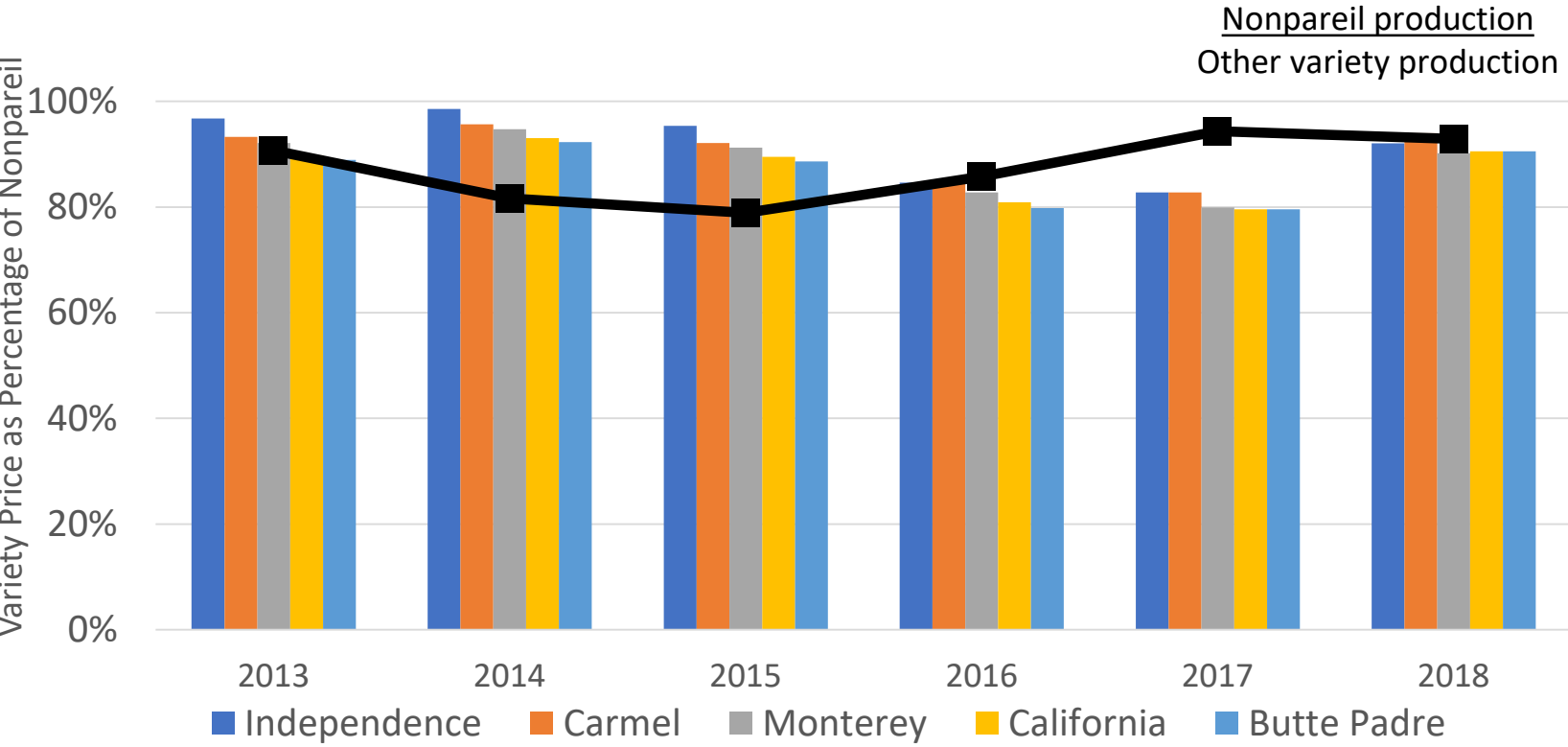
# Variety Choice

- Yield and Price
- Bloom time
- Harvest date
- Insect and Disease Pressure
- Pollination costs
- Operation characteristics
  - Size
  - Farming style
  - Risk preferences



Source: Champetier, Lee and Sumner (2019) California Almond Acreage Report, 2018 NASS and CDFA, Blue Diamond (BD) Payment History in filled markers (2004 to 2016), Merlo Farming Group (Merlo), Almond Price Overview in hollow markers (2016 to present). GDP deflator for United States from World Bank database.

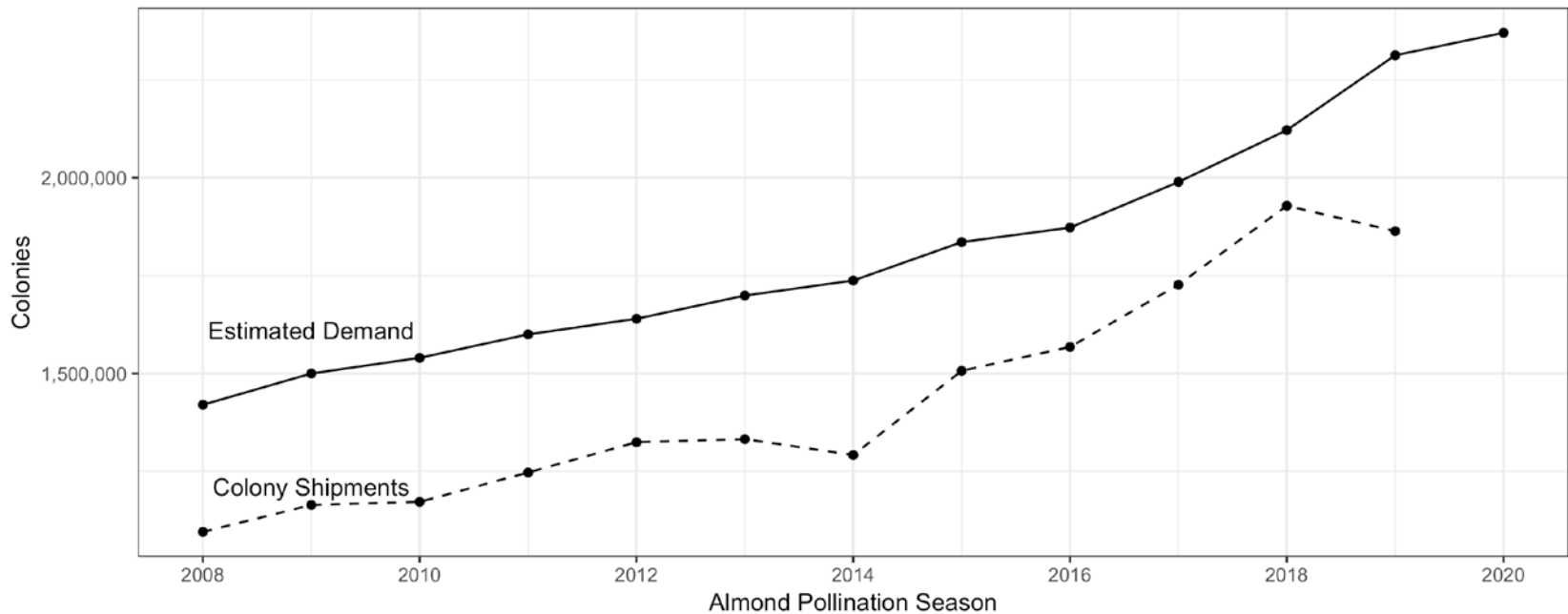
# Variety Price as Percentage of Nonpareil



Sources: Blue Diamond Payment History 2013-2018. Almond Board of California Almond Almanac 2013-2019.



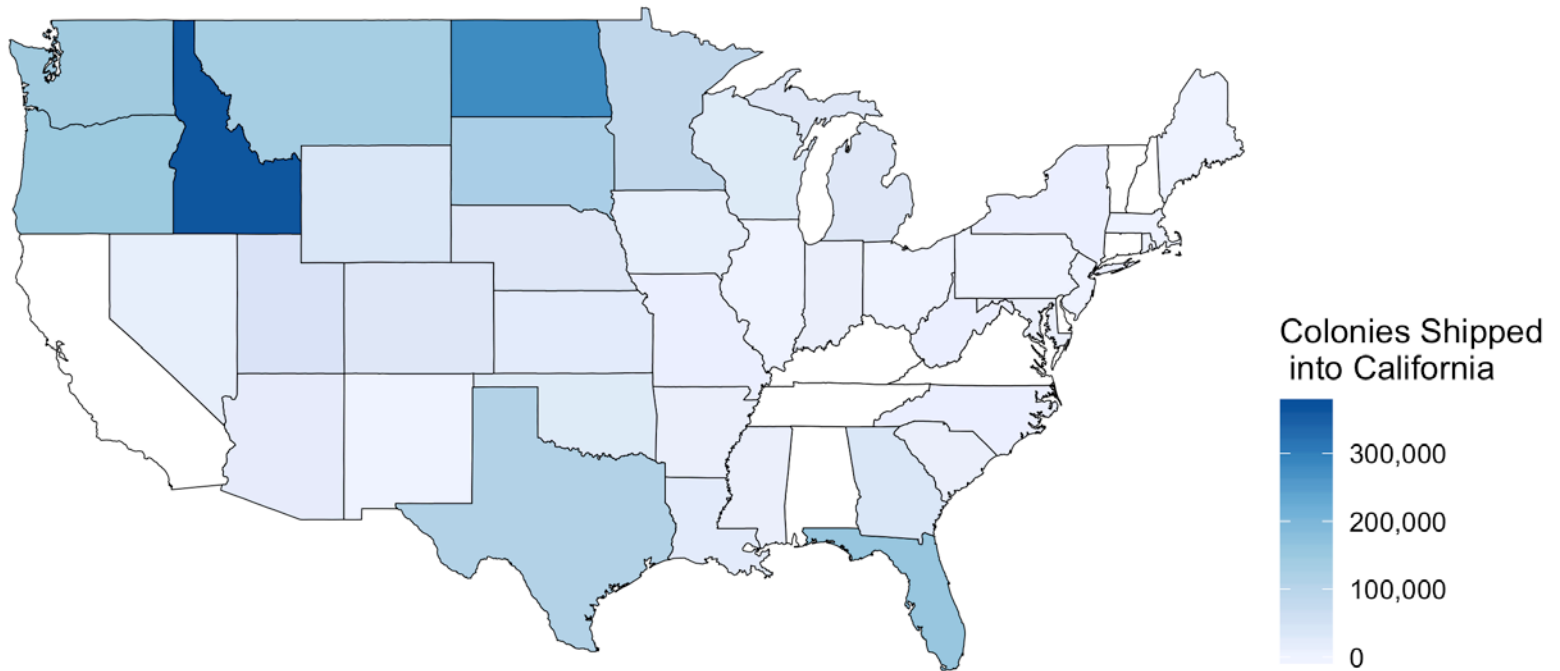
# Estimated Demand and Colony Shipments into CA, 2008-2020



**Estimated demand:** 2 hives/acre x Traditional Varieties, 1 hive/acre Self-Fertile Varieties

*Sources: 2008-2018 Almond Acreage Reports, USDA NASS and CDFA; Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services*

# 2019 Colony Shipments into California for Almond Pollination



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

**2019 Almond Bloom:**  
1.86 million colonies

**2020 Estimated Demand:**  
2.4 million colonies

Already utilizing >75%  
of U.S. Colonies!

# 2019 Colony Shipments from Top 10 States

State	Colonies for 2019 Bloom	% Change from 2018
Idaho	360,127	6%
North Dakota	277,961	4%
Florida	156,432	-27%
Oregon	145,483	-3%
Washington	141,234	1%
Montana	127,373	3%
South Dakota	118,809	9%
Texas	105,497	-22%
Minnesota	77,527	2%
Utah	38,737	14%
<b>Net change for top 10 states</b>		<b>-2%</b>

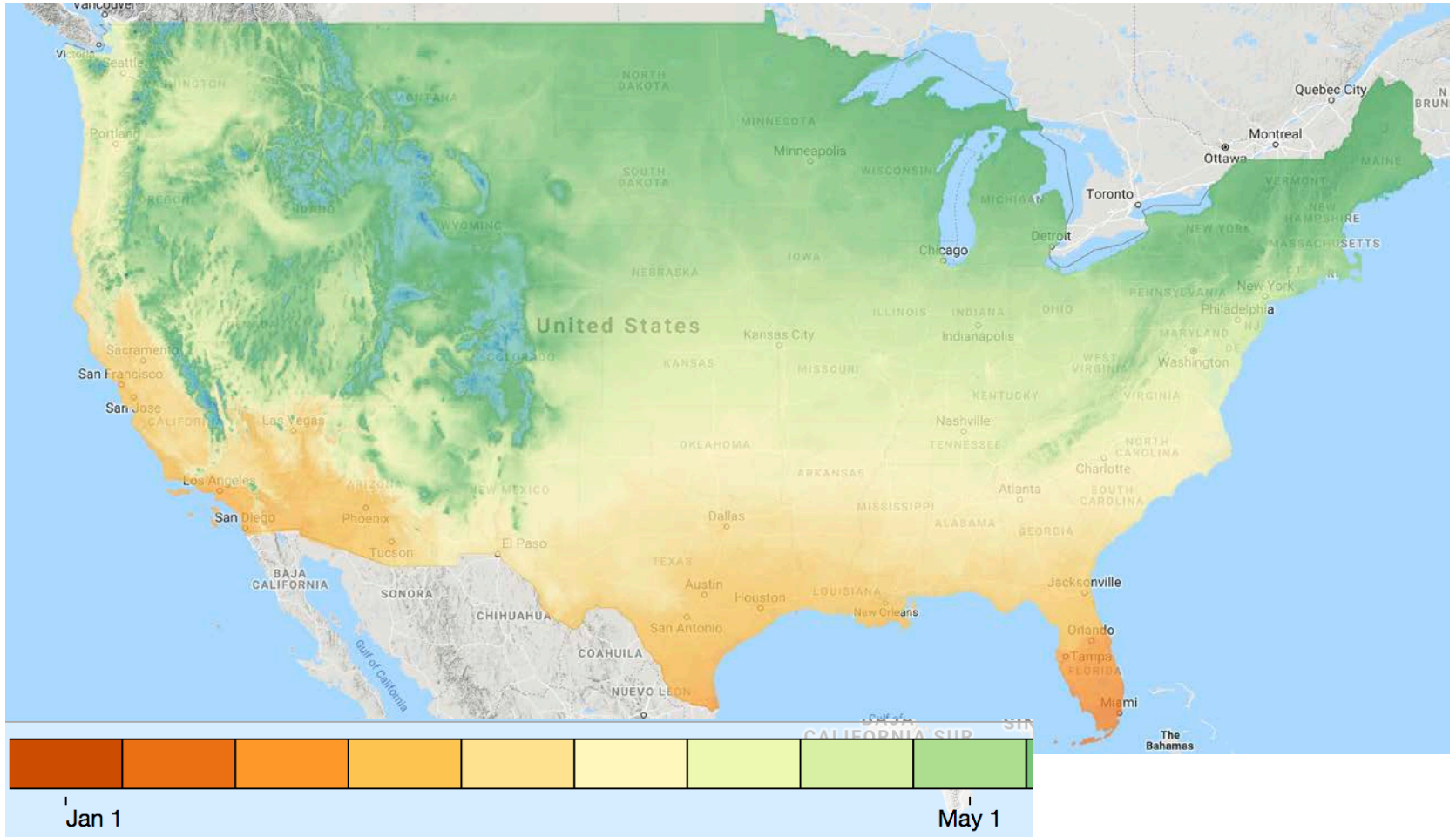
# What Impacts the Supply of Colonies?

- Beekeeping economics
  - Pollination fee
  - Costs
- Colony health in major supply states: Pacific Northwest, North Dakota, South Dakota, Florida, Texas
  - Number of colonies available
  - Strength of available colonies (approx number of bees/colony)
- Regional weather prior to almond bloom
  - Weather is a primary influence on colony mortality (Furgala and McCutcheon, 1992)

# Beekeeping Costs of Almond Pollination

- Moving hives
  - Distance, Labor, Equipment
  - Round-trip shipping costs from southeast: \$27-\$42 per colony
- Potentially missing out on honey production
  - Southern Florida, Texas, Georgia, etc.
- More inputs from colony strength requirements

# Foregone Honey Production



Historical Spring Index, 2016

Source: USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)

# Colony Strength Requirements

- **Minimum #** brood frames covered with adult bees
  - Coverage specifics: at least 75% or 4 bees/square inch
- **Minimum Average #** frames covered
  - Standard: 6 - 8 frames
- Per-frame incentives

Grower view



Beekeeper view



# Meeting Colony Strength Requirements

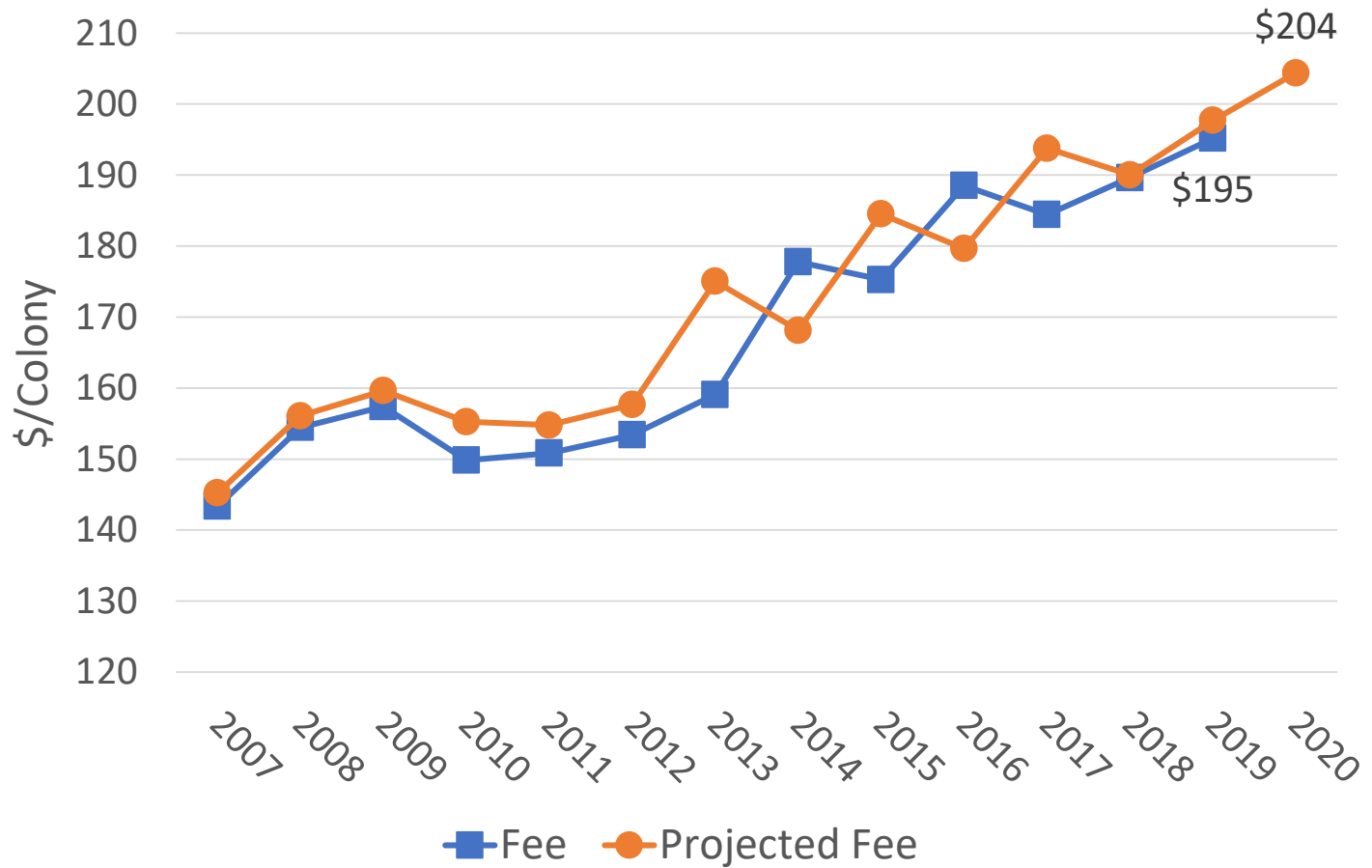


# Crop Insurance, Colony Strength and Hive Density

- Current policy document states growers must use:
  - “minimum of two six-frame colonies per acre or its equivalent (for example 1.5 eight frame colonies)”
- Almond growers may even go below the minimum, but the crop insurance adjuster will need to:
  - “verify the number the producer typically uses by reviewing receipts of colony rentals for at least **one non-loss** year”
- Talk with your crop insurance agent before making any drastic changes

USDA RMA and FCIC. 2018. “Almond Loss Adjustment Standards Handbook 2019 and Succeeding Crop Years.” FCIC25020 (10-2018).

# Almond Pollination Fees



Source: California State Beekeeper's Association

# Colony Strength and Fees—2015

## 2015 Almond Pollination Fees by Colony Strength Contract Type

### Almond Pollination Fee/Colony Summary

<b>Colony Strength Requirement:</b>	<b>Average</b>	<b>Min</b>	<b>Max</b>
None	\$165.20	\$140.00	\$180.00
Average of 8 frames or less	\$169.70	\$135.00	\$215.00
Average of more than 8 frames	\$179.40	\$150.00	\$200.00

Source: Goodrich and Goodhue (2016) Honey Bee Colony Strength in the California Almond Pollination Market, *Giannini Foundation ARE Update*

# Colony Strength and Fees—2020 Projections

## Assumptions:

- 2015 relationship between colony strength and fees was **representative** and has **remained constant**
- CSBA survey projection of \$204/colony is close to realized average

Colony Strength Requirement:	2015 Relationship	2020 Projections
None	2.65% Discount	\$199
Average of 8 frames or less	Base	\$204
Average of more than 8 frames	5.72% Premium	\$217

Source: Goodrich and Goodhue (2016), CSBA Pollination Fee Survey 2019, Author's Calculations

# How to save \$\$ on pollination

- Lowest Fee  $\neq$  Best Fee
  - Low fees likely signal low quality
  - Communicate with beekeeper/broker--know what you are getting!
- Potential ways to decrease fees without sacrificing colony strength
  - Locked gates to deter theft
  - Offer bee holding yards (preferably with gates that lock!)
  - Pay % of total upfront
  - Paved roads into almond orchards that offer easy truck access
- Decrease # colonies/acre?
  - Will going from 2 to 1.8 hives/acre decrease your yield?
    - Depends on many factors: Neighboring orchards, colony strength, etc

# Questions?

Contact:

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