



**THE ALMOND
CONFERENCE**  20
25

WELCOME!



 CULTIVATING A HEALTHIER
FUTURE



CROP ESTIMATES AND ACREAGE TOOLS

Speakers

Bryce Spycher, Almond Board of California

Brock Densel, Almond Board of California

Joel Kimmelshue, Land IQ

Megan Nunes, Bountiful

Stuart McAllister, Terra Nova Trading, Inc.

A BRIEF HISTORY OF NASS

Washington's Agricultural Survey (1791)

President Washington initiated the first agricultural survey in response to an inquiry from an English farming export.

Survey covered land values, crops, yields, livestock prices, and taxes.

Results were compiled and sent, forming the first "crop report."

Washington's proposal for a National Board of Agriculture was rejected by Congress in 1796.

Lincoln Establishes the Department (1862)

USDA founded by Abraham Lincoln, called "the people's department."

Division of Statistics established in 1863.

First official USDA crop report published in July 1863.

Many names throughout history (1905-Present)

Division of Statistics, Crop Reporting Board, Federal-State Crop Reporting Service all have been renamed through various USDA re-organizations to form what is now NASS

A BRIEF HISTORY OF ABC

1937- The Agricultural Marketing Agreement Act becomes law and allows growers to join together to create marketing orders to serve their collective interests.

1949- Almonds are added to the list of commodities eligible to create marketing orders

1950- Almond Control Board (now Almond Board of California) established.

- Included in the 1950 establishment of the Board is a requirement to provide the Secretary of Agriculture the, “ratio of the estimated trade demand, minus the estimated handler carryover, **to the estimated production of almonds**”
- In the early days of Marketing Orders USDA was required to approve and publish in the Federal Register ABC’s budget each year; to do so ABC was required to provide the Secretary with “**all data supporting such recommendation**”

ALMOND ESTIMATE HISTORY

UNITED STATES DEPARTMENT OF AGRICULTURE
CROP REPORT as of July 1, 1937. BUREAU OF AGRICULTURAL ECONOMICS CROP REPORTING BOARD Washington, D. C., July 9, 1937 3:00 P.M. (E.T.)

Production is placed at 56,000 tons; the 1936 crop totaled 41,900 tons. Almond production is indicated at 15,300 tons compared with the 1936 crop of 7,600 tons and with the 5-year (1928-32) average of 12,200 tons. Most of the important almond producing areas are showing an exceptionally heavy crop. Olives bloomed heavily in most localities but the set of fruit was irregular. Fig prospects in California are good in all areas, but it is too early for definite indications on probable production. In Oregon, walnut prospects are favorable, since June rainfall resulted in no unusual damage. Trees, however, still show the effect of the 1935 freeze. Filberts set well and present prospects are for a heavy crop.

----- MISCELLANEOUS FRUITS AND NUTS IN CALIFORNIA, OREGON, AND FLORIDA -----

STATE and CROP	Condition July 1			Production		
	Average: 1923-32	1936	1937	Average 1928-32	1936	Indicated 1937
CALIFORNIA:		Percent			Tons	
Apricots	69	59	74	1/	227,400	248,000 285,000
Figs, dried)	83	70	86		17,100	20,000
Figs, not dried)						
Olives	68	57	57	1/	20,100	25,000
Almonds	66	41	70		12,200	7,600 15,300
Walnuts	79	71	88		34,800	41,900 56,000

II. Survey History

The Almond Objective Measurement Survey began in 1962 to fulfill industry needs for an accurate almond production forecast prior to harvest.

1937 – Earliest record of an almond forecast conducted by USDA

1950-53 – No record directly referring to USDA estimates, but the numbers used for budgets and reserves match

July 1, 1954 – “Crop Report” by USDAAMS Crop Reporting Board cited officially in ABC documents

1954-1968 – ABC used the USDA estimates as published in various crop reports

1968- First reference to USDA conducting an Objective measurement conducted to “fulfill industry needs for an accurate almond production forecast prior to harvest.”

1986 - Oldest Objective Measure Currently Available

1986-2025 Objective measurement used to comply with Marketing Order requirements and budgeting

CURRENT MARKETING ORDER REQUIREMENTS

§ 981.48 Duties

- (c) To investigate the growing, shipping, and marketing conditions with respect to almonds and to assemble data in connection therewith;
- (d) To furnish to the Secretary such available information as may be deemed pertinent or as he may request;

§981.49 Board Estimates and Recommendations

“To aid the Secretary in fixing the salable and reserve percentages, the Board shall furnish to the Secretary...(a) The quantity of marketable almonds to be produced”

§981.80 Expenses

“...The recommendation of the Board as to the expenses for each such year, together with all data supporting such recommendation, shall be submitted to the Secretary on or before August 1 of the crop year in connection with which such recommendation is made.”



**THE ALMOND
CONFERENCE**

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25

CROP ESTIMATES AND ACREAGE TOOLS: GET YOUR FOOTPRINT RIGHT FIRST

JOEL KIMMELSHUE, PHD, CPSS

DECEMBER 11TH, 2025





LAND IQ TECHNICAL DISCIPLINES

Land-Based Sciences: Land and Water Resources

- Agronomic assessments/soil science
- Water quality and supply evaluations
- Salinity and nutrient management
- Agricultural reuse
- Land stabilization and erosion control
- Soil reclamation and irrigation/drainage

Spatial Sciences: Remote Sensing and GIS

- Consumptive use estimation and crop identification
- Large landscape evaluations
- Irrigation and drainage
- Production agriculture

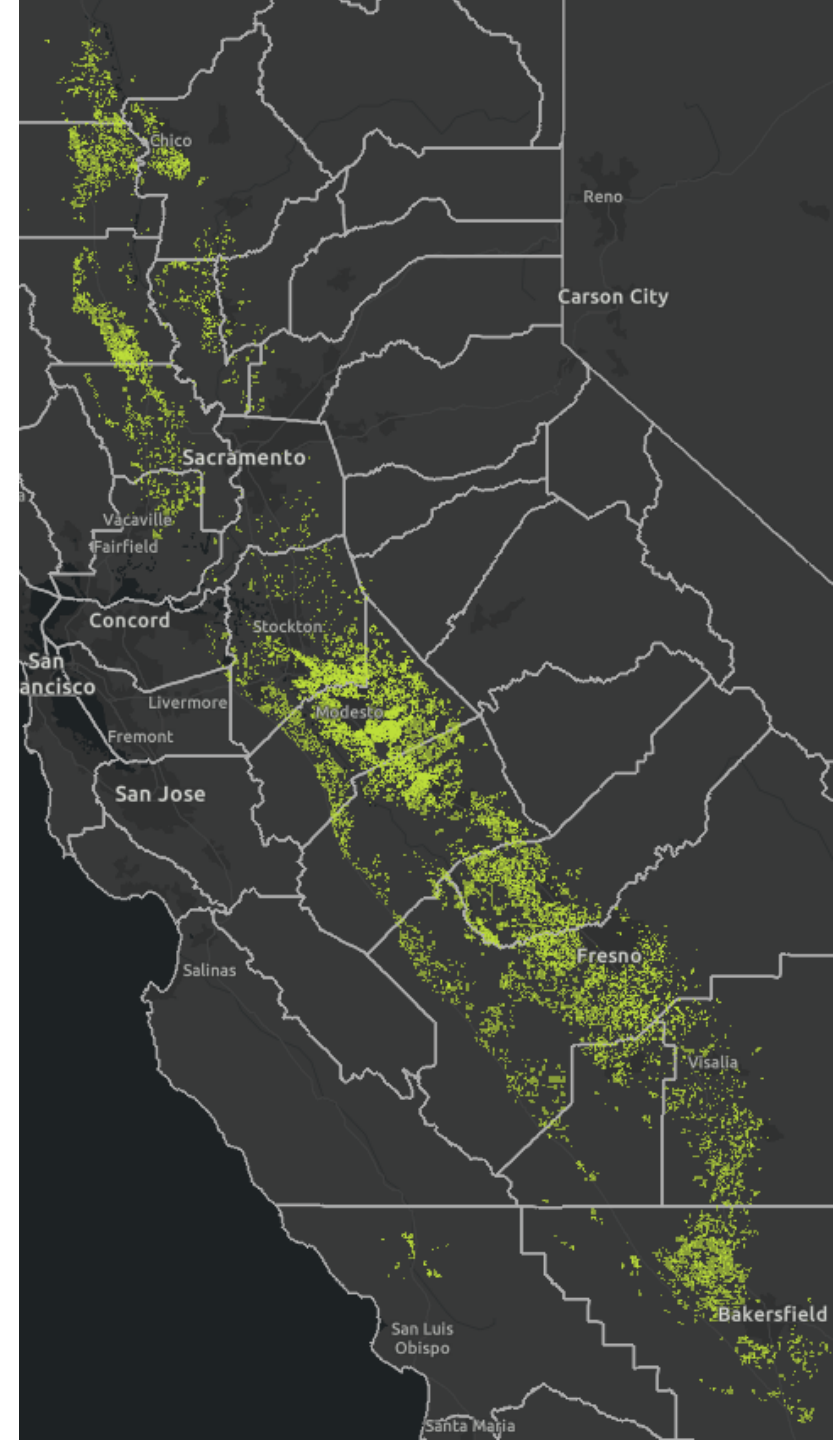
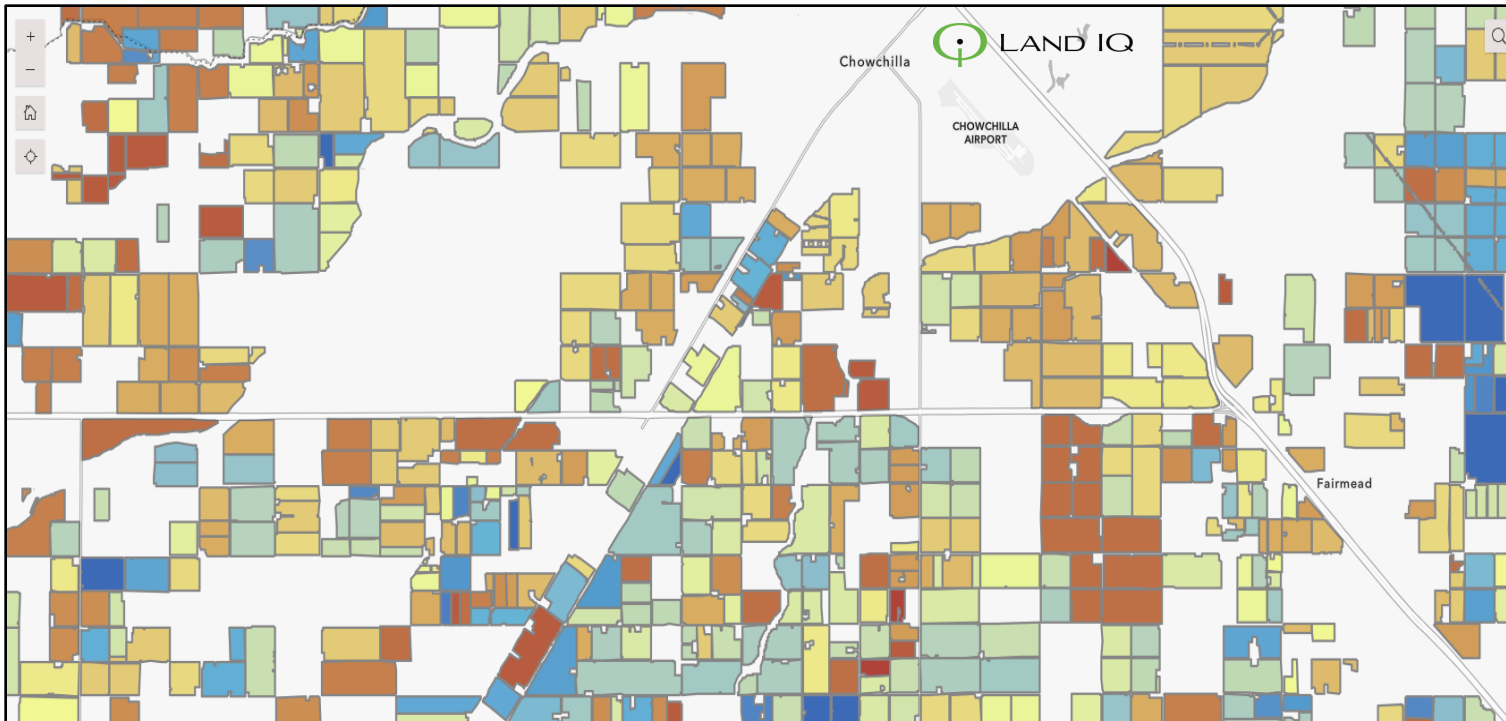
Development

- Data management tools
- Multiple commodity groups, GSAs, Water/Irrigation districts

FOUR VARIABLES NEEDED TO ESTIMATE TOTAL ALMOND YIELD

1. Acreage – How many actual producing acres are there?
2. Location – Where are these actual production acres?
3. Age – How old is every orchard?
4. Yield Estimate – What is the yield (in pounds/acre) considering the acreage, location, and age?

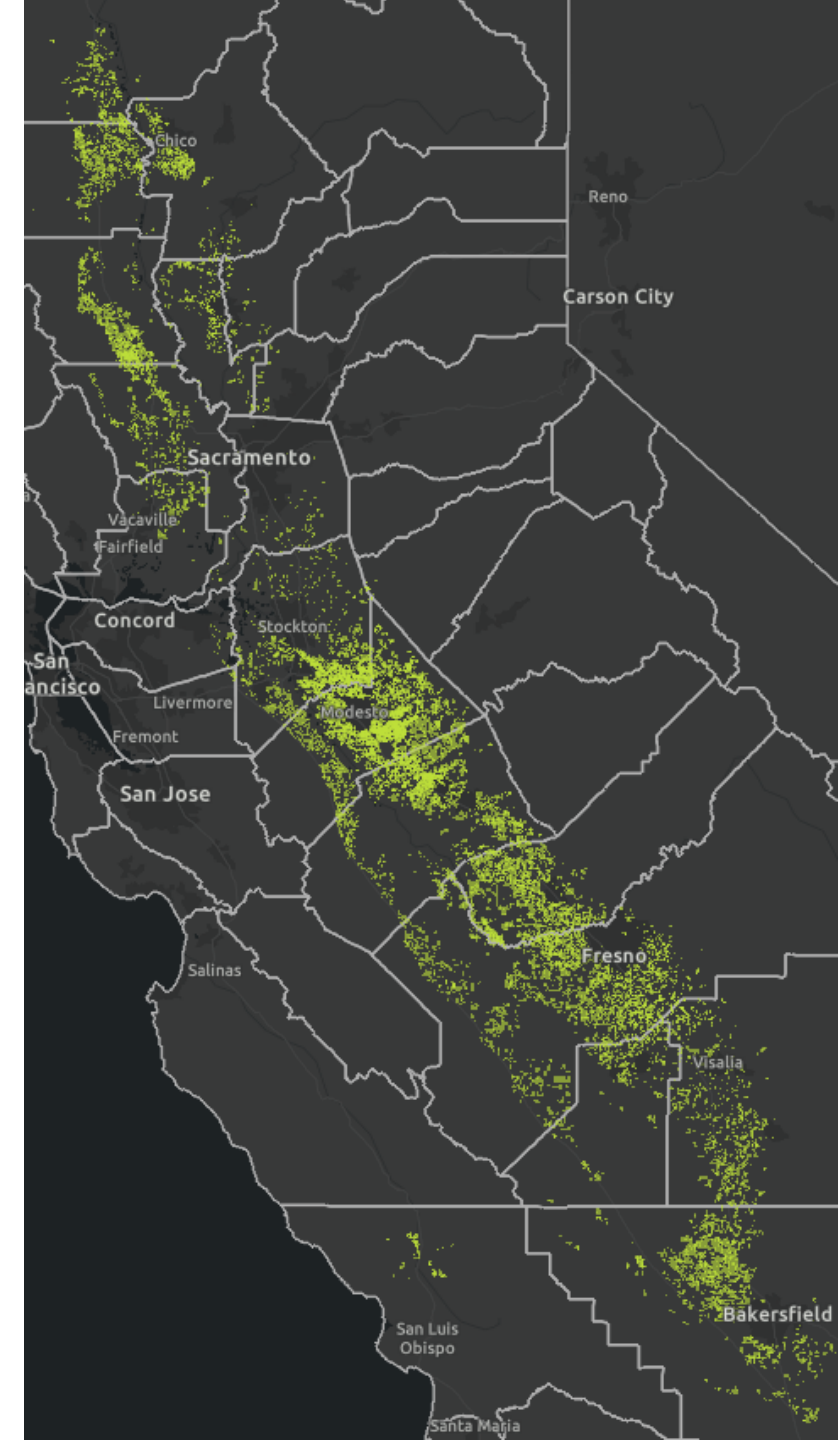
Year Planted



FOUR VARIABLES NEEDED TO ESTIMATE TOTAL ALMOND YIELD

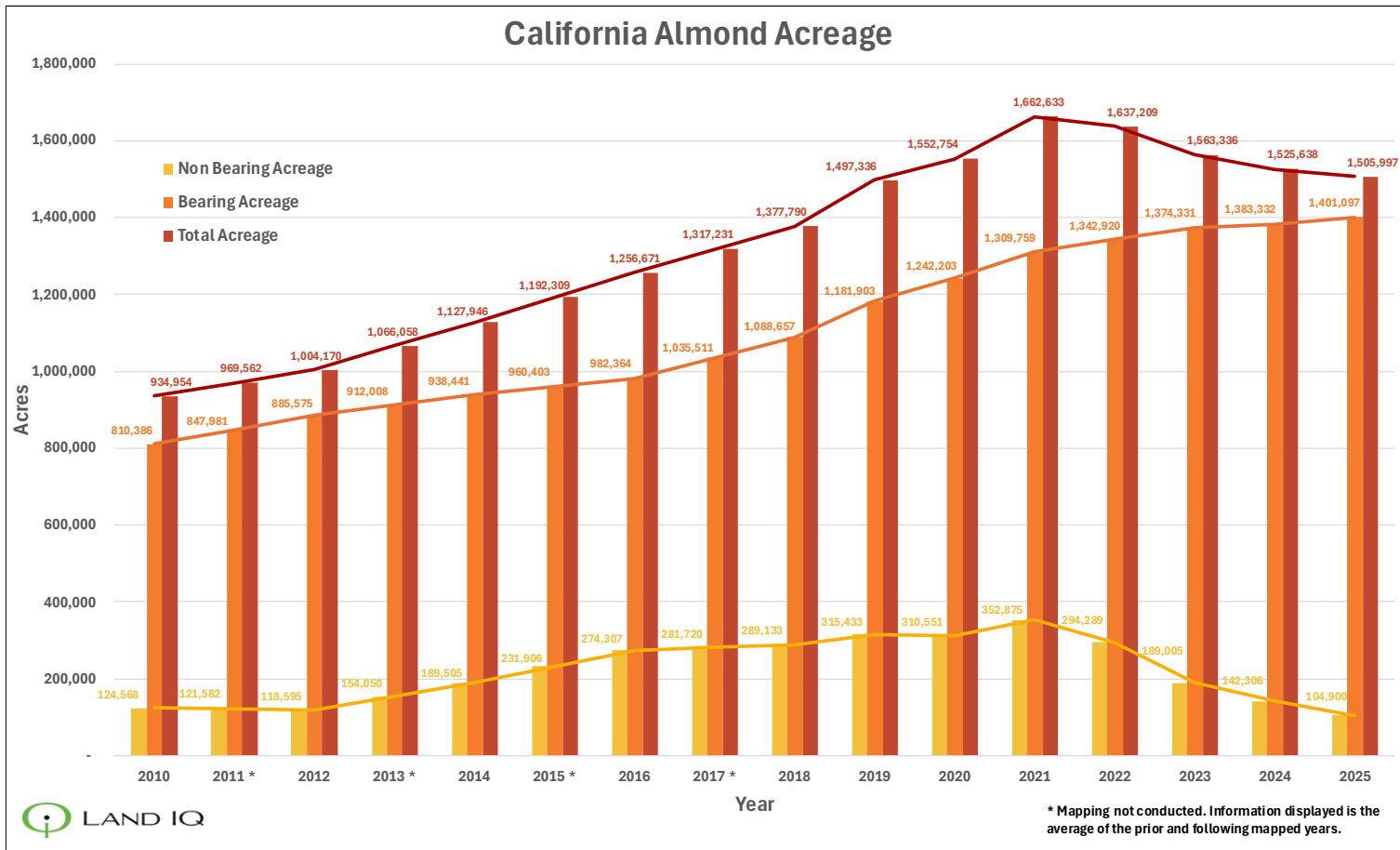
1. Acreage – How many actual acres are there?

- History and Approach – Standing acres only. Grower driven. Beginning in 2010.



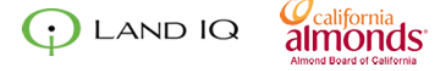
FOUR VARIABLES NEEDED TO ESTIMATE TOTAL ALMOND YIELD

1. Acreage – How many actual producing acres are there?
 - Bearing, Non-Bearing, Total: Is that all we need to know?



2025 STANDING ACREAGE - FINAL ESTIMATE

In cooperation with the Almond Board of California
Released: November 19, 2025



RESULTS

Each year Land IQ produces an in-year, statewide almond acreage estimate. This estimate is the result of extensive ground truthing and advanced remote sensing analytics, allowing Land IQ to differentiate almond orchards from other tree and annual crops.

The result is a highly accurate mapping of almonds that are a minimum of three years old. Almond orchards that are less than 3 years old cannot be consistently differentiated from other similarly aged tree crops using remotely sensed methods. The ground truthing data, proportionality of almonds to other tree crops, and other lines of evidence are used to numerically estimate acreage for orchards that are one and two years old. Both the remotely sensed and numerical estimates are combined for a total statewide acreage estimate. The 2025 estimate is 98.8% accurate.

As a result, the 2025 acreage estimate is:

- **104,900 non-bearing acres** (defined as those orchards planted in 2023, 2024, and 2025)
- **1,401,097 bearing acres** (defined as those orchards planted in 2022 and earlier)
- **1,505,997 total acres** (defined as total standing acres during the growing season of 2025)
- **19,927 potentially abandoned acres** (defined as orchards experiencing high levels of stress but included in the bearing and total acres above)

There is variation in the number of bearing acres between the initial and final estimates. This is the result of additional acreage (planted in 2021 or before) identified between the initial and final analyses. Additionally, the final total removed acreage was less than originally estimated. These two values account for most of the difference in final bearing acreage compared to the initial estimate.

Each mapping year, Land IQ not only maps all almond orchards within the state, but also applies a separate algorithm to quantify the age of each individual orchard. The accuracy of this estimate is greater than 95% at +/- 1 year. Based on that analysis, Land IQ determined that:

- 7 percent of California's almond orchards were 1-3 years old,
- 46 percent were between 4 and 10 years old,
- 34 percent were between 11 and 20 years old,
- 8 percent were between 21 and 25 years old, and
- 5 percent were over 25 years old.

APPROACH

Land IQ draws upon multiple lines of evidence including agronomic and remote sensing knowledge, unique field boundaries, robust on-the-ground verification, customized image analysis, artificial intelligence and machine learning algorithms to classify almond orchards.

For each mapped year, the following steps are taken as the basis for determination of bearing acreage and the numerical estimate of non-bearing acreage.

Imagery Acquisition

Evaluate and acquire imagery from various sources based upon cost and spectral, spatial, and temporal resolution suitability. New imagery sources allow for annual mapping of almonds.

Field Boundary Delineation

Utilize imagery and other resources to delineate individual fields defined as a homogenous crop. These boundaries are not legal boundaries of the property and do not include roads, homes or farmsteads. Irrigated field boundary positional accuracies are +/- 6 feet at a 95% confidence interval.

Ground Truthing

Identify and geo-reference crops through thousands of miles of actual verified orchards from Tehama to Kern County. These data provide necessary training data for algorithms as well as validation data for the classification.

Remote Sensing Analysis

Utilize custom image analysis, artificial intelligence, and machine learning algorithms to determine crop type. This allows for the differentiation of almond orchards from other tree and annual crops. Accuracy assessments are performed using statistical probability and validated against ground truth information.

Change Analysis and Update

Determine which orchards have been removed or added using a change analysis as part of the overall remote sensing efforts.

Non-Bearing Estimate

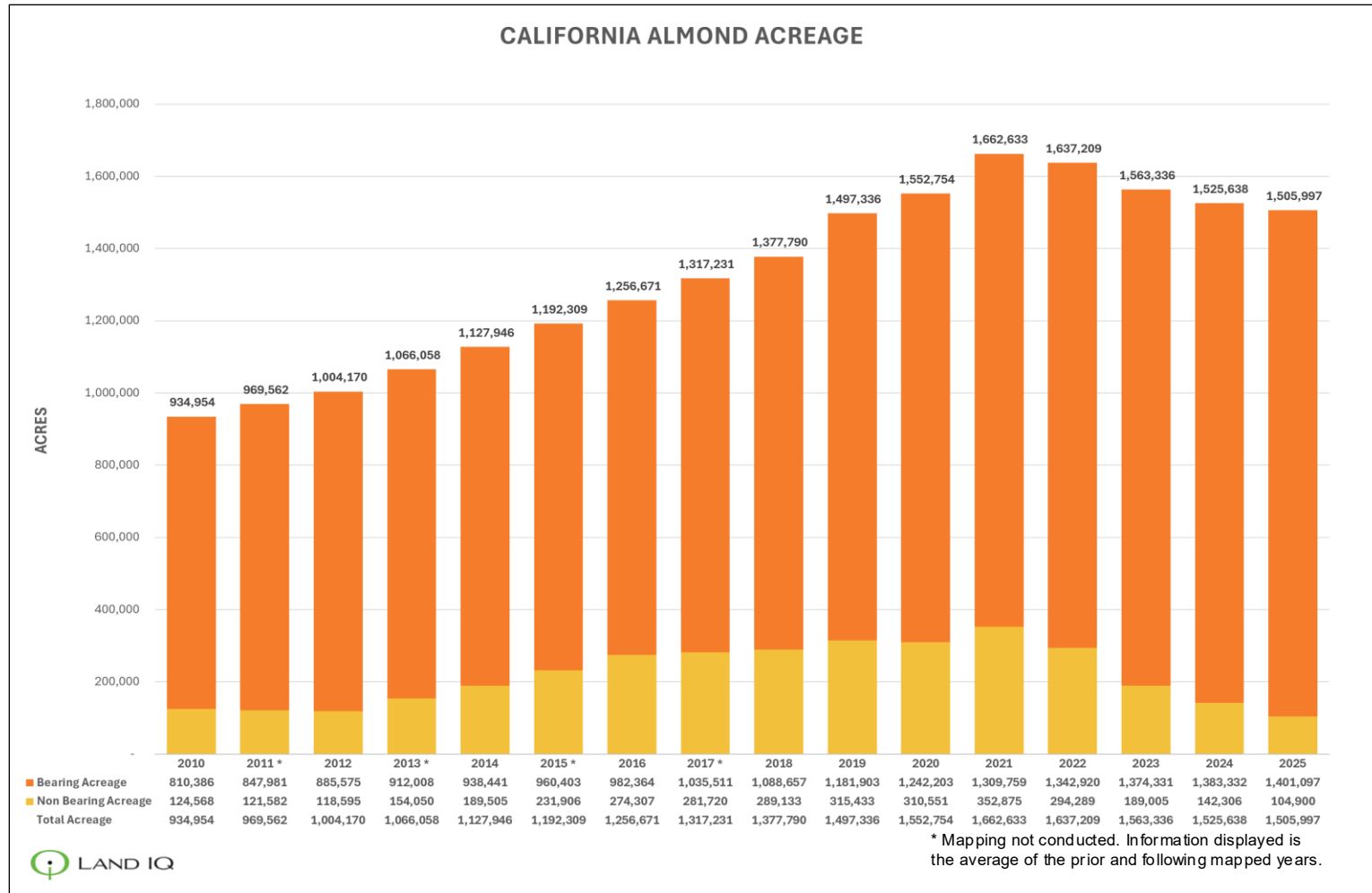
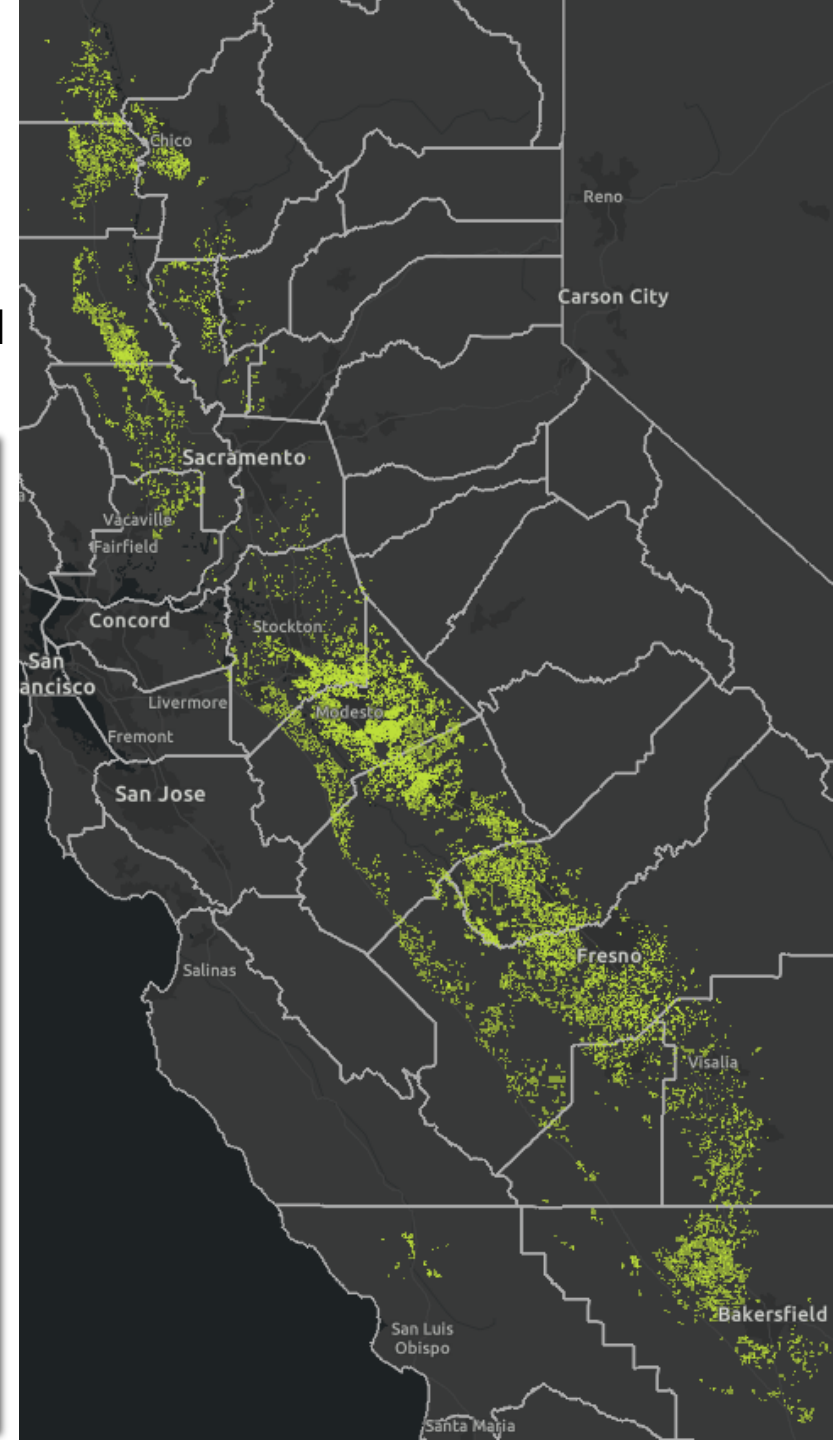
During the second mapping event, an estimate of non-bearing acreage is conducted, taking into account the data collected with ground truthing in the summer months.

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Sacramento, CA 95811
www.LandIQ.com - (916) 265-6330

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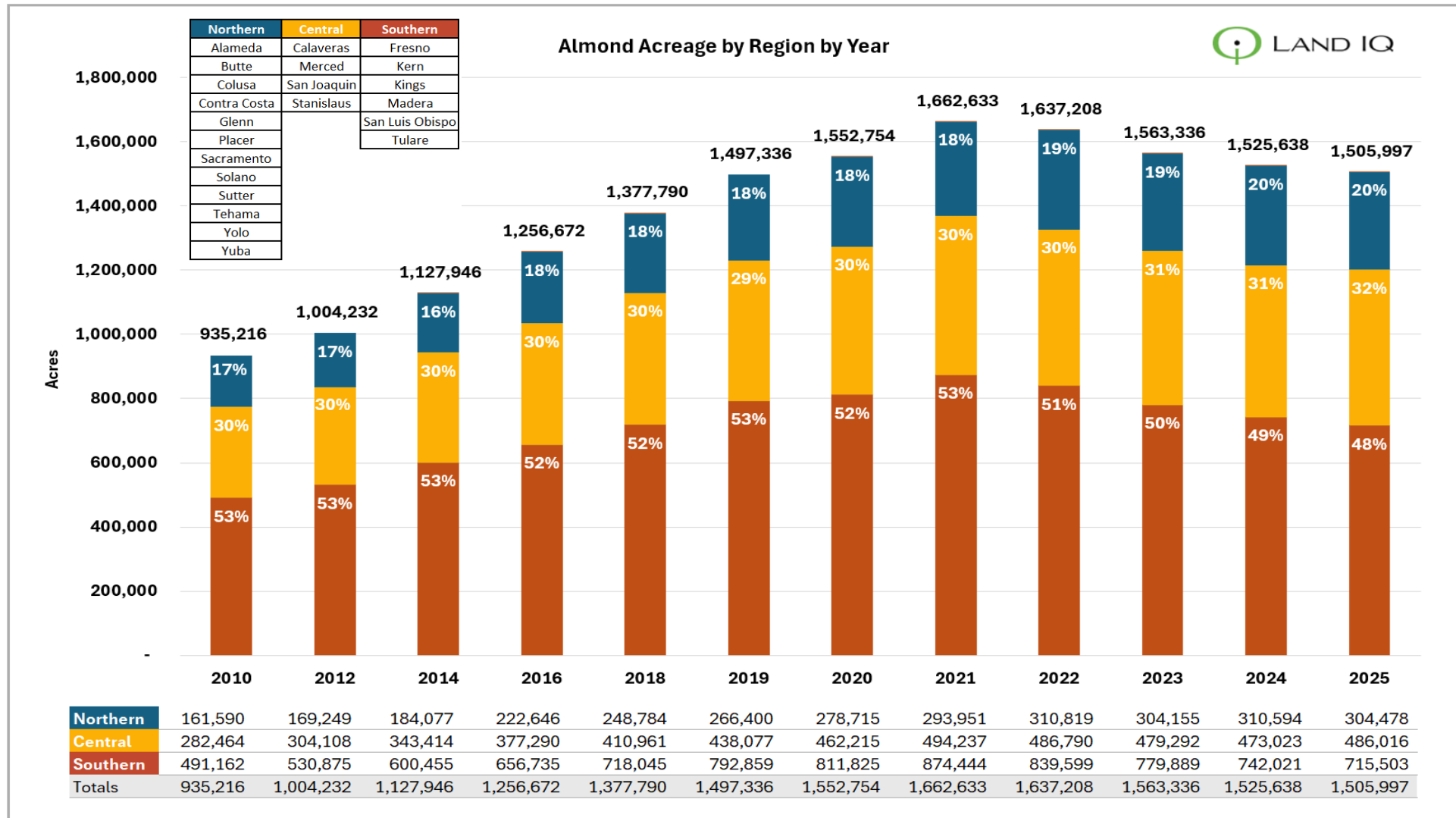
Other Variables: Standing vs Producing, Abandoned, Stressed, Removed



FOUR VARIABLES NEEDED TO ESTIMATE TOTAL ALMOND YIELD

2. Location – Where are these actual production acres?

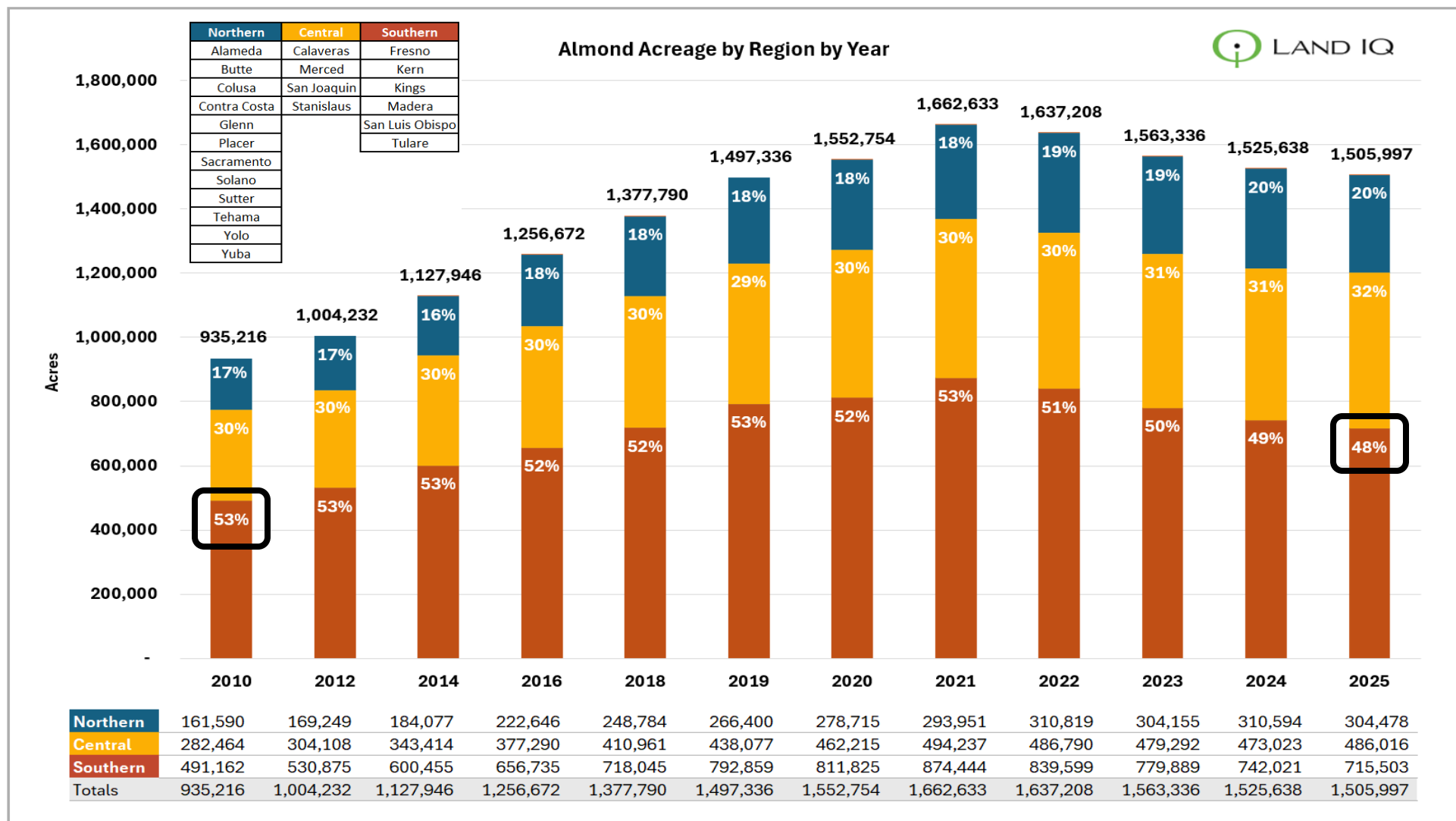
- Known relationship between yield and location – yields generally increase from north to south



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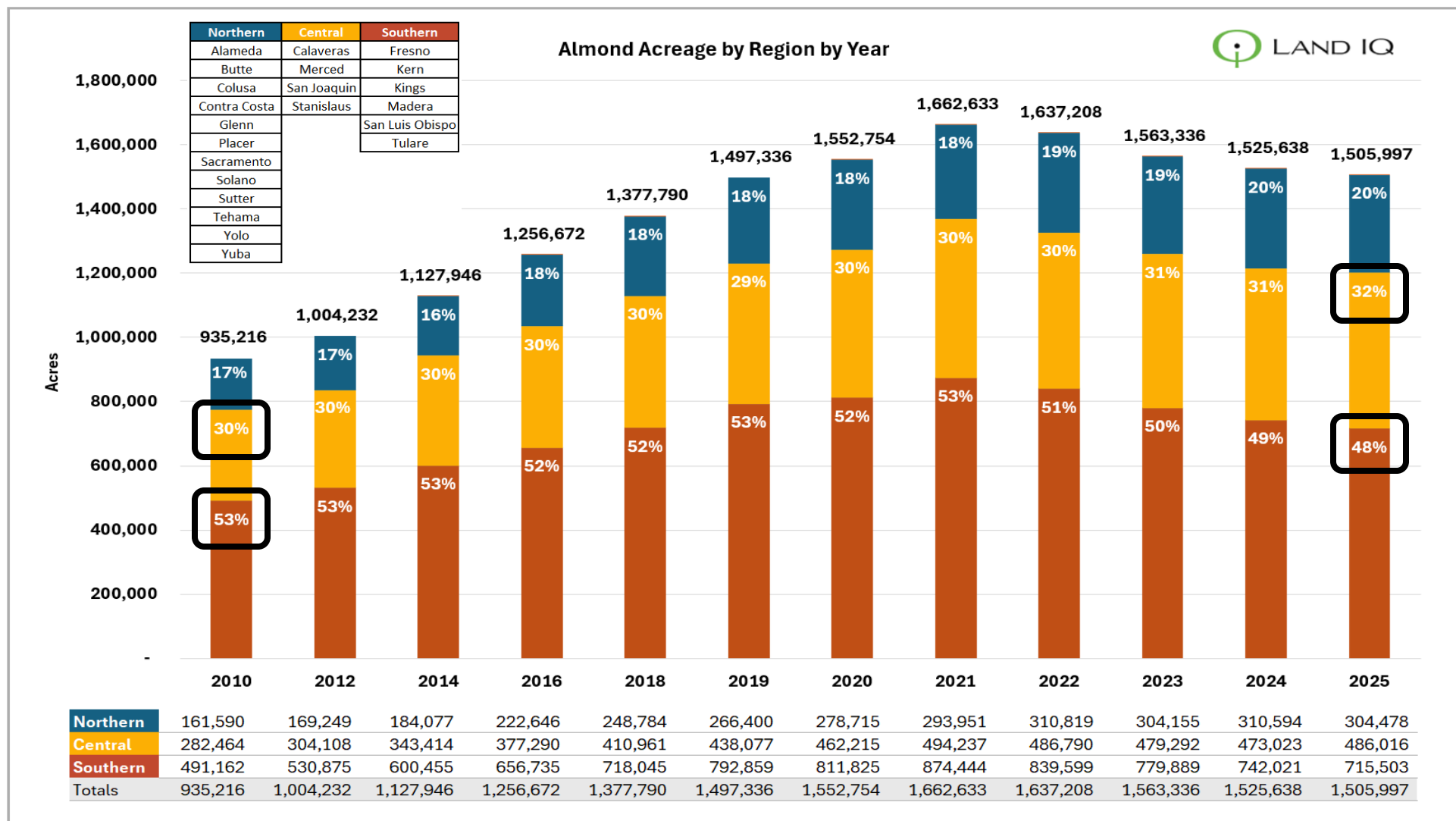


-5%

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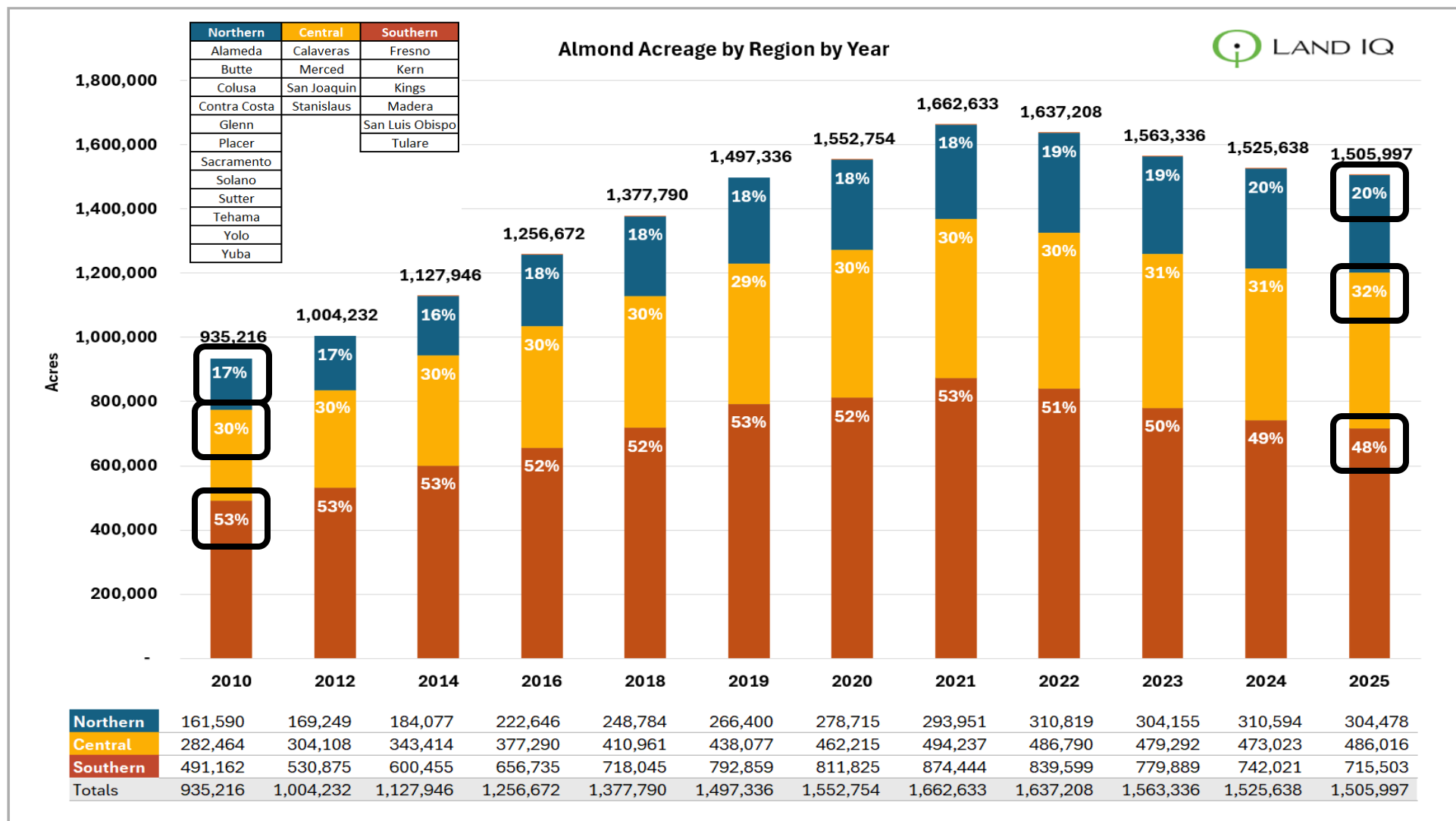
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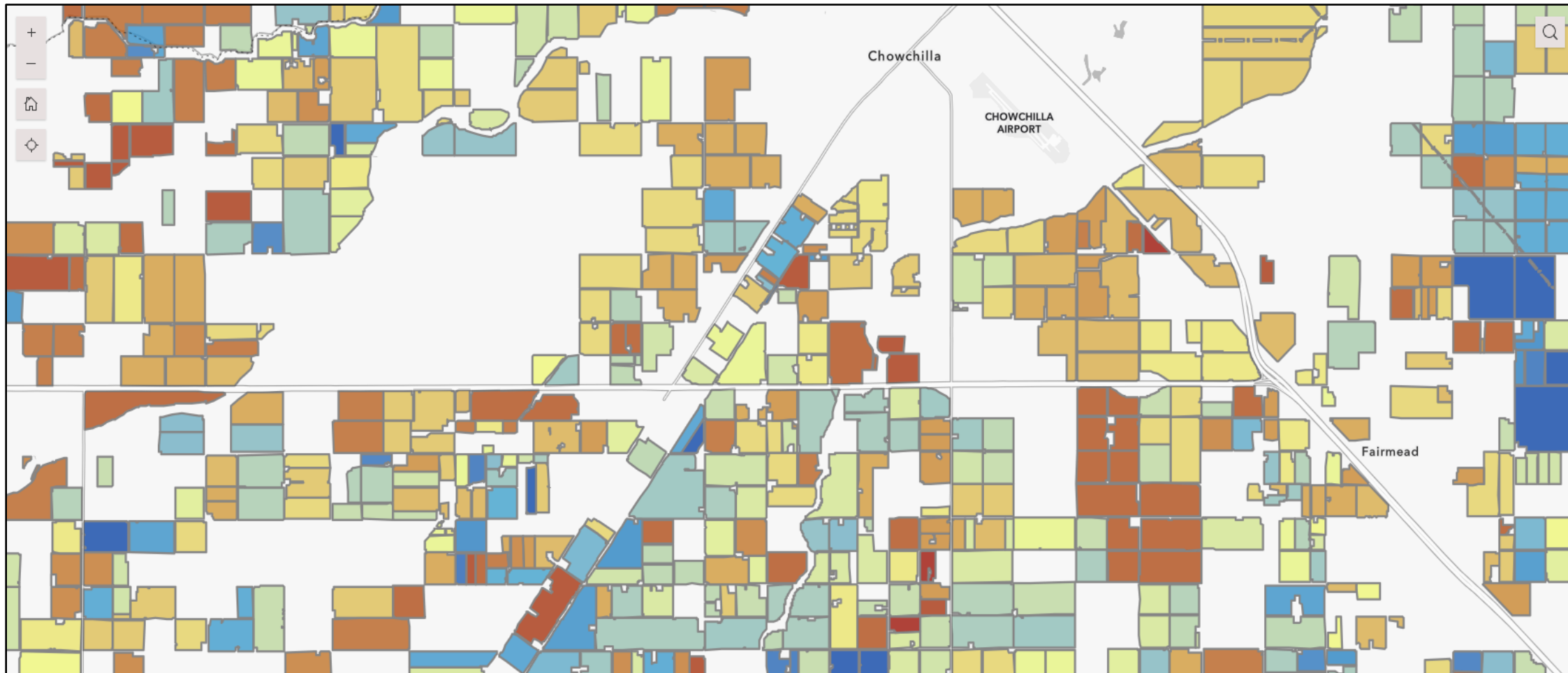
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FOUR VARIABLES NEEDED TO ESTIMATE TOTAL ALMOND YIELD

3. Age – How old is every orchard?

- Known relationship between yield and age – yields increase with age, to a point.
- Southern SJV (#/ac): Year 3: 600, Year 4: 1200, Year 5: 2400, Year 6+: 2800



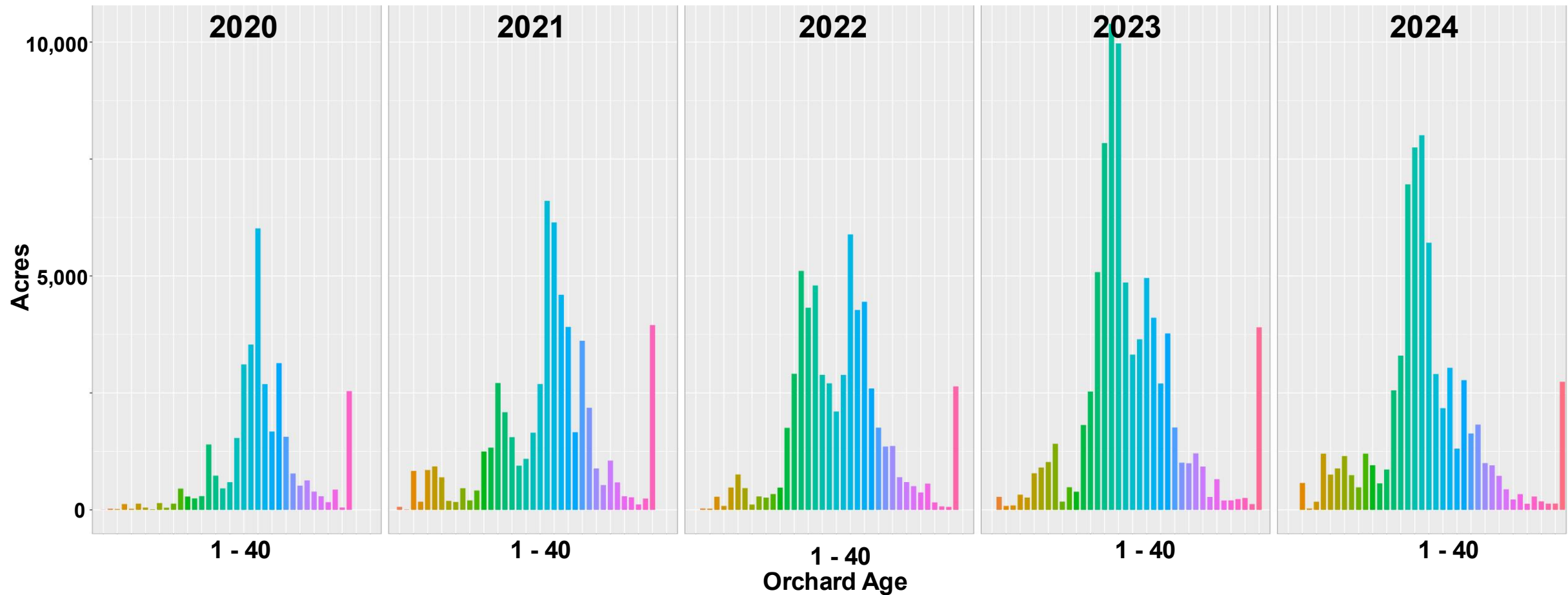
Year Planted

- 2024
- 2023
- 2022
- 2021
- 2020
- 2019
- 2018
- 2017
- 2016
- 2015
- 2014
- 2013
- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
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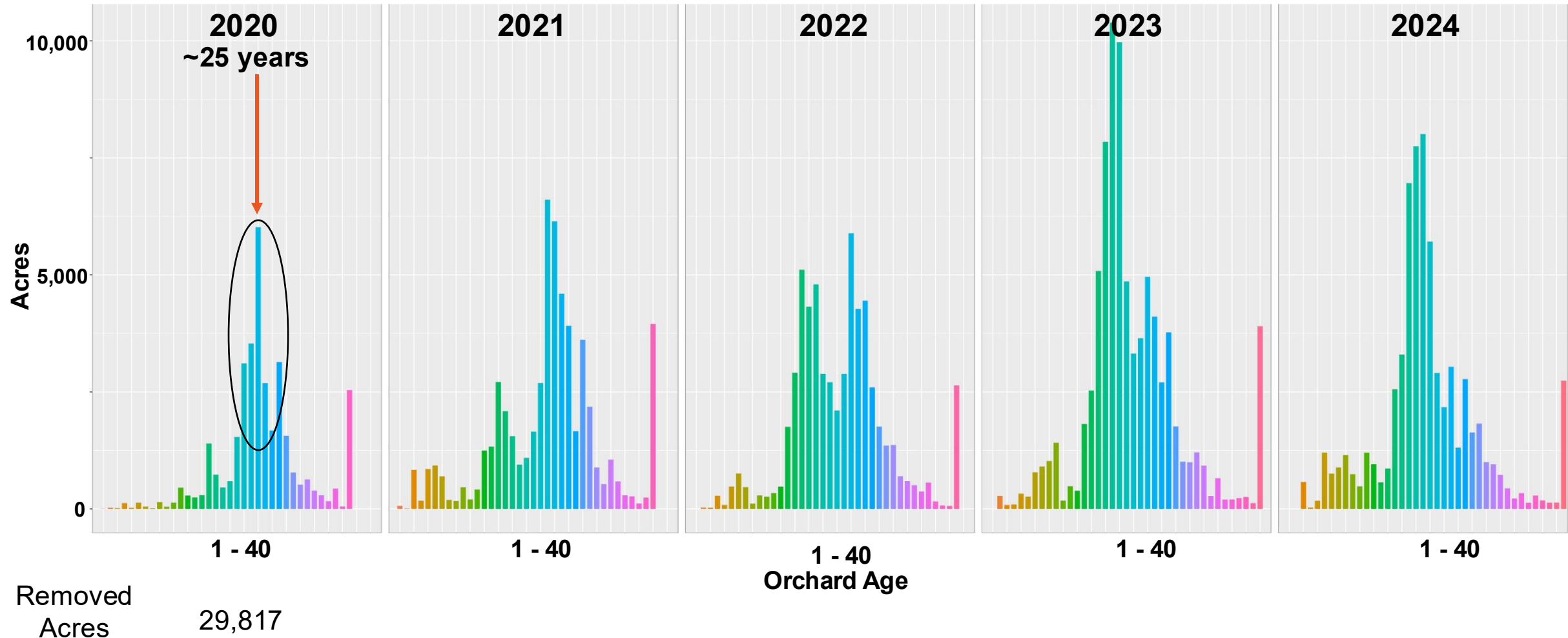
- Removed orchards by age: Is there a trend in removals associated with age?



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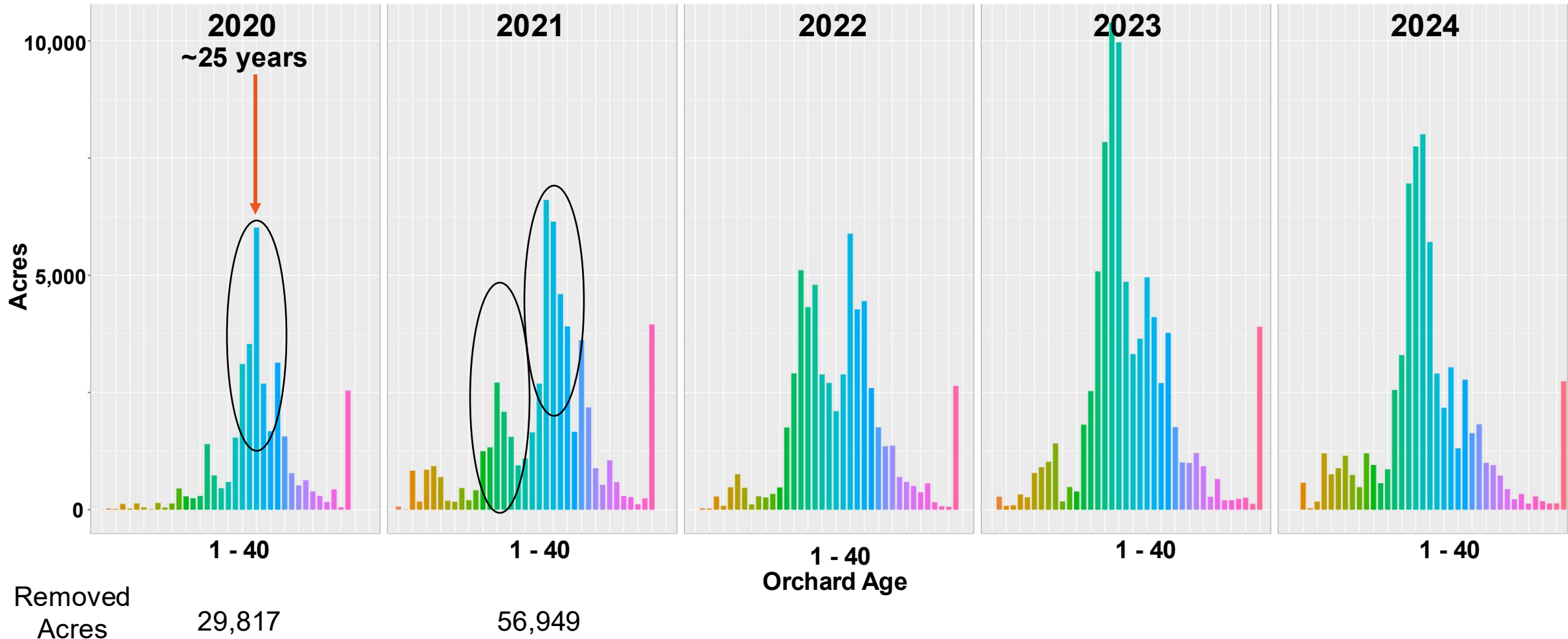
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- Was this driven by price? Regardless, it's a quantifiable trend



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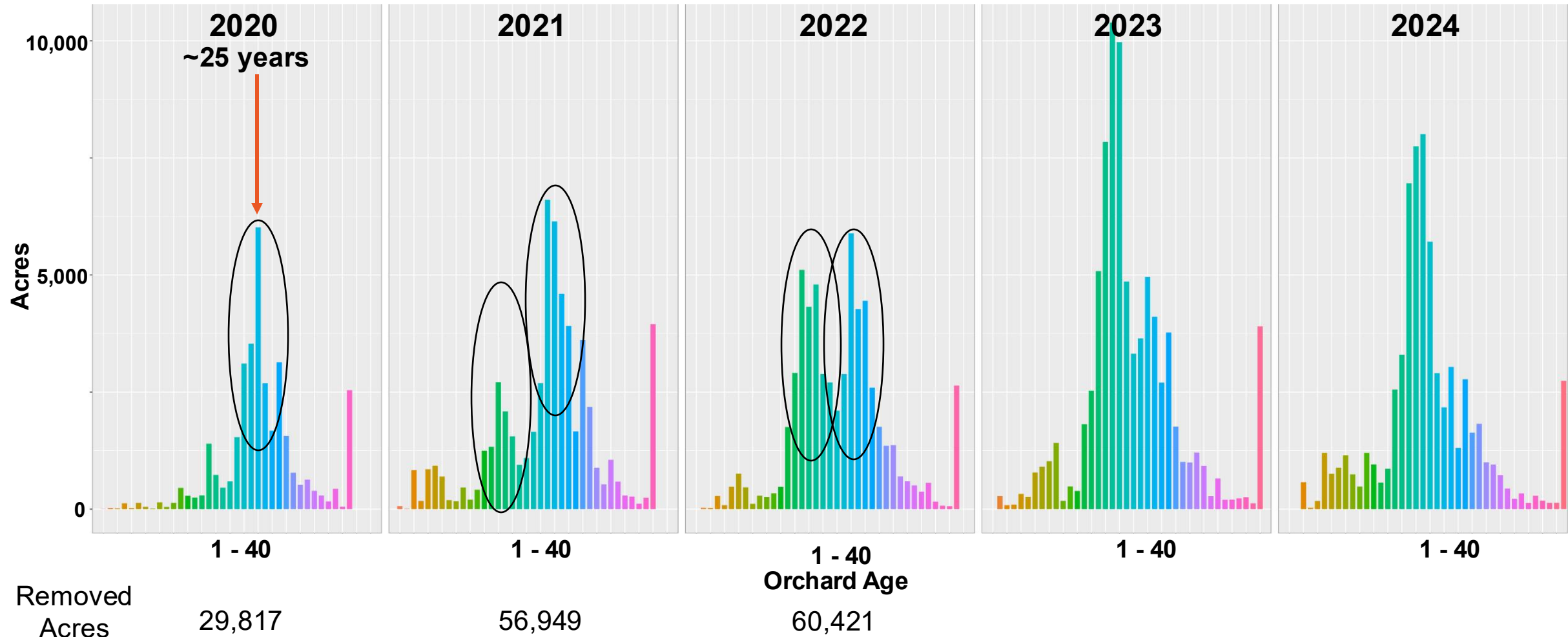
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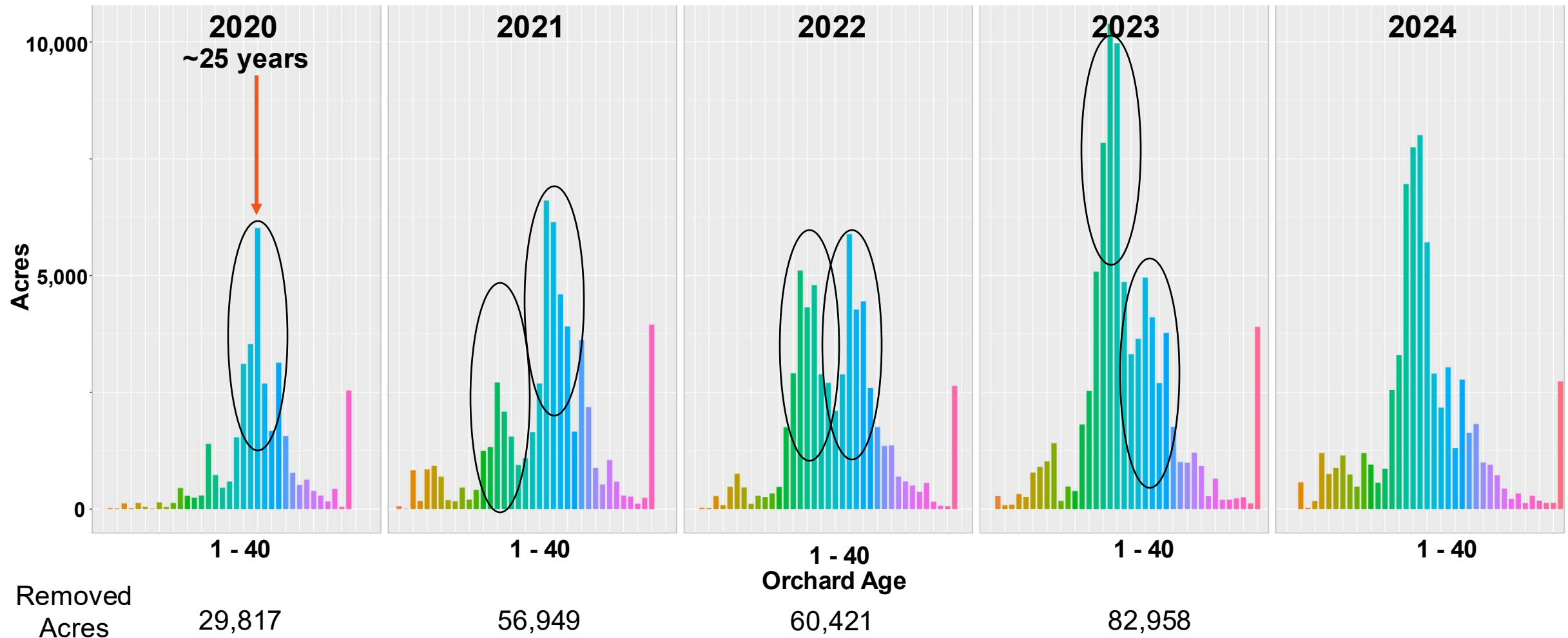
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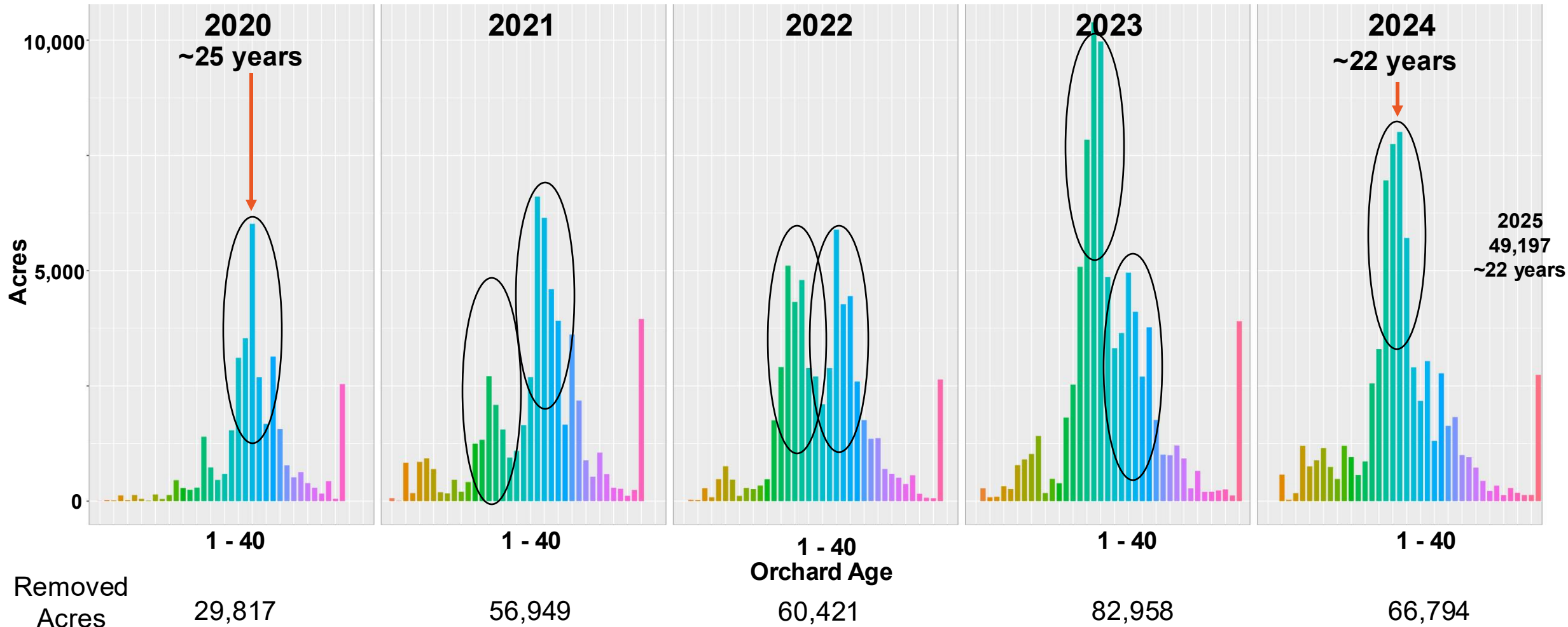
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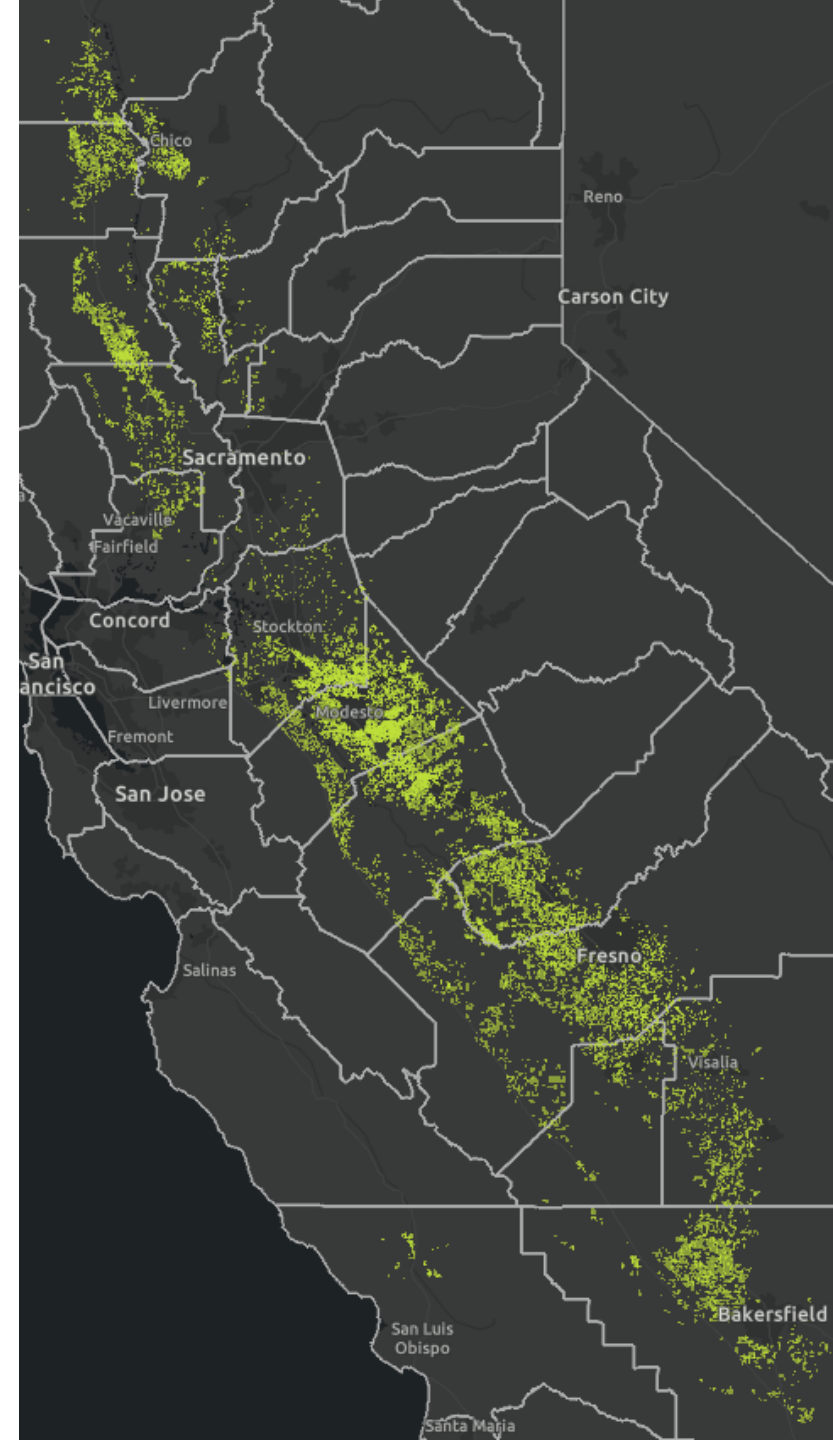
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FOUR VARIABLES NEEDED TO ESTIMATE TOTAL ALMOND YIELD

4. Yield Estimate – What is the yield (in pounds/acre) considering the acreage, location, and age?

- We know highly accurate acreage (99%), location (99%), and age (+/- 1 year @ 95% confidence)
- We have answered 3 out of 4 variables
- How is the last variable determined? – likely a combination of:
 - Field observations: (e.g. counting nuts on trees)
 - Modeling approaches: (e.g. environmentally driven)
 - Crowd sourcing of current yield (e.g. surveys)
 - Grower determined?
 - Buyer determined?
- All have strengths and limitations
- When incorporating all available information, expected and repeatable variability should be (+/- 2-5%) – year over year.





THANK YOU!

Land IQ Contributors:

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CULTIVATING A HEALTHIER

FUTURE

Bountiful

Forecasting Methodology
The Almond Conference

Megan Nunes, Founder & CEO

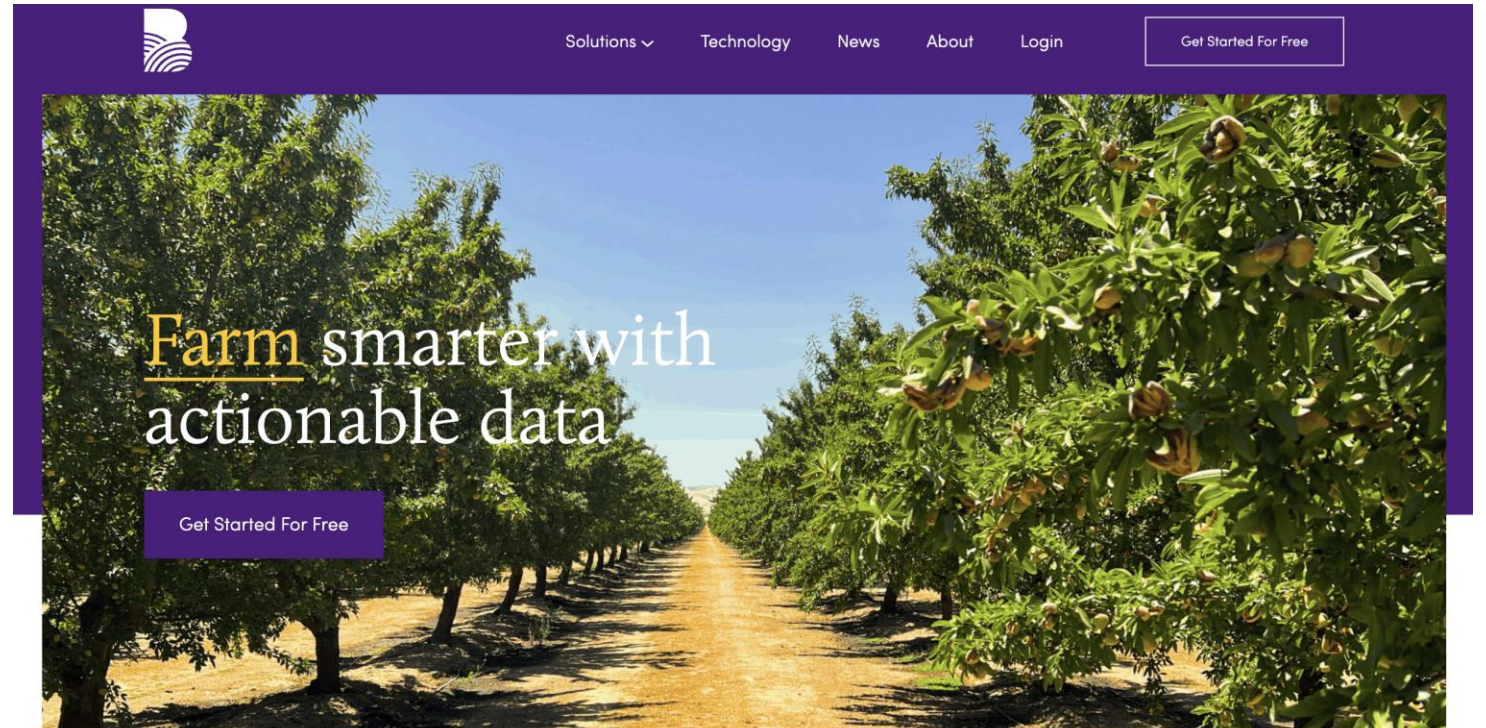
December 11, 2025



Bountiful

About, Introduction

- Operating System for Ag
- Specializing in data & analytics
- Working with farmers, sellers, and buyers
- Crop types: almonds, walnuts, pistachios, apples, cherries, citrus, & grapes



Why Bountiful

Our Goal

- Deep passion for agriculture and technology: share our talents
- Help farmers with things they had little time for or uninterested in
- Bring truth and observability into specialty agriculture; “Can only improve what you measure”
- We saw a need for accurate and clean data -> leverage technology to make improved decisions



Who

Our Customers

- Anyone in the specialty crop value chain: farmers, sellers, buyers
- Focus on farmers with large land holdings with multiple assets
- Anyone using technology to help solve problems on farm



Almond Forecasting In-Season

Our Approach - ML

- We forecast almond yield for CA state, and almond growing counties: 4x before harvest
- We use a suite of Machine Learning (ML) models utilizing supervised learning to map input features like weather, satellite imagery, soil, geography, age, practices to a yield outcome.
- We train on historical data and then pull in season conditions to get an updated outlook on the crop: 5-7 years worth of training for accurate results (90% or better)
- Forecasting yield capture true biological signal driving production



Bountiful Forecasts

2025/2026 Almond Crop Size

- **Four Forecasts Released**
 - April to July
 - Range: low, median, upper
- **Median Range April to July**
 - 2.67B Lbs. to 2.76B Lbs.

2025 Bountiful Yield Forecast Distribution				
Release Date	Lower	Median	Upper	
April 15, 2025	1,870	1,941	2,012	
May 12, 2025	1,905	1,984	2,063	
June 12, 2025	1,910	1,990	2,070	
July 14, 2025	1,925	2,003	2,081	
Avg	1,903	1,980	2,056	

2025 Bountiful Production Forecast Distribution				
Acres	Lower	Median	Upper	
1,376,129	2,572,905,073	2,671,066,777	2,769,228,481	
1,376,129	2,621,713,280	2,730,240,333	2,838,767,386	
1,376,129	2,628,409,524	2,738,497,108	2,848,584,692	
1,376,129	2,649,438,980	2,756,386,788	2,863,334,595	
Avg	2,618,116,714	2,724,047,751	2,829,978,788	



Almond Projection Post-Season

Our Approach

- After harvest, as crop receipts come in, we project production (and yield) from the position reports
- Receipts follow a sigmoid s-curve: Aug-Oct: exponential, Nov-Dec: beginning to converge, Jan: curve flattens
- By November report: **76-88%** of crop
- By December report: **91-97%** of crop
- By January report: **96-99%** of crop



How does this all help?

Data driven approach

- 1. Know your orchard like an asset:** keep accurate records of historical production and bearing acreage (tree counts) and know these by ranch/block/variety.
- 2. Track what you do, not just what you harvest:** tracking all on farm activity like irrigation/fertigation, spray logs, bees, pruning, labor, inputs, etc. Measurable data you can act on.
- 3. Keep everything in singular digital home:** Clean organized, structured data is the bedrock for better decision making
- 4. Turn data into insights:** can introduce basic statistics, ML or even AI models on top of your data. Early predictions in yield, confidence in cash flow/inventory, needs on water/fertilizer/bees. De-risks yourself: reduces surprises, make faster decisions, capture more value.



Bountiful Current View

2025/2026 Almond Crop Size

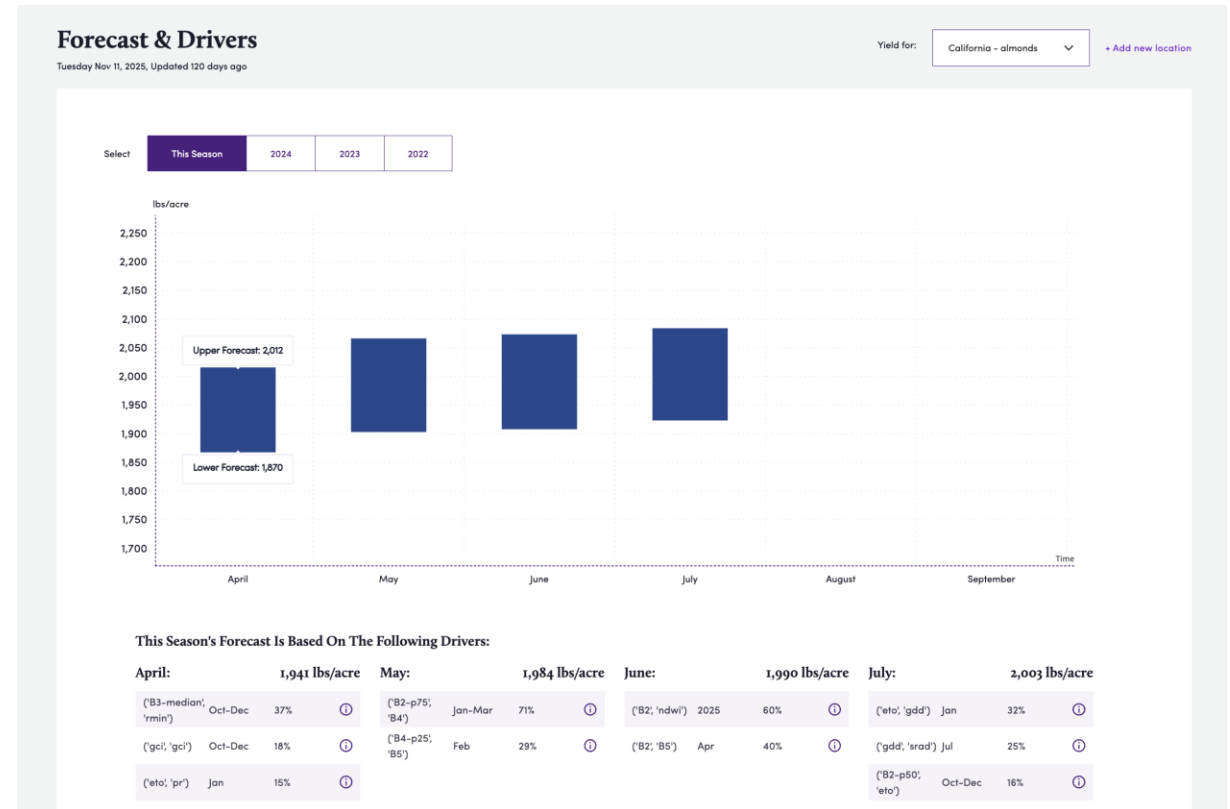
- As of November's Position Report

- Crop receipts trending towards April forecast

- Low to Median

- Low to Median Range

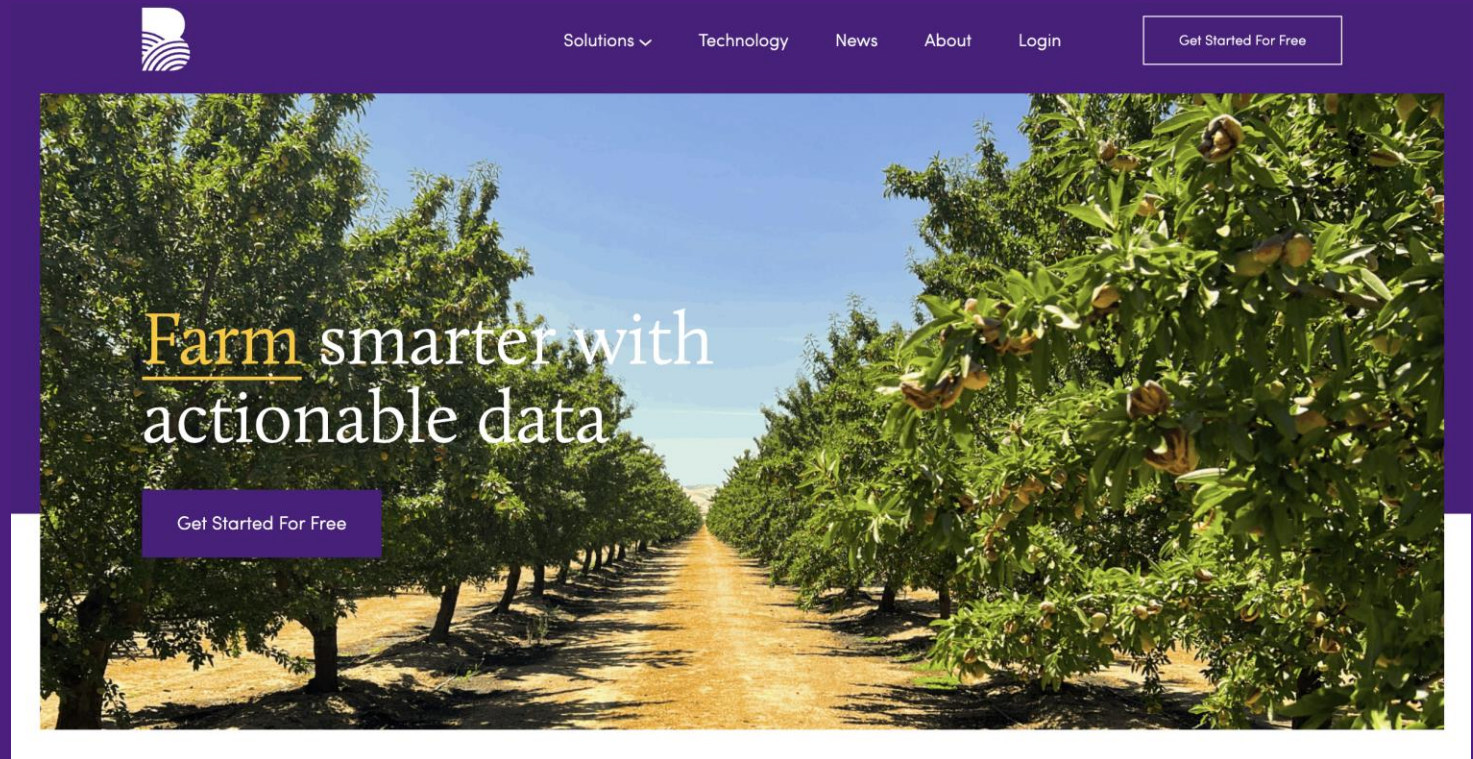
- 2.53B Lbs. to 2.67B Lbs.



Thank you!

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December 11, 2025





Terra Nova

T R A D I N G I N C.

A N N U A L C R O P E S T I M A T E

WHY BOTHER?

****OPINIONS / COMMENTS ARE TNT'S PERSONAL VIEWS
AND NOT THOSE OF ALMOND BOARD OF CALIFORNIA****



HISTORY & REASON FOR EARLY ESTIMATE

- ❖ Born out of frustration after “chaotic” market of 1995:
 - 1995 Subjective of 430m lb. crop (*1994 crop was 735m lb!*)
 - 1995 Objective of 310m lb. crop
 - 1995 Final Crop of 370m lb.
- ❖ Lack of crop information from bloom until Subjective Estimate in May – usually some “horror stories” in certain areas of the state.
- ❖ Starting point for ALL industry stakeholders to discuss potential supply & demand for upcoming new crop season.
- ❖ Offer an independent view on ESTIMATED crop size & observations about different areas of the state and different major varieties.
- ❖ Essentially, a level playing field for buyers & sellers to provide more confidence in new crop marketing decisions.



CURRENT PROCESS FOR TNT ESTIMATE

- ❖ Start by comparing our orchard estimates to actual yields thanks to information provided by growers / handlers on large portion of orchards
- ❖ Analyze latest Land IQ data (November) and latest crop receipts from ABC report to establish representative orchard sample set based on:
 - total acreage per county / proportion to entire state
 - tree age demographics
 - crop receipts by variety & county.
- ❖ “On the road” for 7-8 days estimating 60-70/day SAME orchards until it is removed and then “replace” with newly bearing orchard in same area – **covered 560 orchards in 2025 with 3 readings in each orchard!**
- ❖ Most important factor is number of data points (1,680) and an accurate representation of California’s Acreage by Location / Age / Variety.

COMPARING ESTIMATES SINCE 2011

<u>Year</u>	<u>TNT</u>	<u>SUBJECTIVE</u>	<u>OBJECTIVE</u>	<u>FINAL CROP</u>
2011	1,840	1750	1950	2,020
2012	1,830	2000	2100	1,884
2013	1,960	2000	1850	2,010
2014	2,000	1950	2100	1,868
2015	1,880	1850	1800	1,894
2016	2,060	2000	2050	2,136
2017	2,270	2200	2250	2,260
2018	2,510	2300	2450	2,270
2019	2,530	2500	2200	2,551
2020	2,960	3000	3000	3,107
2021	2,800	3200	2800	2,922
2022	2,900	2800	2600	2,571
2023	2,290	2500	2600	2,446
2024	2,970	3000	2800	2,710
2025e	2,800	2800	3000	?

Within 1%

Within 3%

Within 5%

More than 5%

Why is it becoming more difficult to estimate California's Almond Crop?

- Acreage – multiplier effect of small yield differences**



MORE THAN JUST A NUMBER...

- ❖ Provides not only the crop estimate, but “full readers” enjoy a **State of the Industry highlighting trends from a supply side of view:**
 - variety receipts,
 - abandoned orchards / removals,
 - new plantings
 - Hopefully, likely future yields.
- ❖ **Benefits to ALL industry’s marketing efforts** when discussing entire California crop and not just the poor, usually isolated, production areas that are more talked about – for example, Kern Co in 2024, W. Fresno in 2025.
- ❖ Starts discussion about new crop’s likely supply and demand situation **allowing growers, handlers and buyers to hedge their risk of future price movements** through transparent and efficient free-market pricing.



ROOM FOR IMPROVEMENT?

- ❖ **Future Improvement for TNT estimate will focus on:**
 - Collecting as many actual yields as possible from willing growers & handlers to improve our estimates of each sample orchard
 - Using “nut counting” technology in orchards to get a yearly OBJECTIVE estimate for some/all of our sample orchards
 - Using more and improved data to better assess future trends in average orchards yields
 - Increasing orchard sample size / data points
- ❖ TNT Estimate Goal: to be **CONSISTENTLY** within 100lb. per acre of statewide average yield – that’s still +/-5%.
- ❖ As an **industry finding methods for estimates to be within +/- 2.5%**, or about 50lb per acre, should be our ultimate goal. GOOD LUCK!!



**THANK
YOU!**



**20
25** THE ALMOND
CONFERENCE

CULTIVATING A HEALTHIER

FUTURE

MARKET REACTION TO ESTIMATES...

New Crop Sales - Prior to Harvest						
Year	May	% of Subj	June	% of Subj	July	% of Obj
2018	80.8	3.5%	156.3	6.8%	260.9	10.6%
2019	133.2	5.3%	231.3	9.3%	351.9	16.0%
2020	286.5	9.6%	458.0	15.3%	695.9	23.2%
2021	231.5	7.2%	326.1	10.2%	441.5	15.8%
2022	128.6	4.6%	236.0	8.4%	298.4	11.5%
2023	57.5	2.3%	122.4	4.9%	204.9	7.9%
2024	173.1	5.8%	271.3	9.0%	379.0	13.5%
2025	65.7	2.3%	111.5	4.0%	284.8	9.5%
Average: 2018-2024		5.5%		9.1%		14.1%
2025	Forecast 2018-24	153.2		273.7		422.2
2025	Actual	65.7		111.5		284.8
	Difference	-57.1%		-59.3%		-32.5%

Lowest new crop pre-harvest sales for a decade, COMBINED with a much larger than expected Objective Estimate, created a short-term market decline as growers and handlers had to play “catch up” on new crop sales.

Highlights importance of disciplined marketing programs by growers / handlers!