
STATE OF THE
INDUSTRY

HOW WOULD YOU DESCRIBE THE STATE OF THE INDUSTRY?

NEW JOURNEY OF THOUGHT, INNOVATION, AND LEADERSHIP

State of the Industry

- Richard Waycott, Almond Board of California (Moderator)
- Karen Ross, Secretary, California Department of Food and Agriculture
- Joel Kimmelshue, Land IQ
- Mike Mason, Supreme Almonds of California
- Chris Messer, USDA NASS

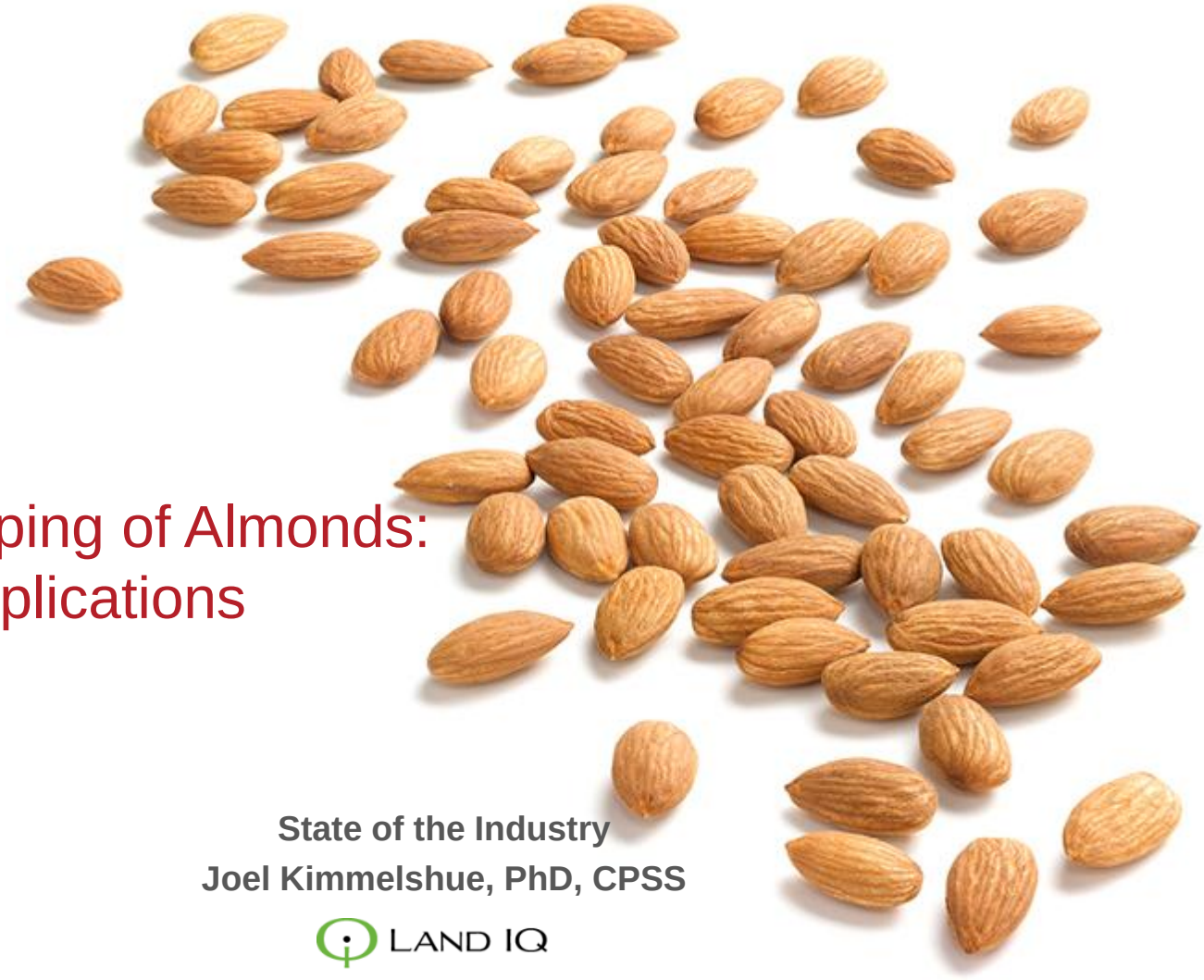

cdfa
SECRETARY
KAREN ROSS

Karen Ross,
Secretary, California Department of Food and Agriculture

california almonds
Almond Board of California


LAND IQ
USDA
National Agricultural
Statistics Service
AGRICULTURE
COUNTS

Joel Kimmelshue, Land IQ



Statewide Mapping of Almonds: Results and Applications

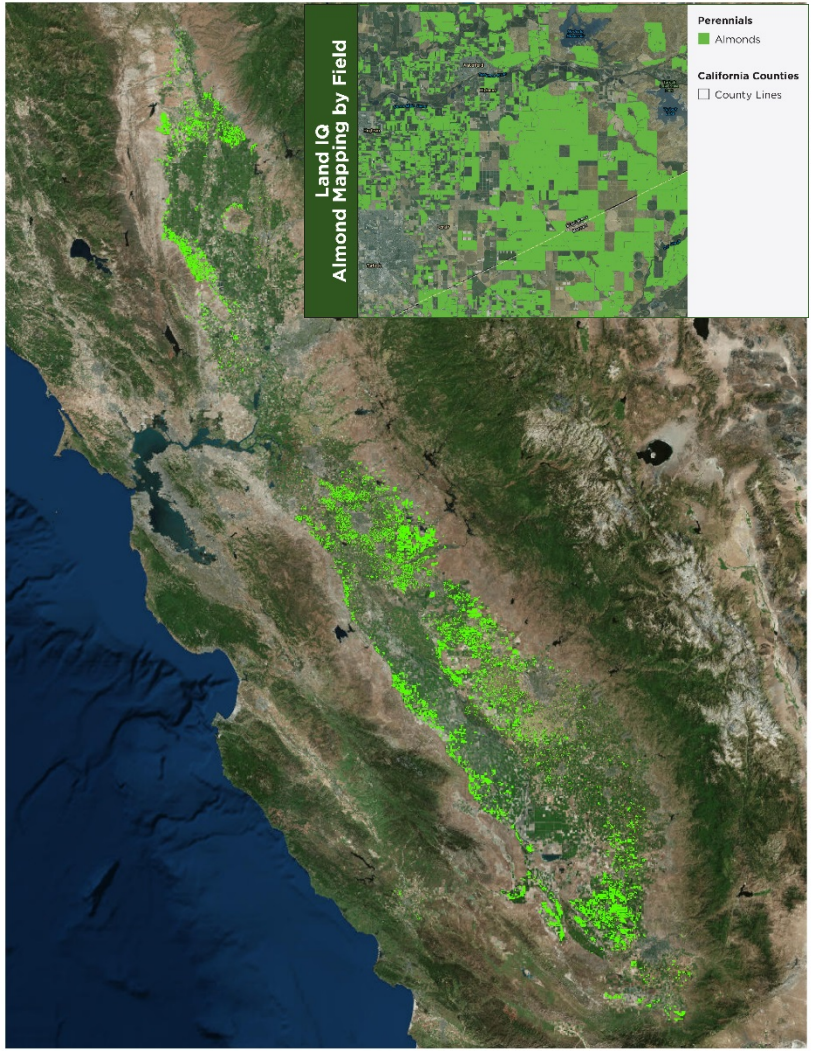
State of the Industry

Joel Kimmelshue, PhD, CPSS

LAND IQ

Presentation Summary

- Cooperators, Resources, and Development Timeline
- Acreage Results
- Applications
  - Age Analysis
  - Recharge Potential
- On-Line Web Map
- Conclusions



Cooperators, Resources, and Development Timeline

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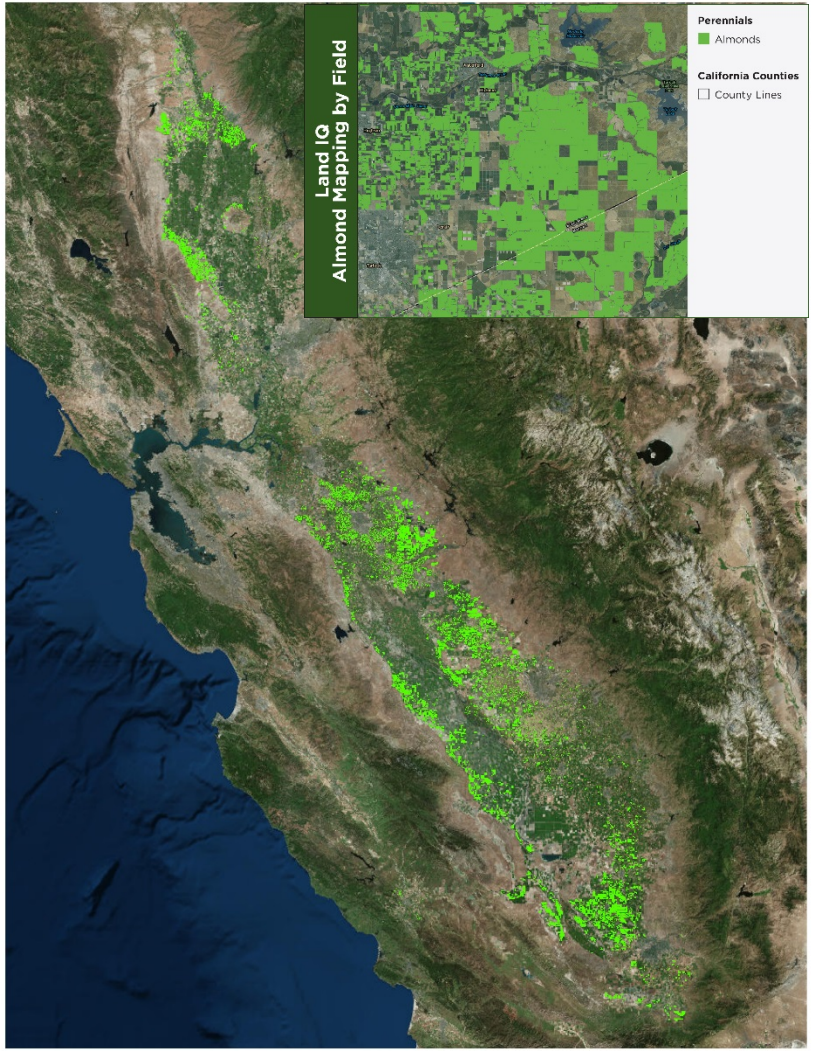
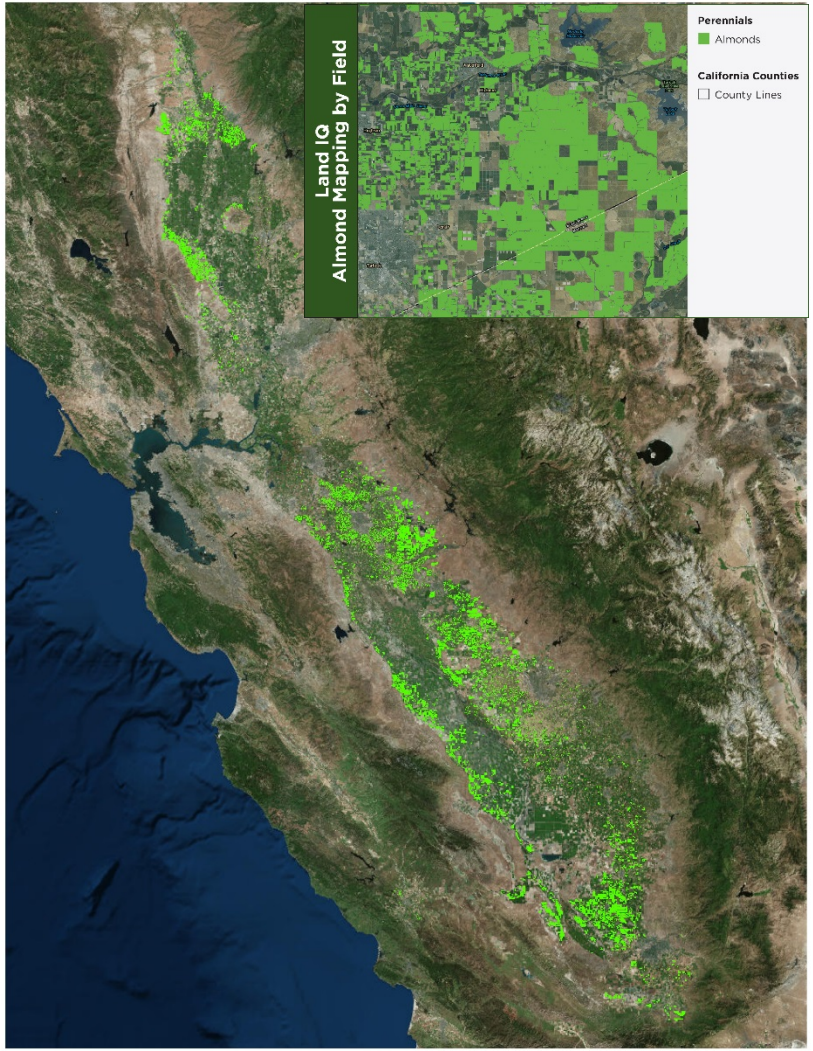
Cooperators and Resources

- Primary Cooperators
  - Almond Board of California (ABC)
  - Land IQ, LLC
- Main Resources
  - United States Department of Agriculture (USDA) National Agricultural Imaging Program (NAIP) imagery
  - Landsat and other imagery
  - California Department of Water Resources (DWR) County Crop Mapping
  - USDA-National Agricultural Statistics Service (NASS) CropScape Mapping
  - USDA-NASS Tabular Records
  - California Department of Pesticide Regulation (DPR) Records
  - County Agricultural Commissioner Crop Reports
  - Grower Knowledge
  - Agronomic and Remote Sensing Expertise



Development Timeline

- Over Half a Decade of Research and Development
  - Idea Development in 2010 and before – Were average yields slightly elevated?
  - Initial Pilot Study in Madera County in 2011
  - Secondary Pilot Study in Madera County in 2013
  - Statewide almond mapping in 2014 including other crops
  - Retrospective 2010 and 2012 mapping
  - Current analyses – derived from most up-to-date mapping
    - Age Analysis
    - Recharge Potential
  - Future analyses
    - Previous Crop Analysis
    - Regulatory Compliance and Risk
    - Renewable Energy Analysis
    - Water Supply Reliability
  - 2016 mapping complete at the end of 1st quarter of 2017
    - Waiting on imagery to become available



Acreage Results

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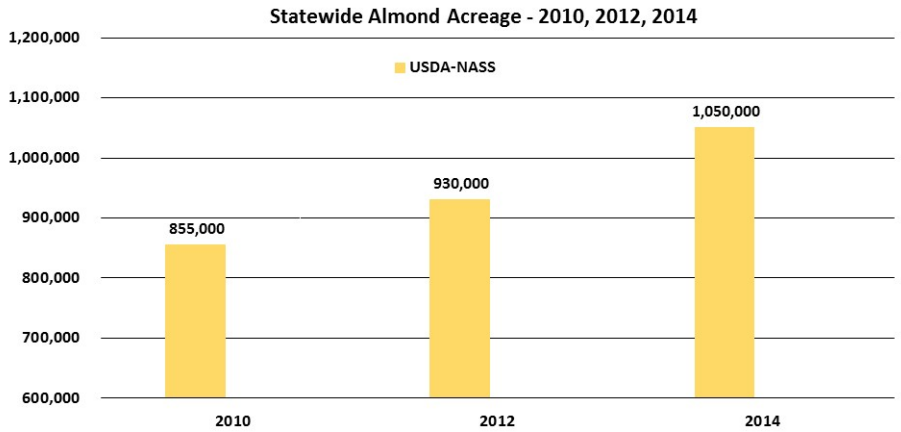
Total Acreage Results – Bearing and Non-Bearing

- USDA-NASS Acreage

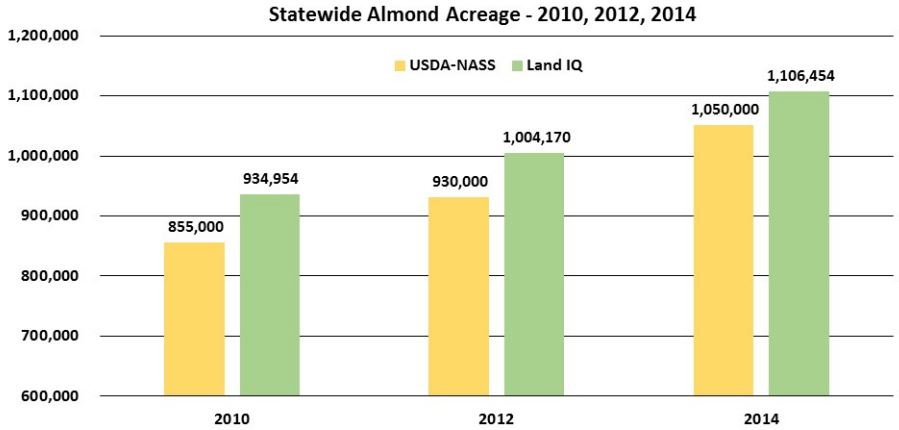
	2010	2012	2014
USDA-NASS	***855,000***	***930,000***	***1,050,000***



Total Acreage Results – Bearing and Non-Bearing

- USDA-NASS and Land IQ Acreage

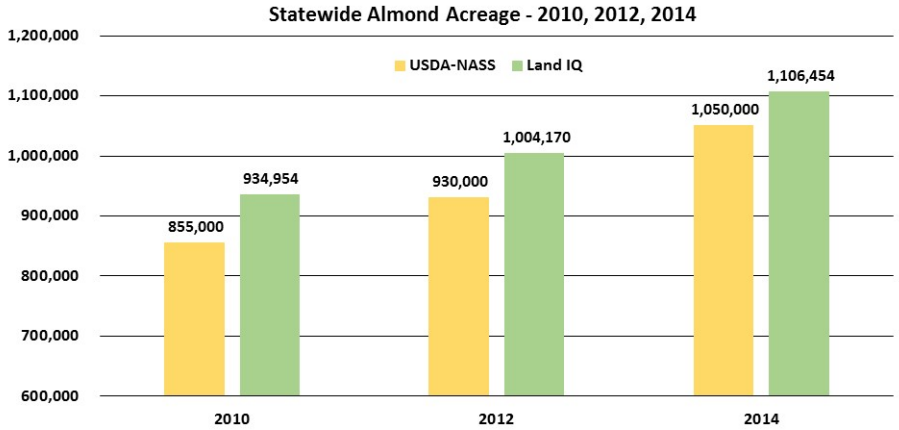
	2010	2012	2014
USDA-NASS	*855,000*	*930,000*	*1,050,000*
Land IQ	*934,954*	*1,004,170*	*1,106,454*



Total Acreage Results – Bearing and Non-Bearing

- USDA-NASS and Land IQ Acreage Comparisons

	2010	2012	2014
USDA-NASS	*855,000*	*930,000*	*1,050,000*
Land IQ	*934,954*	*1,004,170*	*1,106,454*
Difference	*79,954*	*74,170*	*56,454*



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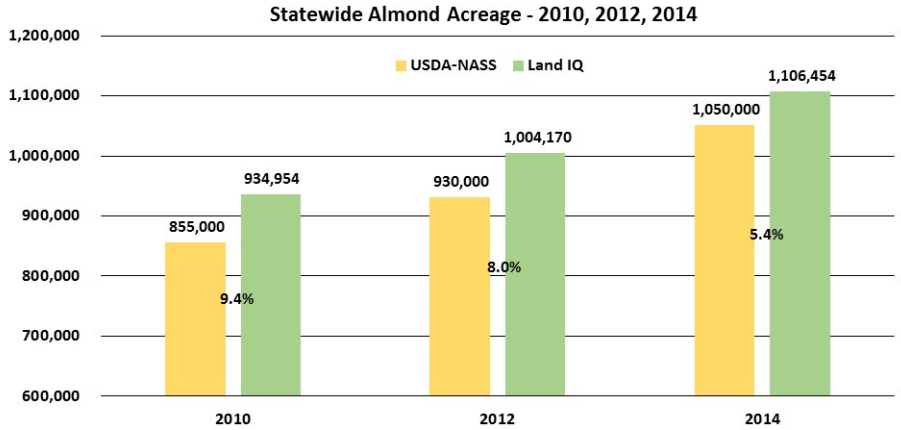
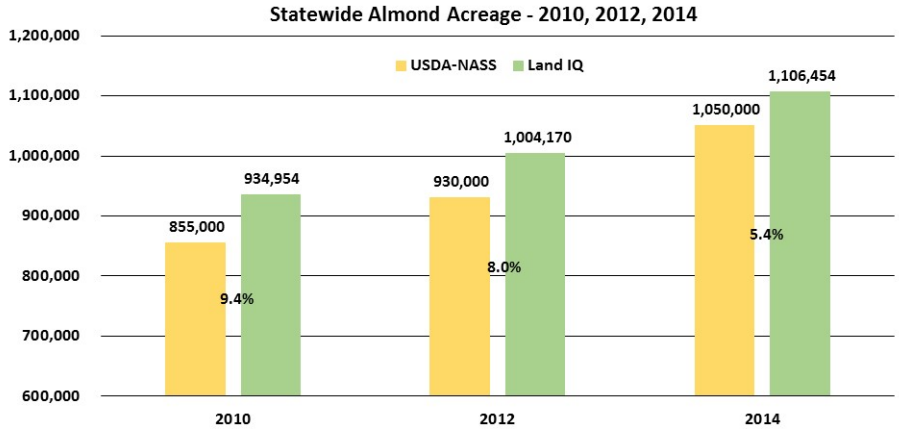
Difference	*79,954*	*74,170*	*56,454*
% Difference	*9.4%*	*8.0%*	*5.4%*



Total Acreage Results – Bearing and Non-Bearing

- USDA-NASS and Land IQ Acreage Comparisons and Conclusions

	2010	2012	2014
USDA-NASS	855,000	930,000	1,050,000
Land IQ	934,954	1,004,170	1,106,454
Difference	79,954	74,170	56,454
% Difference	9.4%	8.0%	5.4%

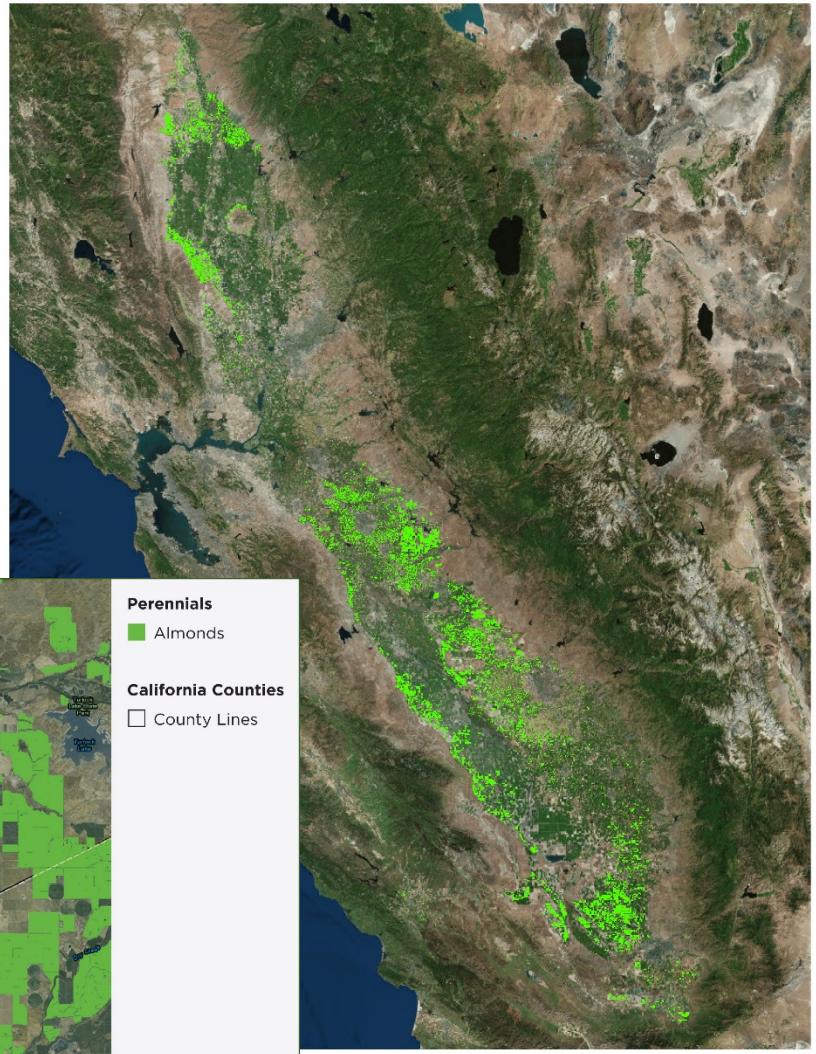


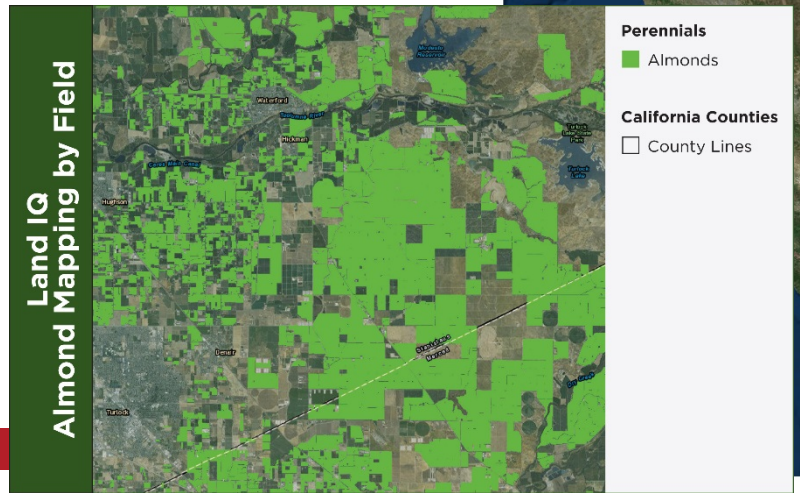
- Key Conclusions
  - Differences are decreasing and have existed for years
  - These acreage differences do not impact volume of production
  - Land IQ has begun a partnership with USDA-NASS to maximize accuracy
  - USDA-NASS will continue to provide official statistics as well as items Land IQ does not provide:
    - Subjective and objective yield estimates
    - Varietal distribution
    - Nursery survey results

Acreage Results – Bearing Only

- USDA-NASS and Land IQ Bearing Acreage Comparisons

	2010	2012	2014
USDA-NASS	*770,000*	*820,000*	*880,000*
Land IQ	*810,386*	*885,575*	*936,263*
Difference	*40,386*	*65,575*	*56,263*
% Difference	*5.2%*	*8.0%*	*6.4%*





Average Yield Results (lbs/acre)

- Land IQ and USDA-NASS Average Yield Comparisons and Conclusions

	2010	2012	2014
Crop Volume (lbs)	*1,640,000,000*	*1,890,000,000*	*1,870,000,000*
USDA-NASS	*2,130*	*2,310*	*2,130*
Land IQ	*2,024*	*2,134*	*1,997*
Difference	*106*	*176*	*133*
% Difference	5.2%	8.0%	6.4%

- The ABC and grower suspicions were verified – average reported yields/acre were slightly higher than experienced
- Although average yields/acre were actually lower, this was a result of higher acreage, not additional volume of crop

Applications – Age Analysis

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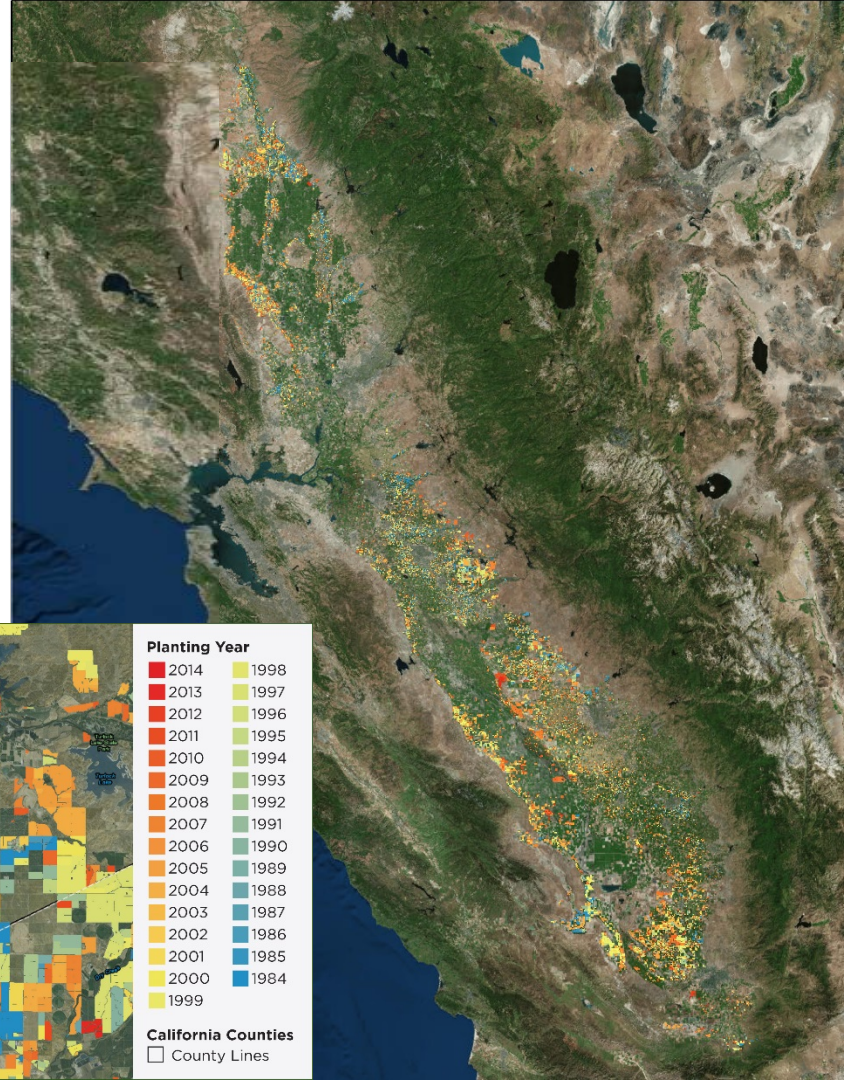
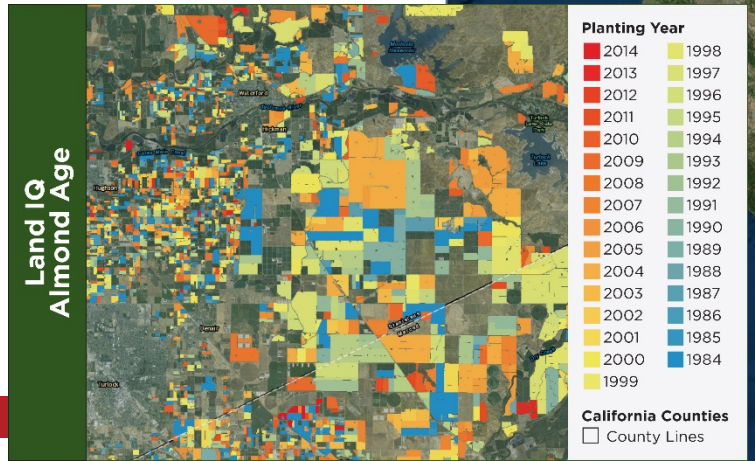
Applications – Age Analysis

- Question: Can you also determine the age of each orchard?
- Answer: Yes
  - Once orchards are mapped, only then can age be determined
  - A backwards looking approach (through 1984) at various imagery sources is conducted
  - Once “signature” appears as open ground, then this establishes planting date
  - +/- 1-2 years
  - Accuracy = 90-95%
- Significance: Potential Uses
  - Yield forecasts/enhancements
  - Biomass/carbon accumulation





Applications – Groundwater Recharge Potential

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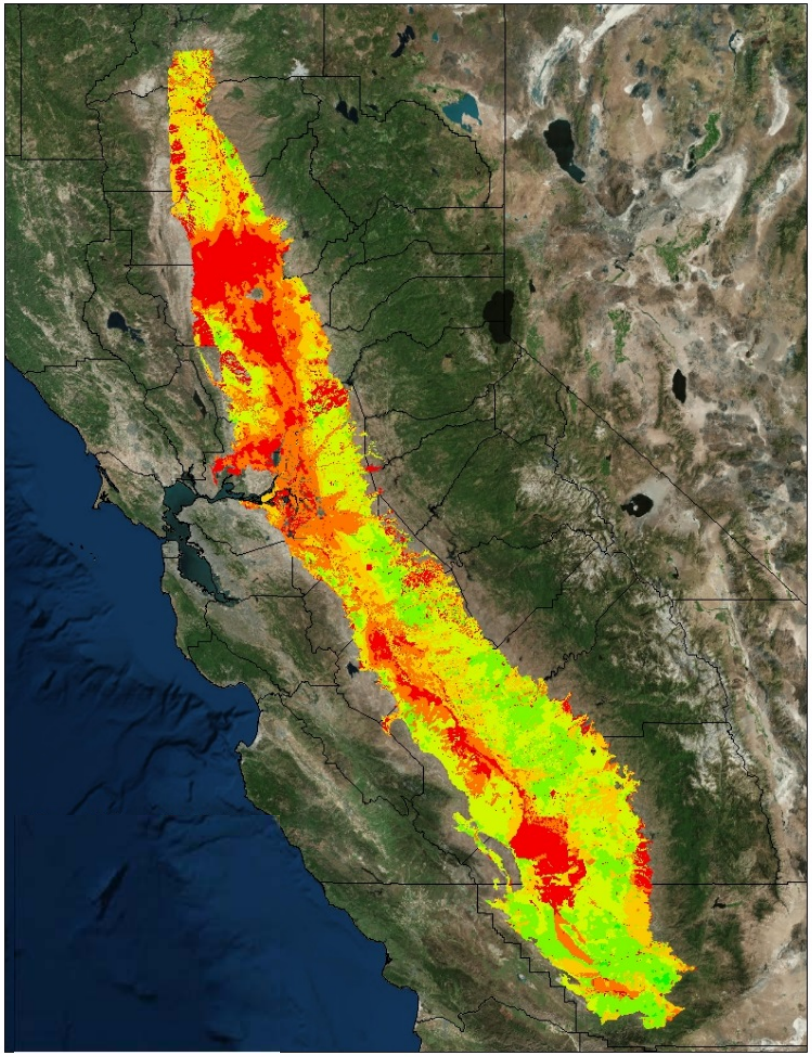
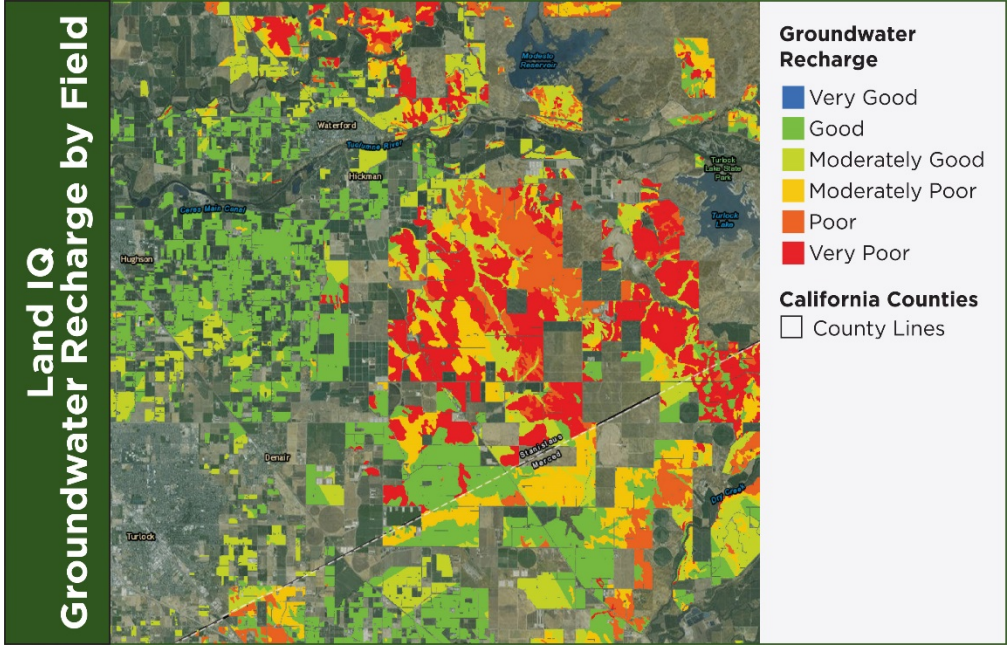
Application – Groundwater Recharge Potential

- Question: Given increased interest in winter recharge by ABC and state regulations, can you tell which orchards are most suitable for intentional recharge?
- Answer: Yes
  - Developed a Central Valley wide suitability index utilizing:
    - University California Davis (UCD) Soil Agricultural Groundwater Banking Index (SAGBI)
    - California Department of Water Resources (DWR) Groundwater Levels
    - United States Geological Survey (USGS) Central Valley Hydrologic Model (CVHM) well logs
    - California Department of Water Resources (DWR) Irrigation District Coverage
    - Hydrology & Points of Diversion
  - The index provides a locating tool for determination of suitable areas for intentional groundwater recharge in any crop



Application – Recharge Potential

- Overlay almond orchard mapping on top of recharge suitability index
- Inherit the recharge classification to the specific almond orchard itself
- Result is a new map product that shows recharge classification specifically for almond orchards



- Significance:
  - Resulted in approximately 600,000 acres of suitable almond orchards
  - Allows growers and water providers the ability to locate most suitable orchards in relation to water supply infrastructure
  - Prioritizes land for recharge opportunities
  - Does not replace site-specific investigations
  - Allows for interaction with other researchers for assessing impact on crop, soils, leaching, etc.

Web Map Application

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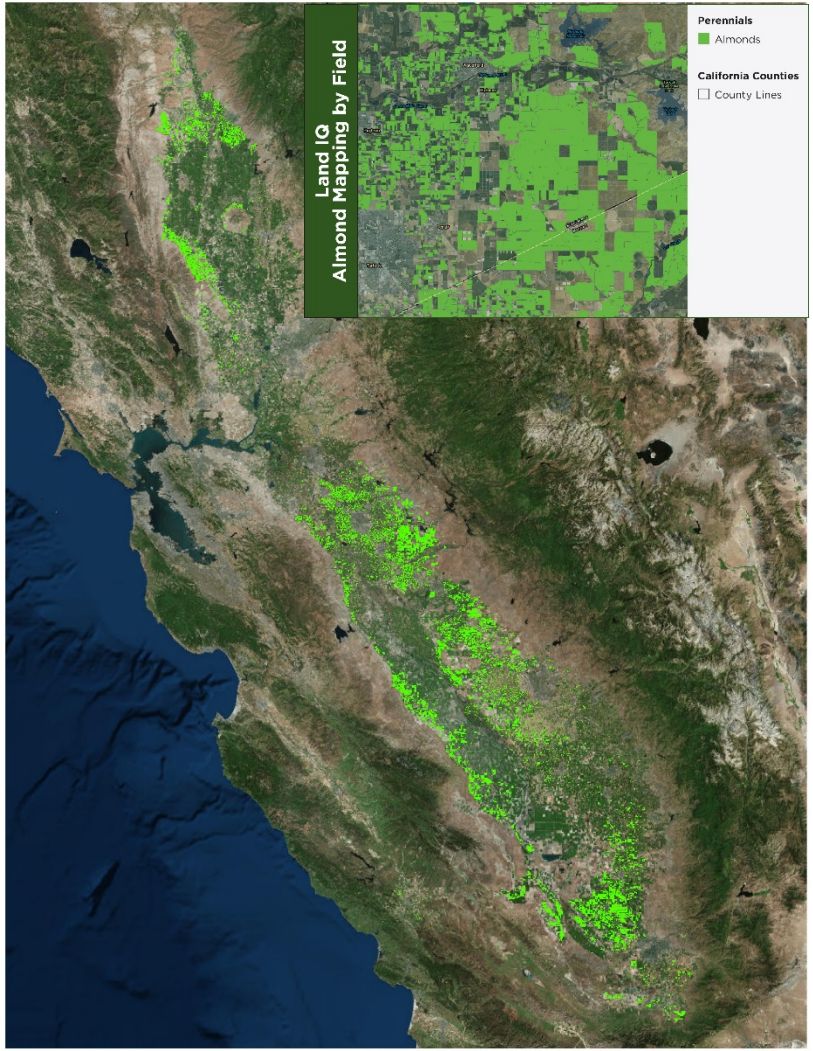
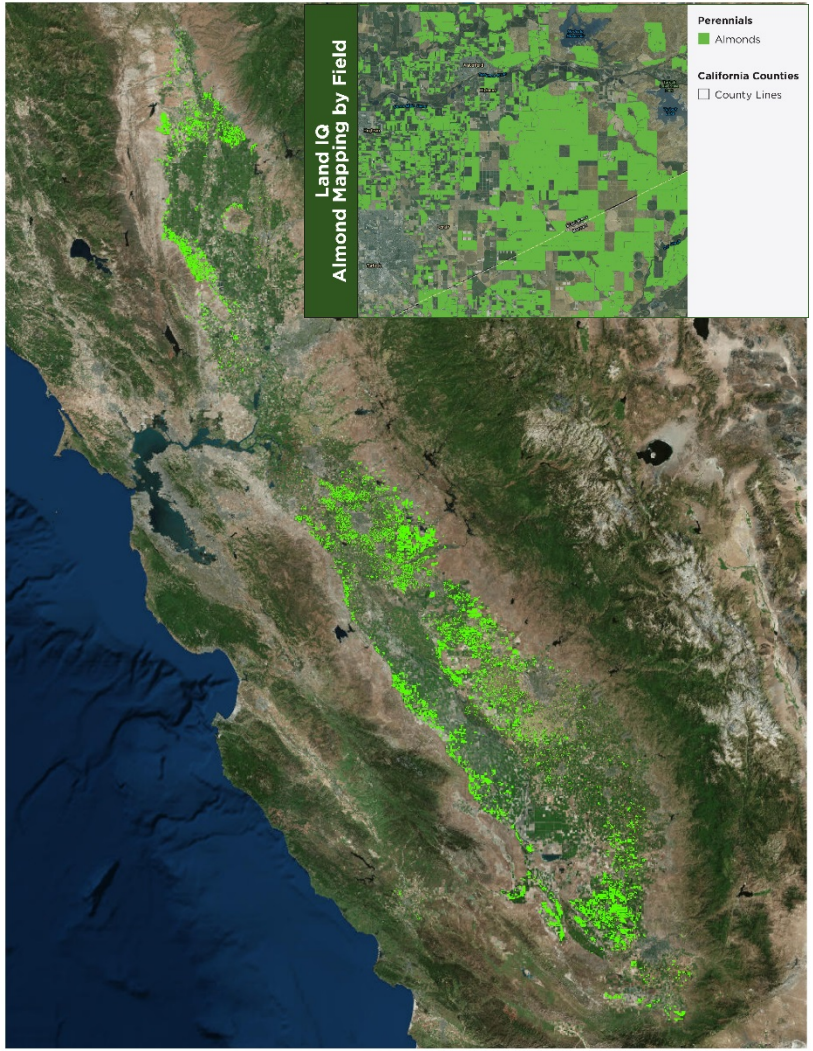
Web Map Application

- These research results (mapping and applications) are now available to all interested growers, processors, industry members, and the public
- Method of dissemination of these research results is a web based mapping tool.
- The tool can be accessed at the ABC web site at www.almonds.com/maps
- Web map considerations:
  - View only
    - No modifications to underlying information possible
    - Protects integrity, management, and updates of the base layer data
  - No identifying information is contained within this web site or map



On-Line Web Map Site

- For public use
- It's a "living" map and will continually be updated over time as new analysis results become available (e.g. 2016 mapping).
- Web map components:
  - Various map backgrounds
  - 2010, 2012, 2014 almond mapping layers
  - Age Analysis by orchard
  - Recharge Suitability by orchard
- Technical support at: technical.support@landiq.com and 916.265.6358



Web Map Demonstration

Conclusions

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Conclusions

- Almond Board of California proactively commissioned a map-based (spatial) format to better understand statewide acreage and agricultural issues
- The mapping that has been completed for 2010, 2012, and 2014 is greater than 96% accurate as to orchard location and acreage
- 2016 mapping will be completed at the end the first quarter of 2017 once USDA NAIP imagery becomes available
- There are multiple uses of the base layer information for analysis purposes, including age determination, intentional almond recharge potential, regulatory compliance, renewable energy analysis, water supply reliability, crop forecasting
- A public use web map has been developed that allows for viewing of almond mapping for various years and analysis results www.almonds.com/maps
- Technical support for the web map can be reached at technical.support@landiq.com or 916.265.6358

Acknowledgements

- Almond Board of California
- Land IQ
    - Mica Heilmann, CPSS
    - Zhongwu Wang, PhD
    - Seth Mulder, MS, CPAg, CCA
    - Chris Stall, MS
    - Matt Twietmeyer, MS
    - Stephanie Tillman, MS, CPAg
    - Ruth Spell, MS
    - Nolan Schultz
    - Kyleigh Turnquist
    - Andrew Loberg

End

Chris Messer, USDA NASS

USDA's National Agricultural Statistics Service

The Almond Conference
December 6-8, 2016
Sacramento, CA

Chris Messer

Almonds and NASS program

- Federal Program
- Agreements
- Resources

Almonds – Federal Program

- **Almonds**
  - Noncitrus Fruits and Nuts - June annual
  - Crop Production - May and July

2017 Guide To
Products and Services

Almonds - Agreements

- Almond Acreage Report
- Almond Objective Measurement Survey
- Almond Nursery Survey

Almonds - Resources

- Fruit Acreage Database
- CropScape
- LandIQ data?

Almonds – The 3 Cs

- Collaboration
- Communication
- Cooperation

NASS Thanks You!

- www.nass.usda.gov
  - www.nass.usda.gov/ca
  - Email nassrfopcr@nass.usda.gov
  - Telephone 800-851-1127


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National Agricultural
Statistics Service
AGRICULTURE
COUNTS

Meet Land IQ and NASS at The Almond Board Booth

Tuesday, December 6:

- 5:30 - 7:00 pm – Joel Kimmelshue and Chris Messer

Wednesday, December 7:

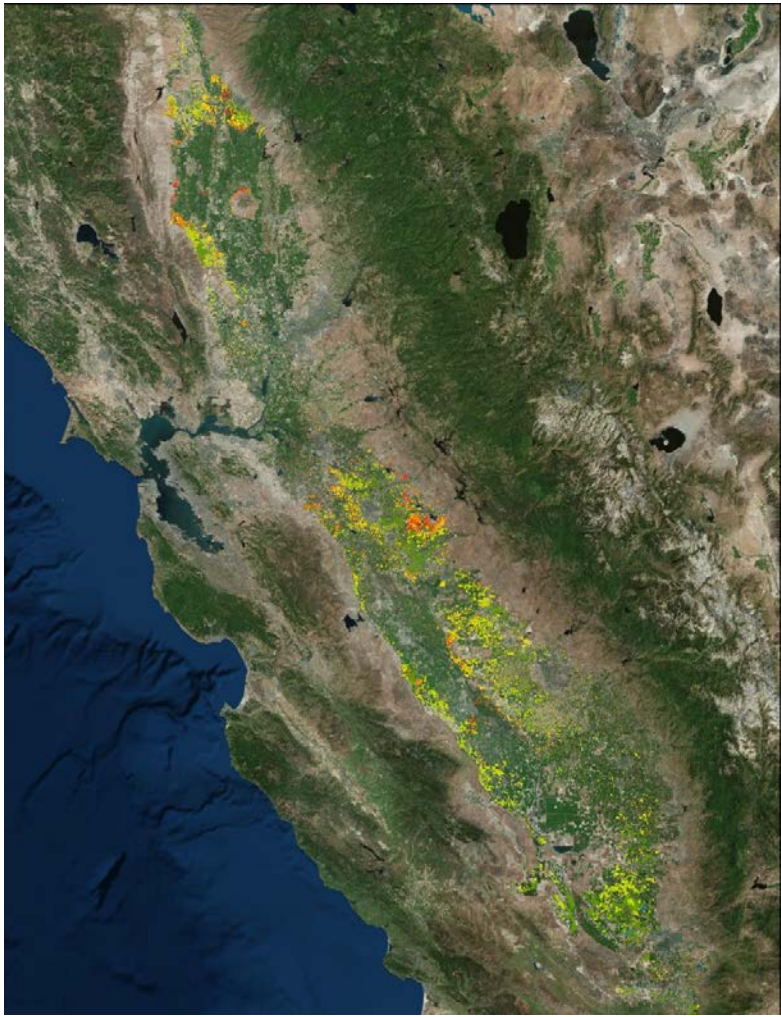
- 9:30 - 10:15 am – Mica Heilmann
- 1:15 - 2:15 pm – Joel Kimmelshue
- 3:30 - 5:30 pm – Joel Kimmelshue or Mica Heilmann

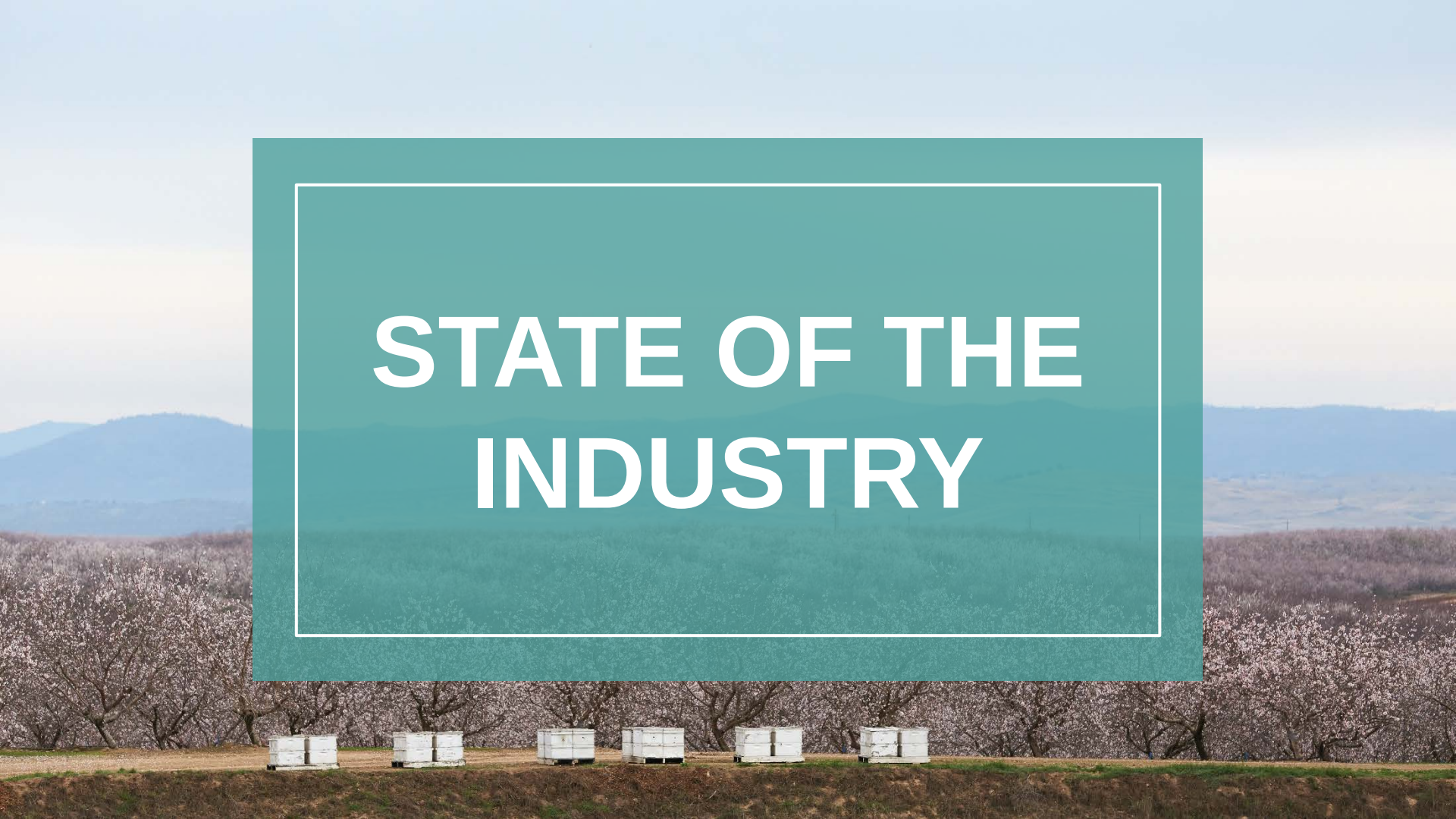
Thursday, December 8:

- 1:30 - 3:00 pm – Joel Kimmelshue

USDA
National Agricultural Statistics Service

LAND IQ





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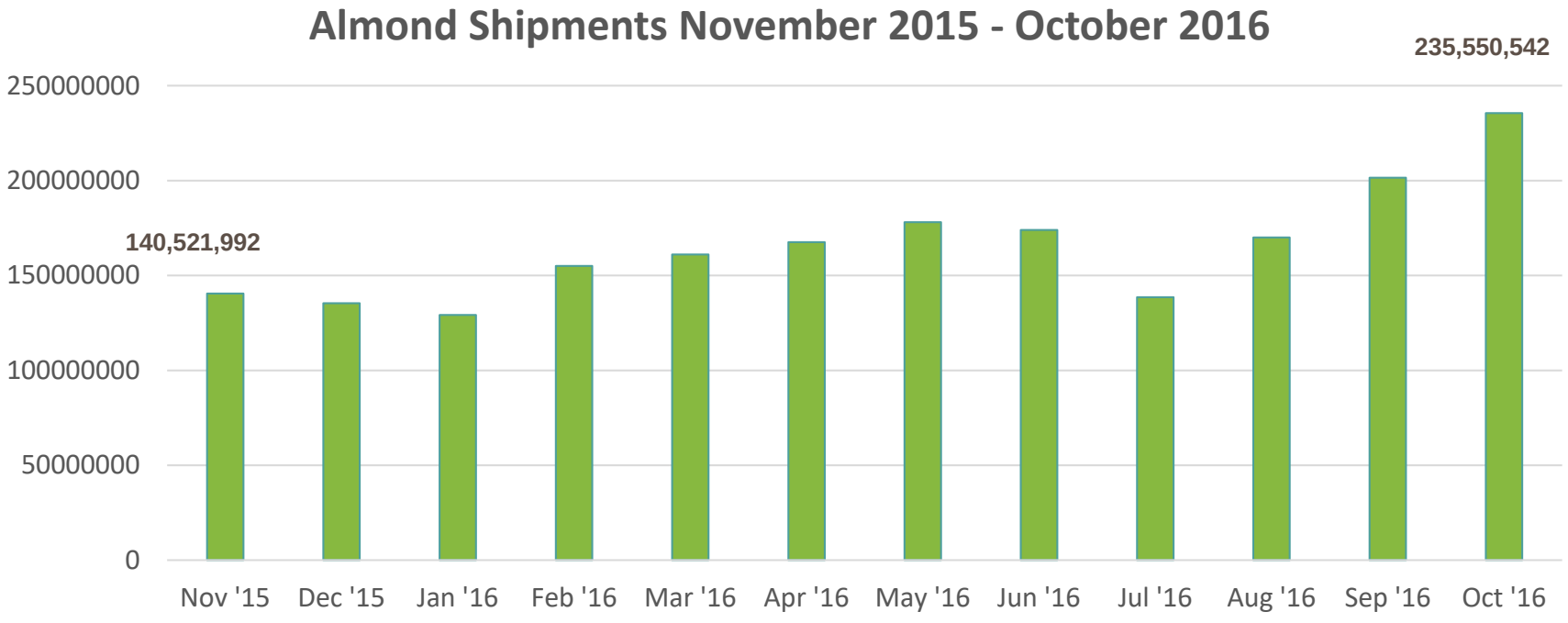
WHAT A DIFFERENCE A YEAR MAKES

Some of last year's important uncertainties are now more certain



FOCUS ON THE LONG TERM NEEDS OF THE INDUSTRY AND WHERE WE CAN MAKE A DIFFERENCE


25% increase = 500 million pounds

COURSE OR BOLD NEW INITIATIVES

TWO ESSENTIAL CONSIDERATIONS:


CONSENSUS
IS REACHED


ADDITIONAL FUNDING DECISION
PENDING AT USDA


A BIG
DIFFERENTI
Industry volunteerism
ATOR


Sustainable Conservation
EDF
ENVIRONMENTAL DEFENSE FUND
Finding the ways that work
Audubon
Almond Alliance
OF CALIFORNIA
SUCCESSFUL PARTNERING
1+1=3 OR 4 OR 5

ACCELERATED GROWER AND HANDLER ADOPTION IS KEY

VIDEO


STATE OF THE
INDUSTRY

Questions?

growing ADVANTAGE
The Almond Conference