May 2019

# Bees and Trees: The ecological ramifications of our "honey-nut" agriculture

Becci Larreau
*Western Washinton University*

ABSTRACT: People love almonds and honey bees. The honey bee is the only agriculturally-reliable pollinator of almond trees. California produces the entire domestic supply of almonds, and ~80% of the international supply. In early spring, nearly all of the commercially-managed beehives in the nation travel by truck to California to pollinate the almond orchards. They remain for a mere few weeks and then move on to other areas to service other crops or to seek honey forage. Migratory beekeepers are the linchpin that keeps the wheels of this particular agricultural system in motion. Without the migratory beekeeping industry, California's multi-billion dollar almond crop would not exist. But, over half of the honey bees needed for pollination come from out-of-state, and the cross-country transportation of the hives contributes to the agro-industrial carbon footprint. Unfortunately, too, the close quarters inherent in bee transport serve as a transfer mechanism for the ectoparasitic mite Varroa destructor, who is itself a vector for several viral honey bee pathogens. Furthermore, California almonds are a thirsty crop, whose one million+ acres use between 8-11% of the state's agricultural waters. Recently, climate-influenced drought has compelled almond farmers to withdraw groundwater for irrigation. This has led to land subsidence and permanent damage to the aquifer's ability to recharge. Advertising campaigns by the California Almond Board have increased the demand for almonds, spurring economic growth and a rapid increase in the amount of almond orchard acreage. These successful marketing efforts have been congressionally-compelled and industry-funded. The result is that almond consumers support an agricultural management regime that is in ways both beneficial, and detrimental, to the ecology of honey bees and humans. Therefore, people who really *do* love almonds and honey bees should consider reducing their almond consumption and/or signaling a preference for self-pollinating almond varieties.

# Do You Love **BEES?**

(Of course you do!!!)

- They produce all of the Honey/Beeswax/Propolis that we humans enjoy.
- We share a cultural connection with honey bees that spans thousands of years.
- Commercially-managed honey bees provide vital pollination services for a number of agricultural crops.

# Almonds too?

- Nutritious, delicious AND a valuable crop.
- Honey bees are the ***only*** economically reliable pollinator of California almonds.

**But, over 80% of the world's almonds come from California and there aren't enough endemic bees to pollinate the existing orchards.**

**In 2018 alone, beekeepers moved 1,800,000+ honey bee colonies in and out of California!**

**Annually, bee transport accounts for ~*eight million road miles* of fully-loaded semi-truck greenhouse gas emissions...**

(also, we have an almond problem…)

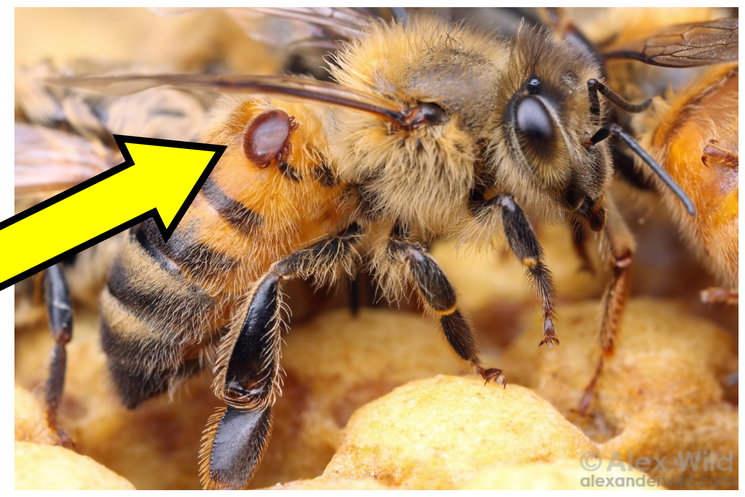
- Surface water restrictions and drought
- Land subsidence from groundwater withdrawal
- Permanent damage to the underlying aquifer

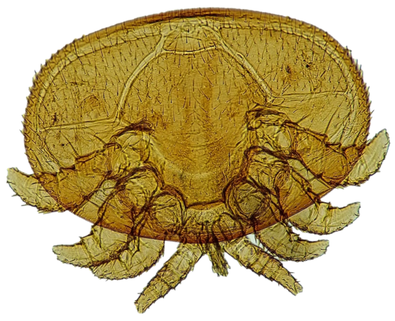
# CLIMATE CHANGE

- Almond trees require a chill period of 300-600 hrs below 45°F for their buds to break dormancy

## Oh, no!!! VARROA DESTRUCTOR

(bee problem)



- An ectoparasitic mite that is a direct threat to colony health and a known vector for viral pathogens
- Crowding of bee hives within apiaries and of apiaries within landscapes have been shown to increase mite transmission.
- Commercial beekeepers keep pace with losses by splitting colonies after the almond pollination

Proximal vector for Varroa
(400 hives/truck)

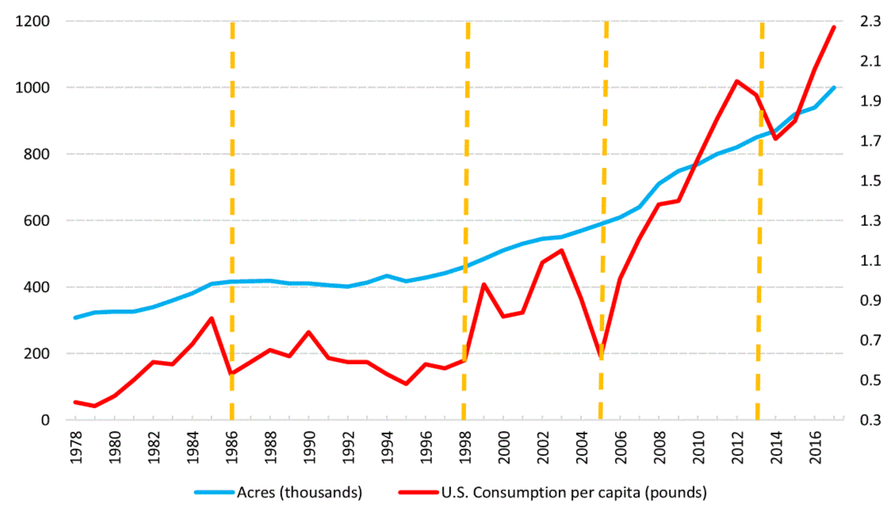
## Migratory Beekeeping

GHG emissions

**CALIFORNIA ALMONDS**

Bearing acres (in thousands) ~ U.S. per capita consumption (in pounds)

*[Major advertising campaigns 1986, 1998, 2005, 2013]*




Data source: United States Department of Agriculture – ERS, *"Fruit and Tree Nut Yearbook Tables"*

- Successful advertising influences consumer choice, increasing the market demand which compels farmers to plant more almond acreage.
- Purchasing preference may impact production decisions that affect the environment.
- As consumers, we have an opportunity to live by our values.
- Therefore, we may consider reducing our almond consumption (and/or signaling a preference for self-pollinating almond varieties).

***As bee-lovers, we could...***

# RETHINK ALMONDS

HUXLEY COLLEGE OF THE ENVIRONMENT ON THE PENINSULAS

**Acknowledgements: Dr. Troy Abel (WWU—Huxley on the Peninsulas), Dr. Brian Hauge (Peninsula College), Dr. Gail Sandlin (WWU—Huxley on the Peninsulas), the West Sound Beekeepers Association, and unnamed peer reviewers.**

WESTERN WASHINGTON UNIVERSITY

**Becci Larreau, BA Environmental Policy**
**Huxley College Extension (Poulsbo)**
**Email: larreab@wwu.edu**

Sources:

(link to working paper)