

# Adapt

*On-farm changes in the face of climate change*

## Top Five Crops to Watch

**Almonds**

**Walnuts**

**Stone Fruit**

**Wine Grapes**

**Tomatoes**

**USDA California Climate Hub**  
U.S. DEPARTMENT OF AGRICULTURE

## CONTACTS

*Climate Hub Director, Steve Ostoja,*  
[smostoja@ucdavis.edu](mailto:smostoja@ucdavis.edu)

## UC Extension Specialists

*Climate Adaptation in Agriculture, Tapan*  
[tpathak@ucanr.edu](mailto:tpathak@ucanr.edu)

*Orchard Systems, Katherine Jarvis-Shean,*  
[kjarvisshean@ucanr.edu](mailto:kjarvisshean@ucanr.edu)

*Viticulture, Mark Battany,*  
[mcbattany@ucanr.edu](mailto:mcbattany@ucanr.edu)

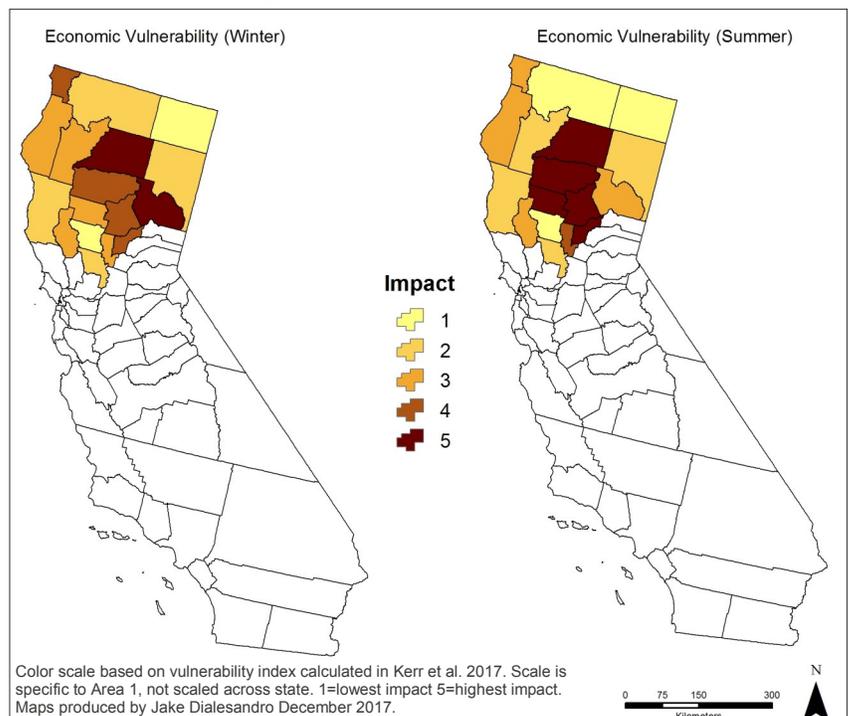
*Kerr et al., "Vulnerability of California specialty crops to projected mid-century temperature changes". 2017.*

## More Heatwaves and Less Chill for California

The agricultural economy of certain counties in California are more vulnerable to projected changes in climate than others; this flyer details on-farm adaptation strategies to mitigate some of the effects of increased winter temperatures and frequency of summer heatwaves.

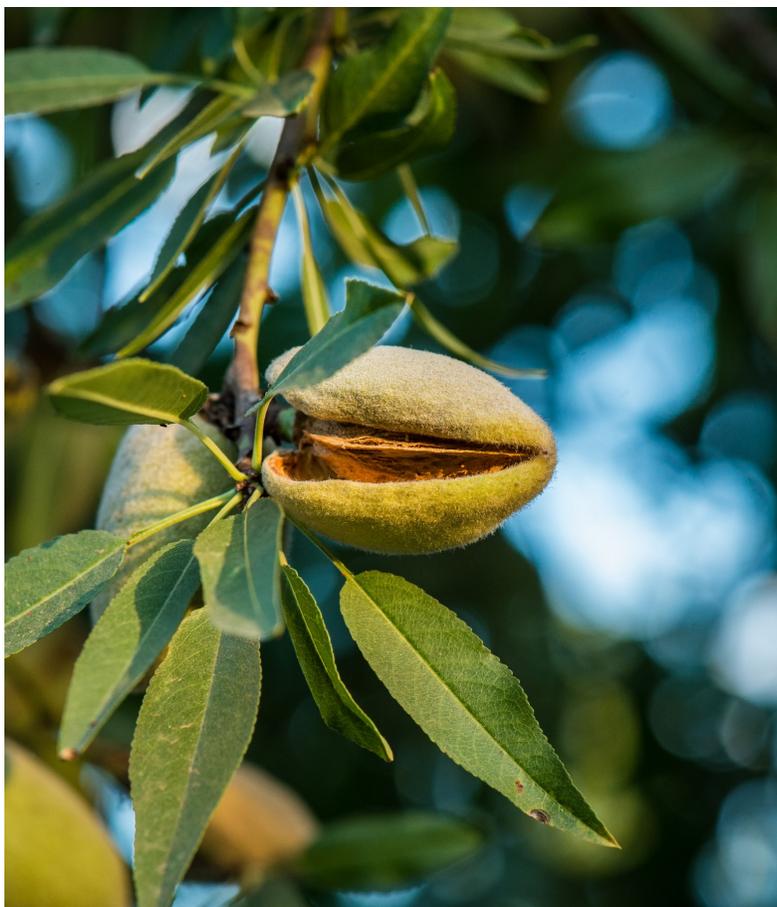
Projected conditions put the most strain on heat intolerant crops and crops with high chill requirements. Crops with these characteristics that also have a high market value or are grown in large acreage, make a county vulnerable to economic declines. Information on this flyer highlights the most vulnerable counties in California Area 1 and crops which are causing this.

For more detailed advice, please reach out to the UC Cooperative Extension Specialists listed to the left.



**Almonds** orchards will likely cause declines in the agricultural economy of Glenn, Sutter, Tehama, and Yolo. Almonds' summer heat vulnerability, chill-portion requirements, dependency on bee pollination, and increased pest pressure with warmer weather coupled with their high value make them an economic driving force. Adaptation strategies include frost avoidance through heat reflection products to delay bloom, changes in harvest timeframe to avoid pest pressures, and deficit irrigation strategies to adapt to statewide drought conditions. Planting natural pollinator habitat could alleviate honey bee population decline and breeding programs to develop low-chill, self-pollinating, insect resistant, and earlier yielding varieties will be essential to the longevity of almond orchards in California.

**Tomatoes** experience yield reductions outside of their optimal temperature range (for most varieties daytime optimal: 75-95°F, nighttime optimal: 55-70°F). In some counties tomatoes could benefit from increased temperatures, but in Colusa, Sutter, and Yolo, tomatoes are economically vulnerable due to the projected increase in winter temperatures and already high summer temperatures. On farm management strategies for these areas are limited to heat tolerant variety selection.



**Walnuts** are extremely vulnerable to the projected increases in winter temperatures because of high chill requirements and moderately vulnerable to extreme summer heat. The counties likely to experience economic losses due to climate are Butte, Glenn, Lake, Sutter, Tehama, Yolo, and Yuba. To reduce effects of summer heat waves, irrigation can be carefully monitored to avoid water stress and trees can be treated with sunburn spray. However, there are no government-approved products available for combating warmer winters, but producers can advocate for more breeding of heat-tolerant and low chill varieties.

**Stone Fruit\*** are sensitive to increases in summer temperatures, extreme heat events, and reduction in winter chill. The counties most vulnerable to economic loss from climate change are Butte, Sutter, Tehama, and Yolo. As spring and summer temperatures rise, the trees are vulnerable to decreased fruit set, decreased size, and sunburn. Early fruit thinning to increase remaining fruit size and irrigation to avoid water stress can mitigate temperature effects. Producer advocacy for increases in low-chill research and breeding could benefit new cultivar options.

\*Apricots, cherries, peaches, plums, prunes, and nectarines

**Wine Grapes** are likely to create economic losses in Lake, Mendocino, and Yolo counties because of moderate yield sensitivity and high flavor sensitivity to temperature increases coupled with high value. On-farm techniques that may help avoid economic loss include transitioning to varieties with greater heat tolerance, canopy misting, irrigation tactics, trellising type, canopy management, partial shading, reflective material spray, and taller vine training height. Changing varieties may not be feasible due to market demand.