



Climate Risks to California Agriculture



California: The Nation's Agricultural Powerhouse

California is the largest agricultural producing state in the U.S., growing more than one-third of the nation's vegetables and more than two-thirds of the nation's fruits and nuts. With nearly \$50 billion in total gross value, California's agricultural sector relies on widespread irrigation water provided by Sierra Nevada snowpack and Central Valley aquifer groundwater. In addition to growing more than 400 different crops, California has a thriving livestock industry, with a value of more than \$11 billion. The state leads the nation in dairy production, producing more than 18% of U.S. milk, and grows cattle and sheep on approximately 40 million acres of working rangeland.

Climate Change Effects on Farm and Ranch Production

Although farmers and ranchers are coping with changes in average weather conditions, it is often extreme events that are most impactful and most difficult to manage for. Agricultural producers are tasked with mitigating damages from climate and weather-related challenges including:

- Greater year-to-year variability in precipitation and more intense droughts and floods
- Hotter and more frequent summer heatwaves
- Reduced chill accumulation and more pest pressure due to warmer winters
- Reduced grazing productivity for livestock

Changing climatic conditions in California have lengthened the growing season, shortened the time from planting to harvest, increased pest pressures, reduced soil moisture, increased plant moisture stress, and increased water scarcity. Research shows that extreme temperatures will warm more than average temperatures; that precipitation will be more variable, leading to drier dry years and wetter wet years; and that mountain snowpack will be reduced, with more winter precipitation falling as rain instead of snow.



The Role of the USDA Climate Hubs

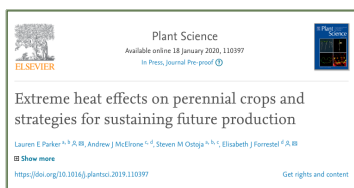
The Climate Hubs are a unique collaboration across a number of USDA agencies. The Climate Hubs were designed to develop and deliver science-based, region-specific information and technologies to agricultural and natural resource managers to enable climate-informed decision-making. Here in California, the Climate Hub serves the unique and variable needs of our agricultural producers, from high-value fruit and nut crops, to vegetables, to livestock.

How the California Climate Hub Supports Agricultural Resiliency

Led by ARS scientist Dr. Steven Ostoja and housed on the University of California Davis campus, the USDA California Climate Hub provides science-based, actionable information with the mission to enable climate resilient agriculture, facilitate communication, and support co-production of knowledge, tools, and products. The Hub works towards its mission through producing:

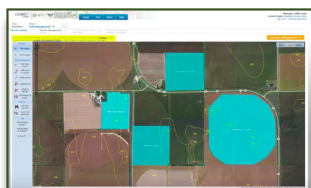
Research and Syntheses

- Recent research and information syntheses:
 - [Parker et al. 2020](#).
Extreme heat effects on perennial crops and strategies for sustaining future production.
 - [Fettig et al. 2019](#).
Managing effects of drought in California.



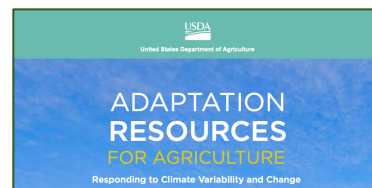
Technology and Tools

- Cal-AgroClimate is slated to be a one-stop-shop for climate-related agricultural decision support tools. Including:
 - Chill and growing degree day accumulations
 - Frost and heat advisories
 - Crop-specific information



Education and Outreach

- Produced with feedback from stakeholders, the California Agriculture Adaptation Workbook will provide California agriculture with state-of-the-science information for adapting California agriculture to climate change.



Partnering for Success

In service of the state's working lands, the Climate Hub works with partners across federal and state agencies, universities, and industry to help enable climate-informed decision making and advance the adaptive capacity for California's agricultural working lands to meet the challenges of the future. Partnership examples include:

- **workshop collaborations with NRCS** to assess farmer and rancher adaptive practices and climate-related tool and information needs.
- **research collaborations with UCANR** to develop web-based decision support tools for supporting agricultural adaptation to climate change.

Climate Hub Partners in Agriculture

- USDA ARS, USFS, NRCS
- USDA APHIS, RMA, NIFA, OCE
- UC Agriculture and Natural Resources
- UC Davis John Muir Institute of the Environment
- UC Working Lands Innovation Center
- UC Davis Department of Land, Air, & Water Resources
- UC Davis Department of Viticulture & Enology
- California Department of Food and Agriculture
- California Natural Resources Agency
- Western Regional Climate Center

For More Information

Contact

Steve Ostoja, Director
530-752-3092
steven.ostoja@usda.gov

Visit us online!

<https://www.climatehubs.usda.gov/hubs/california>