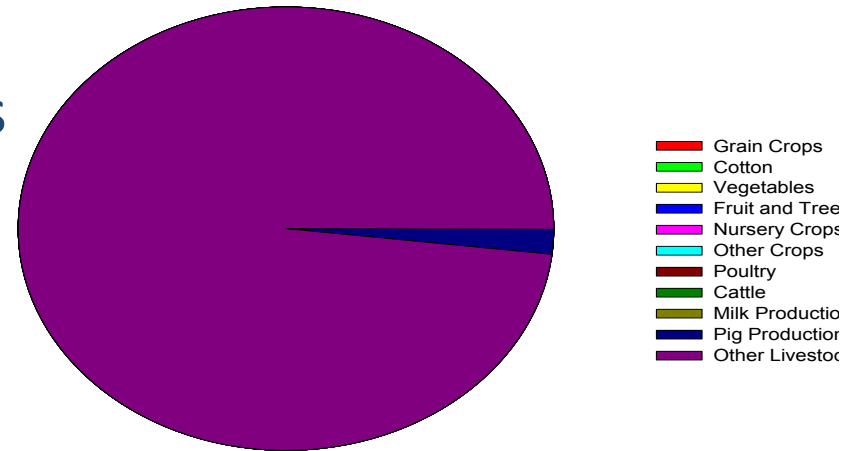


# **National Climate Assessment (NCA): Agriculture Chapter**

US CLIVAR 2012 Summit Report  
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# NCA: agriculture chapter

- Ag is a very broad field
  - multiple dependencies on climate
  - 8 pages, including tables, figures, and title page(!)
- Traceable accounts/key messages
- Sections (1 June version)
  - Introduction
  - Crops & livestock responses
  - Impacts on soil and water
  - Extreme events
  - Adaptation and economics
  - Research needs

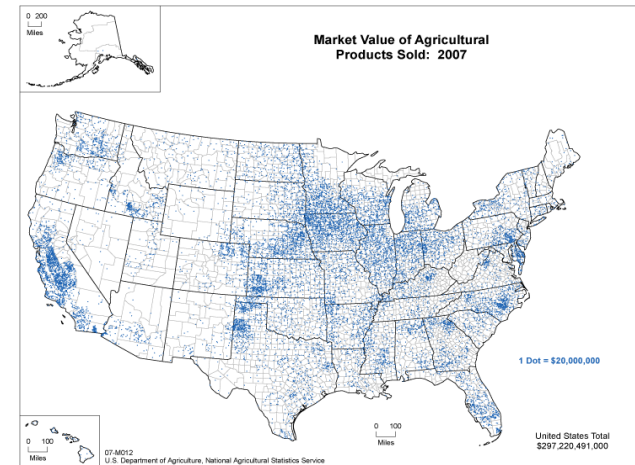


# NCA: traceable accounts

- **Abiotic**
  - CO<sub>2</sub>, T, P changes affect and in some cases stress crops/livestock.
  - Detail of changes uncertain; interactions (e.g. animal/rangeland); adaptation likely on short term.
- **Biotic**
  - Exacerbate pest pressures; pollination, growth cycles altered
  - Timing matters but is uncertain; interactions (e.g. pests and ag product); departures from past equilibria
- **Natural resources**
  - Soil fertility/erosion losses; water availability (e.g. ground water drops; less snow 'banking')
  - Precip changes: shifts, timing & intensity uncertain; adaptation limited and already started (e.g. drip)
- **Extreme events**
  - Thresholds matter & differ quite a bit between commodities; combinations matter (high RH with high T); timing can be more critical than magnitude (e.g. slight freeze at blossom )
  - Simulation of extremes (esp. combinations) uncertain; rarity introduces uncertainty
- **Economics**
  - Larger market forces; adaptation has costs (e.g. changing crops, water delivery); infrastructure and critical size issues; regulation
  - Quantifying complex interactions of market sectors uncertain; economic value of ecological services uncertain

# NCA: Sections highlights

- Introduction
  - 300\$B enterprise; climate change a major challenge to ag; ag resilient on short term
- Ag Crops & livestock responses
  - CO<sub>2</sub> affects plant growth (crop & weeds); interactions (soil, water avail, T, etc.); some adaptation possible; crop zone shifts (e.g. chilling hours figs.)
- Impacts on soil and water
  - Erosion (increased rainfall intensity); tillage demands; water demand up availability ?
- Extreme events
  - impacts greatest at early development & harvest; other phenological issues (bolt); conditioning livestock
- Adaptation and economics
  - Adaptation & pest control have costs & need infrastructure;
- Research needs
  - Quantify clim. chg. interactions on yield across species
  - Develop management tools/systems for extremes
  - Eval clim. chg. on pests range & crop interaction
  - Integrated assessment of various adapt strategies
  - Future climate chg on range of time & space scales, especially for extremes (& wx combinations)



Winter Chill Decline

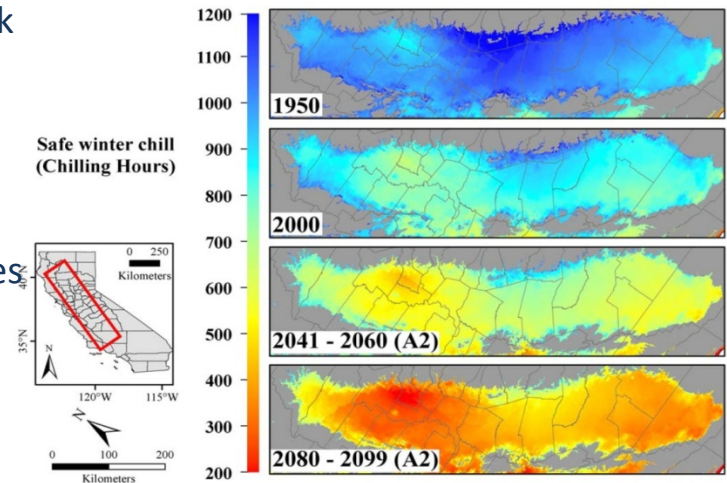


Figure 3. Safe winter chill in California's Central Valley in 1950, 2000, 2041-2060 and 2080-2099, calculated with the Chilling Hours Model. Future winter chill was quantified using the A2 IPCC greenhouse gas emissions scenario. doi:10.1371/journal.pone.0006166.g003