

Resource Constraints on Wine Production in California

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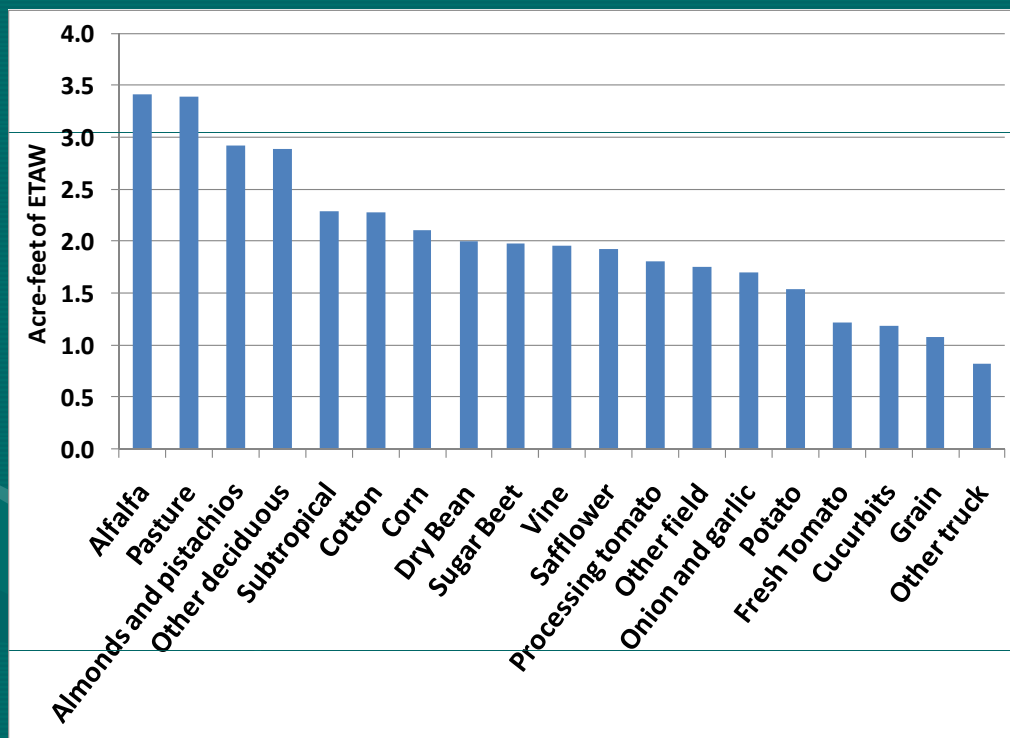
Resource Risks for California Wine production

- Increased water scarcity costs due to urban and environmental competition
- Increased water scarcity cost due to climate change
- Change in the regional micro climates of established areas

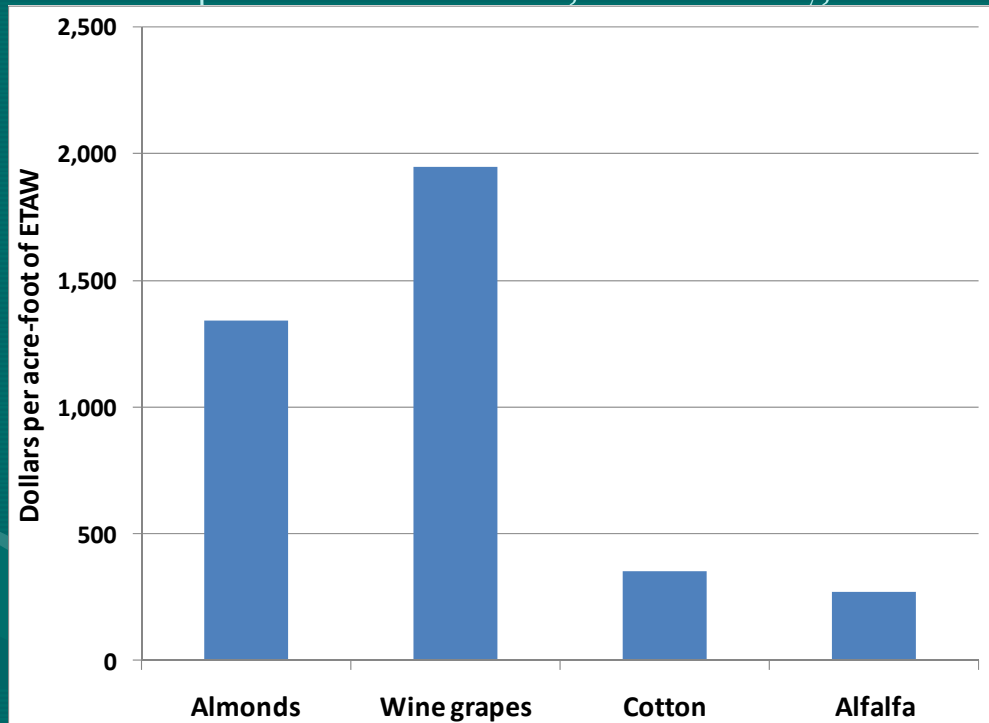
Percent Reduction in Optimized Water Deliveries in 2050

Region	Agriculture	Urban	Total
Sacramento	24.3	0.1	19.1
San Joaquin	22.5	0.0	17.6
Tulare	15.9	0.0	13.5
Southern California	25.9	1.12	8.9
Total	21.0	0.7	14.0

Evapotranspiration of applied water (ETAW), Tulare Lake water region, 2003-2005 average by crop group



Value per acre-foot of ETAW, Fresno County, 2009



ETAW = evapo-transpiration of applied water; ETAW data is for the Tulare Lake region, average for 2003-2005

Technological Change and Crop Demands by 2050

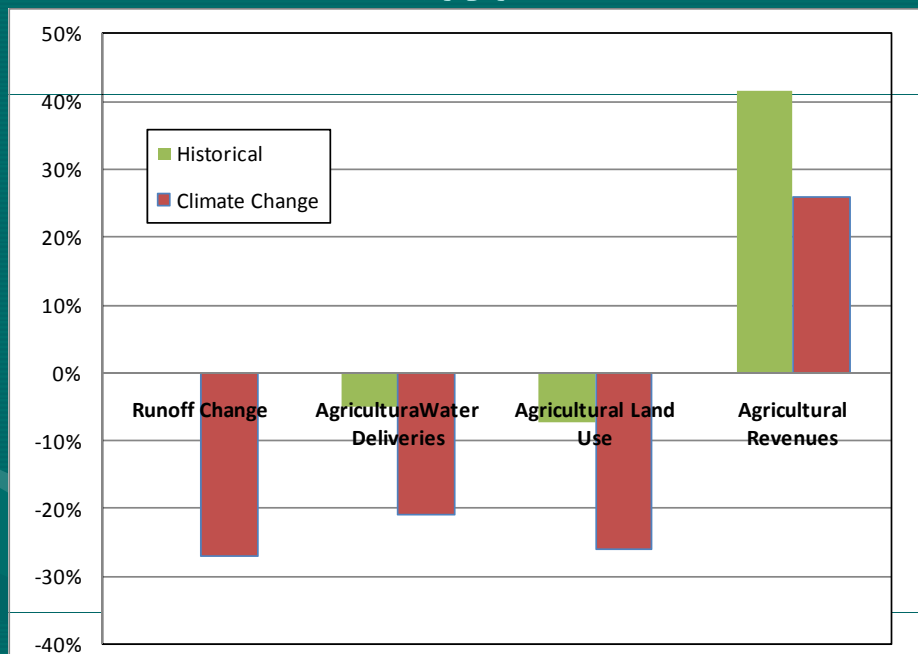
Crop	Yield % Change Technology	Demand % Change Intercept
Alfalfa*	29.1	3.3
Citrus	28.5	3.6
Corn	25.4	5.7
Cotton	29.1	2.1
Field	29.1	3.3
Grains	29.1	7.6
Grapes	23.4	16.4
Orchards	36.4	3.8
Rice	31.9	-4.1
Tomato	40.1	26.9
Truck	25.4	45.5

Climate Induced Yield Change

Crop Groups	Sacramento	San Joaquin
Alfalfa	4.9	7.5
Citrus	1.77	-18.4
Corn	-2.7	-2.5
Cotton	0.0	-5.5
Field	-1.9	-3.7
Grain	-4.8	-1.4
Orchards	-9.0	-9.0
Pasture	5.0	5.0
Grape	-6.0	-6.0
Rice	0.8	-2.8
Tomato	2.4	1.1
Truck Crops	-11.0	-11.0

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Runoff, Deliveries, Land Use and Revenues 2050



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Conclusions

- The scarcity value of water will increase rapidly over the next 20-30 years
- Past studies have indicated that projected wine market growth and real price increases can offset the increased water cost. Probably too optimistic.
- Microclimate change may be easier to adapt to than water scarcity
- Websites <http://swap.ucdavis.edu/>,
<http://cee.engr.ucdavis.edu/faculty/lund/CALVIN/>