Three Economic Points

1. Agriculture is important. Farming is 1 to 2% of gross state product, and 3 to 4% counting allied industries and ripple effects. Much bigger share 10% or more in Central Valley regions with the biggest drought impacts.

2. Food price effects will be small for three reasons:
   a. Smaller direct impact where California food specialties are grown
   b. Keep water on those high value per acre-foot produces and tree and vine crops
   c. Biggest impacts on indirect-food field crops and cotton and crops that are also grown elsewhere (rice is an exception)

3. Overall California labor impacts are small as a share (related to points 1. and 2.), but will be severe on many rural people who are already vulnerable.
Water protests draw state attention

NO IRRIGATION water for local farms means high unemployment among the large Central California Latino population. This woman was extremely passionate in her plea for officials to find a solution to provide ample water for area farms.
Understanding drought mitigation is partly arithmetic

Where does the water go and how valuable is it?

- Water in California mostly flows to ocean and we do this on purpose for environmental purposes.
- Urban and industrial water is costly and valuable, but much of it is simply poured on the ground or flushed down the drain (and that is a useful use).
- Farm water is and must be cheap by any normal standard.
  - We measure the cost in acre-feet 326,000 gallons
  - In normal times in normal places the price is between $0.0001 per gallon and $0.001. That is between 0.01 pennies and 0.1 pennies per gallon.
- That is why we pour it on the ground or let it run out under the Golden Gate.
## Estimated Applied Water Use by Crop in the San Joaquin Valley and Gross Revenue per Acre-foot

<table>
<thead>
<tr>
<th>San Joaquin Valley</th>
<th>2012 Bearing Acres (‘000)</th>
<th>Applied Water (acre-feet per acre)</th>
<th>Total applied water (‘000 acre-feet)</th>
<th>2012 Total Crop Value ($ Millions)</th>
<th>2012 Gross Revenue per acre-foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almonds</td>
<td>750</td>
<td>4.0</td>
<td>3,000</td>
<td>$3,883*</td>
<td>$1,294*</td>
</tr>
<tr>
<td>Winegrapes</td>
<td>130</td>
<td>2.4</td>
<td>310</td>
<td>$717</td>
<td>$2,319</td>
</tr>
<tr>
<td>Proc. Tomatoes</td>
<td>220</td>
<td>2.0</td>
<td>440</td>
<td>$805</td>
<td>$1,847</td>
</tr>
</tbody>
</table>

* Almond revenue has rose substantially for 2013.
**Grape Irrigation Water per Gallon of Wine**

<table>
<thead>
<tr>
<th>Viticultural Area</th>
<th>2012 Bearing Acres (’000)</th>
<th>Approximate Acre-feet per Acre</th>
<th>Estimated Acre-Feet (’000)</th>
<th>2012 Tons of Grapes per Acre</th>
<th>Estimated Gallons Water/Ton (’000)</th>
<th>Gallons water/Gallon of Wine*</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Coast</td>
<td>132</td>
<td>0.7</td>
<td>93</td>
<td>4.4</td>
<td>52.5</td>
<td>309</td>
</tr>
<tr>
<td>Central Coast</td>
<td>91</td>
<td>1.4</td>
<td>27</td>
<td>5.7</td>
<td>80.1</td>
<td>471</td>
</tr>
<tr>
<td>Delta</td>
<td>86</td>
<td>1.35</td>
<td>116</td>
<td>10.6</td>
<td>41.3</td>
<td>243</td>
</tr>
<tr>
<td>S.J. Valley</td>
<td>129</td>
<td>2.4</td>
<td>307</td>
<td>14.6</td>
<td>53.2</td>
<td>313</td>
</tr>
<tr>
<td><strong>Total California</strong></td>
<td><strong>459</strong></td>
<td><strong>1.45</strong></td>
<td><strong>667</strong></td>
<td><strong>8.75</strong></td>
<td><strong>54,057</strong></td>
<td><strong>318</strong></td>
</tr>
</tbody>
</table>

*approximately 170 gallons of wine per ton of grapes.*
Gallons of Vineyard Water per Gallon of Wine*

- S.J. Valley: 313 Gallons
- North Coast: 309 Gallons
- Delta: 243 Gallons
- Central Coast: 471 Gallons

*approximately 170 gallons of wine per ton of grapes.
Gross Revenue per Acre-foot by Crop in the San Joaquin Valley

- Almonds
- Winegrapes
- Proc. Tomatoes
## Estimated California Winery Water Use

<table>
<thead>
<tr>
<th>California Wineries</th>
<th>Percent share of production</th>
<th>2012 Gallons produced (millions)</th>
<th>Gallons of water per gallon of wine</th>
<th>Estimated Gallons Used for Production (millions)</th>
<th>Acre-feet of Water Used (thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big wineries</td>
<td>85</td>
<td>563</td>
<td>3</td>
<td>1,690</td>
<td>5.2</td>
</tr>
<tr>
<td>Mid-sized wineries</td>
<td>10</td>
<td>66</td>
<td>6</td>
<td>398</td>
<td>1.2</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>33</td>
<td>20</td>
<td>663</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>663</td>
<td>4.15</td>
<td>2,751</td>
<td>8.4</td>
</tr>
</tbody>
</table>
Average Gallons of Water per Gallon of Wine

- Irrigation Water: 310 gallons
- Winery Water: 10 gallons
- Total: 320 gallons
Economics and Arithmetic

1. Agriculture is important.
   – And, the drought is important to agriculture and the economy
2. Food price effects will be small, but noticeable in some cases
3. Overall California labor impacts are small, but severe for many of the state’s most vulnerable

Arithmetic

Environmental use and farm use is most of the water
Even in wine (a heavy water-user), winery use is tiny compared to the farm use for the raw material.
Conservation in most uses may feel good, but … do the math
For environmental use or farming (except special uses and temp. spikes) water must be cheap -- we pour it on the ground!
Thank you, Dan Sumner
aic.ucdavis.edu