California's Central Valley is called the "salad bowl" of the United States due to its high fruit and vegetable production. In this analysis, I will use the 2010 dataset as a baseline for crop changes due to drought. Because data was collected by satellite, its representations are imperfect, particularly in areas with small plots of land containing various crops (ground resolution of 30 meters).

Case 1: Cotton

The answer to this question could be useful to policymakers who wonder whether farmers are adapting their crop choices to dwindling water supplies or market incentives or other factors hold more sway over crop choice.

Case 2: Almonds

Overall, the attribute table for my final change raster (the result of the model) indicated that 20% of Central Valley cropland use did not change from 2010 to 2014. 42% changed to crops with lower water needs, and 38% was converted to more water-intensive crop production. With this bird's-eye view of crop change, my data model shows that crop production did not shift dramatically toward water conserving crops due to the California drought. Rather, it appears that nearly as many farmers chose more water-intensive crops as chose water-conserving crops (see graph below). According to the New York Times, California cotton production declined by 35% from 2013 to 2014, while almond production has risen 44% since 2003 (Strom 2014). Despite their large water needs, nuts and fruits can bring in ten times more earnings per acre than low-water vegetable crops like spinach, and this market incentive likely explains the increased plantings of water-intensive nuts (Holthaus 2014). This analysis could benefit from quantifying the exact water needs of each type of crop and reclassifying each crop as a high or low water need crop depending on the environmental conditions, so by labeling them as a "high water need" or "low water need" crop, the raster calculation would have been meaningless with regards to the crop change. Reclassifying the data from the FAO into a more specific approach. As my model stands now, it probably both underclassifies and overclassifies each crop need category (used to reclassify each crop) from the FAO. These categories became the foundation of the model as it relates to representations of reality were as it relates to representations of reality were imperfect or ambiguous; for example, the "high water need" crops often include some of the very low water need crops such as almonds, which may be a problem for future versions of the model.

Methods

1) Reclassify, to categorize each crop type into one of three water need categories (high, low, or non/fallow) based on data from the FAO.
2) Raster Calculator: to overlay the reclassified 2010 data from 2014 data to create a crop change raster that represents the drought period.
3) Clip, to constrain the crop change raster area to the Central Valley.

Case Study: Almonds

The most important component of the model as it relates to representations of reality were as it relates to representations of reality were the crop water need categories (used to reclassify the data from the FAO). These categories became the foundation of the model because they provided some credibility to the ranking of crops as high or low water need. Without reclassifying each crop into a high, low, or no-water need category, the resulting output of the model would have been meaningless with regards to the crop change. Through the reclassification of the data from the FAO into a more specific approach. As my model stands now, it probably both underclassifies and overclassifies each crop need category (used to reclassify each crop) from the FAO. These categories became the foundation of the model as it relates to representations of reality were as it relates to representations of reality were imperfect or ambiguous; for example, the "high water need" crops often include some of the very low water need crops such as almonds, which may be a problem for future versions of the model.