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# Turning Crisis into Opportunity: Organic Conversion during Droughts

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The organic food industry has grown rapidly in California and the rest of the United States over the past decades. National organic food sales have grown at double digit rates in nearly every year since the early-90's. In recent years, many organic food companies have found it challenging to increase the supply fast enough to fully meet the robust growth in consumer demand. Consequently, there have been periodic reports of shortages of organic products and large increases in imports of some organic commodities. In response to these challenges, many private firms, nonprofit organizations, and government agencies have explored ways to support American farmers that are interested in pursuing organic production systems.

In this context, researchers and policy makers are interested in the factors that that inhibit or facilitate the transition of a farm from conventional to organic production. The list of possible reasons is long, ranging from macroeconomic reasons such as income growth and commodity prices that affect all agricultural producers, to location- and site-specific reasons such as production potential, certification costs, or even local water shortages. A key challenge in understanding the interplay of these factors for each geographical context is the availability of a consistent and detailed farm-level data that maps the location, commodity type, and the timing of the transition of a farm or field into and out of organic production. The database of organic producers maintained by the USDA National Organic Program (NOP)—while extremely useful as a starting point—does not provide detail on organic field locations that would allow matching with geographic datasets on soils, water, or other factors that might impact organic adoption. In this research project, our goal is to develop farm and field-level data that show the spatial and temporal patterns in the emergence of organic farmland, and then use these data to examine the site-specific factors that could explain these patterns.

In this article, we report on our progress towards the first goal of this project, which was to develop a methodology for accurately identifying organically-managed cropland at the field level. The next section presents the results obtained so far and the last section outlines the ongoing and planned work, particularly in connection with an examination of the role of drought in organic conversion of farmland.

## Case Study: San Joaquin County

We use San Joaquin County during the years of 2011 - 2017 as a case study to develop our methodology. Located in the heart of the California's Central Valley (see Figure 1), San Joaquin County has 920,000 acres of agriculturally productive farmland which produced $2.5 billion in agricultural revenue in 2017(https://www.cdfa.ca.gov/statistics/PDFs/2017-18AgReport.pdf). Most of this revenue is generated by fruit and nut crops, followed by livestock and poultry, and then vegetables. Figure 1 shows the location

of the main irrigation and water districts in San Joaquin County and the 2011 address locations for certified organic farms, as obtained through the USDA NOP Organic Integrity Database.

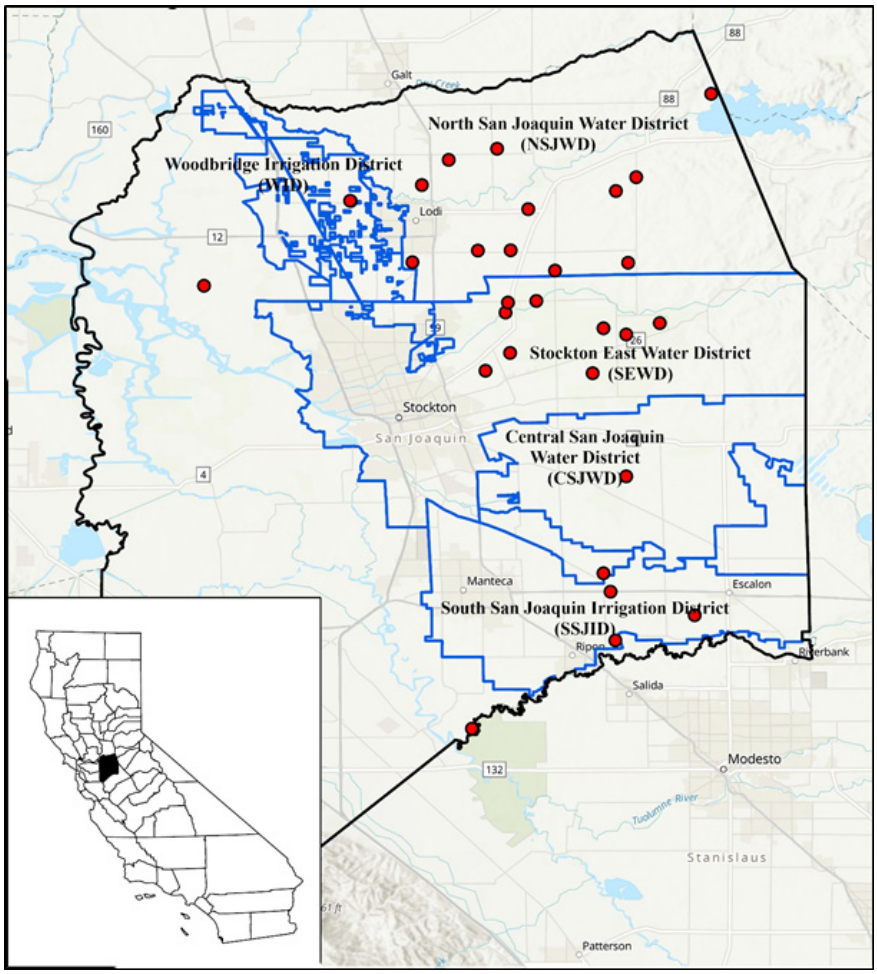


Figure 1. San Joaquin County illustrating the five principal irrigation districts being examined for this study and address point locations of certified organic crop farms in 2011 (Source: USDA-AMS).

We use the California Pesticide Use Database maintained by the California Department of Pesticides Regulation (DPR) that records application of chemicals at the field-level. This database is compiled from farmers' self-reporting on the crops they grow and every chemical, pesticide, fungicides, fertilizers etc., they apply on their fields throughout the year. For each field in the data, we compare the list of chemicals applied by growers or their representatives and compare it against the list of chemicals that are approved by the USDA for organic production. The result is the identification of individual fields that are likely managed in a way that is consistent with organic certification, in each year from 2011 to 2017. Finally, this classification of likely organic management is matched with the information in the CCOF and NOP databases to verify whether the fields that we identify as likely under organic management are in-fact certified as organic.

# Preliminary Results

For ease of presentation, we present only the result for 2011, 2015, and 2017. Figure 2 shows the percent of crop acreage that is likely managed as organic —as identified by our methodology outlined above--in selected irrigation districts in the County. We see some clear spatial differences in the location of likely organic managed fields: North San Joaquin Water District (NSJWD), Woodbridge Irrigation District (WID) and Stockton East Water District (SEWD) have more acreage under the likely organic management classification. An interesting and surprising result was the acreage that appears to be managed organically has reduced consistently over time, particularly sharply in WID from 2011 to 2017.

Vineyards particularly located in NSJWD and WID districts represent the likely organic managed acreage that decreased over the time period, especially in WID. Tree nuts, especially walnuts, saw an increase in acreage during the drought but then a decrease to a level slightly higher than in 2011. Tree nuts were confined to the SEWD district. We found increases in production of likely organic managed fruit crops, especially apples and cherries, in the SEWD and SSJID districts.

Figure 3 shows the maps of individual fields that appear to be managed organically based on pesticide use reporting data in 2017. We see some spatial clustering of field acreage in the northern water districts. The information provided in Figure 3, shows the original and exciting contribution of this research, that organic management can be identified at the field level, by crop, using pesticide use reports. This information will help us to better understand the location and site-specific factors impacting organic adoption, including the possibility of neighborhood and diffusion effects associated with the decision to pursue organic certification. These data we are developing are more comprehensive than those maintained by either the NOP

or by any individual organic certifier. Once finalized, these data will be made publicly available through our project and ARI websites, contributing to the ability of other researchers to study the organic adoption decision and market dynamics in California.

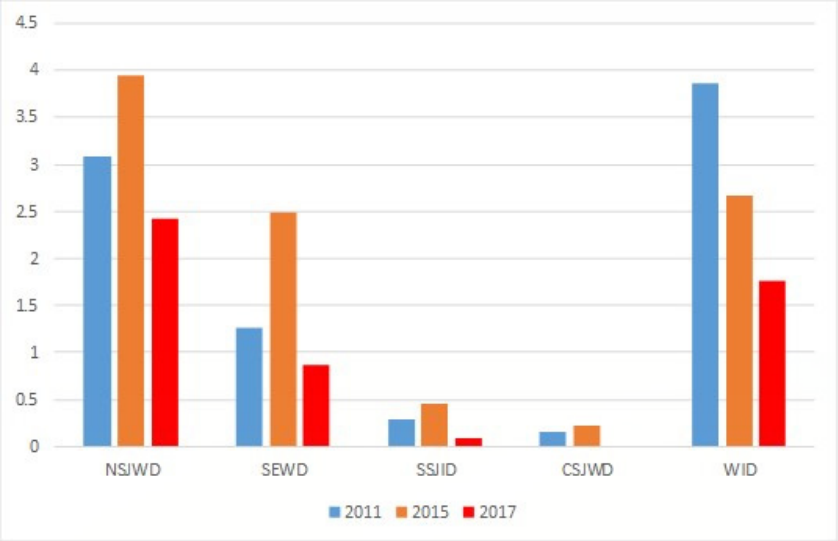


Figure 2. The percent of crops under likely organic management by irrigation district over the time frame of study.

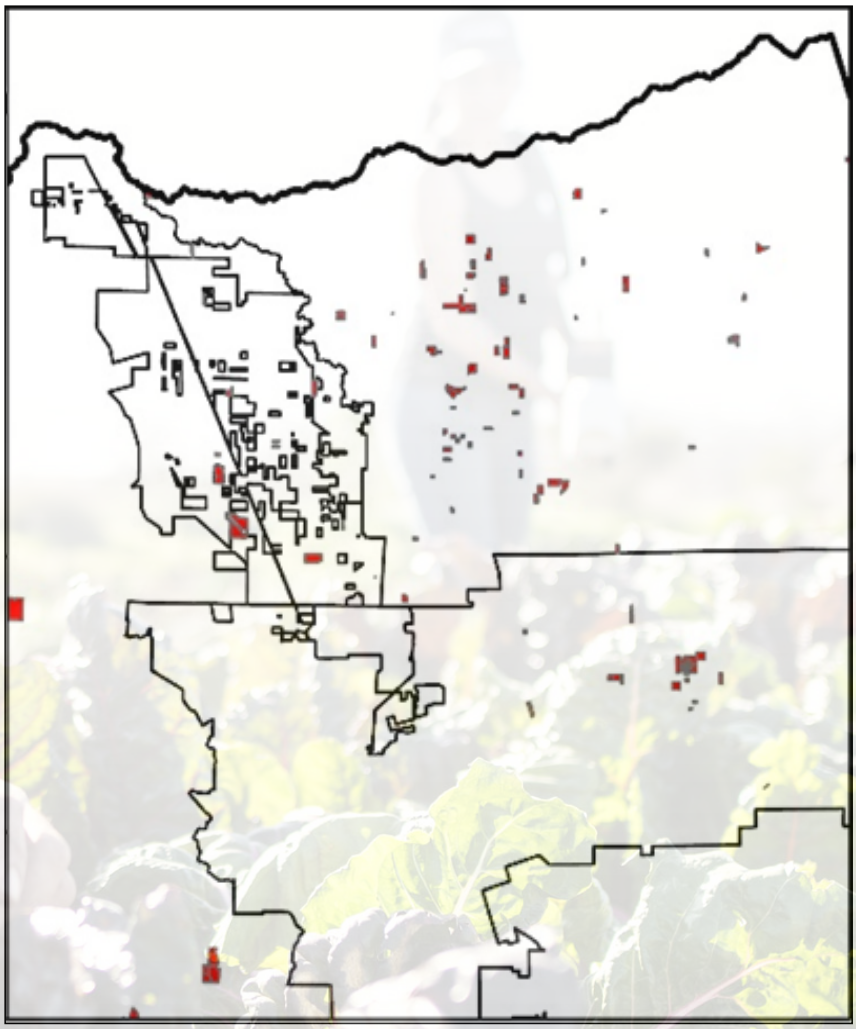

Figure 3. Locations of farm fields exhibiting likely organic management assessed from the DPR databases in 2017.

# On-Going Work

Currently, we are in the process of validating our methodology of identification of fields that are likely under organic management. Next steps include combining the annual drought and water availability data for each water district in the County. The time frame of our analysis, 2011-2017, coincides with one of the most severe recent droughts in California. While water shortages can lead to lower agricultural production in the short run, we would like to explore if farmers in San Joaquin County have used the period of low water availability as a window of opportunity to convert to organic production. If cropland must be fallowed because of water restrictions during drought, the opportunity cost of transitioning to an organic system is likely much lower than during high-productivity periods. Depending on the location in the San Joaquin County, farming uses surface or groundwater sources for irrigation—each of which is differently affected by drought conditions---making the choice of San Joaquin County quite an interesting and useful case study for examining impact of drought on organic conversion.

# Acknowledgements

This multidisciplinary research project, involving research methods from Geography and Economics, is funded by CSU, Chico's Agricultural Research Institute. The team is composed of researchers from CSU, Chico and Cal Poly SLO. California Certified Organic Farmers (CCOF) is a partner with this project and has allowed the research team the use of their proprietary organic certification data. All background photographs are credited to Jason Halley, University Photographer at CSU, Chico.

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## Goals

- Providing management and economic information that will assist managers in agribusiness
- Develop educational programs for North State and regional interests
- Advising on financial management, market analysis, value-added agriculture, and e-commerce for agribusiness firms
- Through applied research, develop economic, management, and marketing information
- Support professional relationships between the College of Agriculture faculty and the agricultural community in order to improve opportunities for undergraduate students developing careers in agriculture
- Working with other groups at California State University, Chico, and other institutions to accomplish projects within the scope of the Institute

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