

GEOGRAPHY OF OWNERSHIP AND LAND FALLOWING DECISIONS WITH RICE FARMERS IN BUTTE COUNTY, CALIFORNIA (1984 - 2012)

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INTRODUCTION

Butte County, California is an important area in the state's agriculture industry, especially with rice production. The clay soils left by the Sacramento River and abundant surface water have made rice a dominant crop in the region. However, some farmers choose to leave their land fallow in lieu of growing rice during certain years. During State Drought Water Bank (SDWB) years (1991-92, 94 and 2009-10), farmers are allowed to sell water to the State Water Project (SWP); therefore, following their land instead of growing rice. This project will look at 29 years of data to determine a variety of potential factors, such as parcel size and ownership geography, that may influence a farmer's decision to fallow their land for a certain year.



Study Area

Three irrigation districts within Butte County:

1. Western Canal Water District
2. Richvale Irrigation District
3. Biggs-West Gridley Water District

Project study area. Map produced on ArcMap 10 (Copyright ESRI).

DATA & METHODS

Geographic Data

- July & August LANDSAT TM from USGS (1984-2012)
- Fallow plots of land derived for each year
- 2011 Butte County tax parcels (includes ownership information)
- Irrigation district boundaries

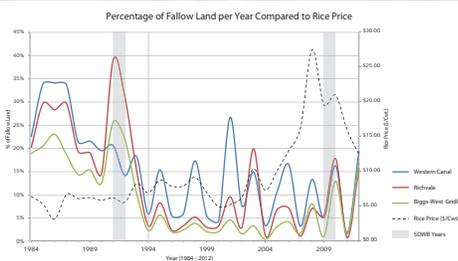


Near infrared LANDSAT imagery shows the difference between growing rice (red) and fallow land (green) (USGS, 1998).

Methods

The fallow areas of land were obtained using near IR combination of the TM imagery from months where rice was in full blossom. A dataset of spatial and temporal data was then created for the 29 years of study with all data aggregated at the tax parcel level.

The graph below shows the change in the percentage of fallow land for each irrigation district over time. Fallowing was more frequent in the 1980s compared to other decades. Furthermore, as rice price increases, the overall percent fallow decreases. Rice price is one economic factor that may influence a farmer's decision to leave a field fallow or not.



RESULTS & ANALYSIS

Sample Years

1986, 1996, and 2006

These three years provide one sample from each decade of the 29 year study. Each sample represents a case where there is either a high or low percentage of fallowing compared to all years. None of the samples occur during SWDB years.

Average Size of a Tax Parcel

Irrigation District	Mean Area (Acres)	Standard Deviation
Biggs-West Gridley	112.05	± 124.21
Richvale	100.50	± 105.58
Western Canal	154.66	± 147.77

Total Number of Fallow/Not Fallow Tax Parcels

Year	Irrigation District	Fallow	Not Fallow
1986	Biggs-West Gridley	219	210
	Richvale	296	297
	Western Canal	316	262
1996	Biggs-West Gridley	24	213
	Richvale	43	309
	Western Canal	65	263
2006	Biggs-West Gridley	26	213
	Richvale	82	310
	Western Canal	124	264

Logistic Regression

Dependent Variable:

Presence of fallow land within a tax parcel

Independent Variables:

Total area of a tax parcel

(Total area of a tax parcel)²

Owner located in a county bordering Butte County

Owner located in California (not in Butte or bordering county)

Owner located outside California

Located in Western Canal Water Dist.

Located in Biggs-West Gridley Water Dist.

1986:

- Total area and (Total area)² significant
- Small and large sized parcels are more likely to grow rice, while medium sized parcels are more likely to fallow
- Rice price extremely low (3.18 Cwt.), see graph)

1996:

- Total area, (Total area)² & Bordering Butte significant
- Small and large sized parcels are more likely to grow rice, while medium sized parcels are more likely to fallow
- Greater probability that owners located in a county bordering Butte will fallow

2006:

- Total area, (Total area)², Bordering Butte, & BWG Water Dist. significant
- Larger parcels are more likely to fallow compared to smaller plots
- Owners located in a county bordering Butte or in BWG Water Dist. are more likely to fallow
- Rice price steadily increasing (13.00 Cwt.)

Regression Results

Year	Variables	B	Significance (P-value)
1986	Total area	0.0124	0.001
	(Total area) ²	-0.000015	0.001
	Owner lives in county bordering Butte County	-0.202	0.490
	Owner lives in CA (not in Butte or bordering county)	0.227	0.279
	Owner lives outside CA	0.848	0.316
	Western Canal Water Dist.	-0.081	0.662
	Biggs-West Gridley Water Dist.	-0.153	0.423
1996	Total area	0.013	0.001
	(Total area) ²	-0.00002	0.001
	Owner lives in county bordering Butte County	0.646	0.098
	Owner lives in CA (not in Butte or bordering county)	-0.462	0.189
	Owner lives outside CA	-19.072	0.999
	Western Canal Water Dist.	0.345	0.199
	Biggs-West Gridley Water Dist.	-0.435	0.195
2006	Total area	0.006	0.005
	(Total area) ²	-0.000001	0.680
	Owner lives in county bordering Butte County	1.527	0.0001
	Owner lives in CA (not in Butte or bordering county)	0.367	0.249
	Owner lives outside CA	-18.749	0.999
	Western Canal Water Dist.	0.312	0.268
	Biggs-West Gridley Water Dist.	-0.909	0.019

CONCLUSIONS

Across the sample years analyzed in this project (1986, 1996, 2006), the size of the the tax parcel and whether or not the owner lived in a county surrounding Butte County were the best predictors as to whether or not a farmer would fallow their rice field. In 2006, the regression showed that larger acre parcels were more likely to be fallow. Western Canal Water District proves these results since it is the irrigation district with the largest mean area, and in 2006, it had the most parcels fallow.

What's Next?

- Conduct analysis over all 29 years, not just a sample, to better understand patterns and how variables are affecting fallowing decisions
- Does a tax parcel's distance from infrastructure, such as silos, roads, and railroads, affect the likelihood of fallowing?
- Correct for data limitation in 2011 tax parcels
- Research and explore the economic impact of rice price and the influence it has on the decision to fallow or not fallow. Other economic impacts?
- Look into patterns of fallowing during drought and SDWB years



Rice growing in the Biggs-West Gridley Water District with the Sutter Buttes in the background (California Rice Commission, 2013)

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