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# Learning from the drought SA farm level drought adaptation

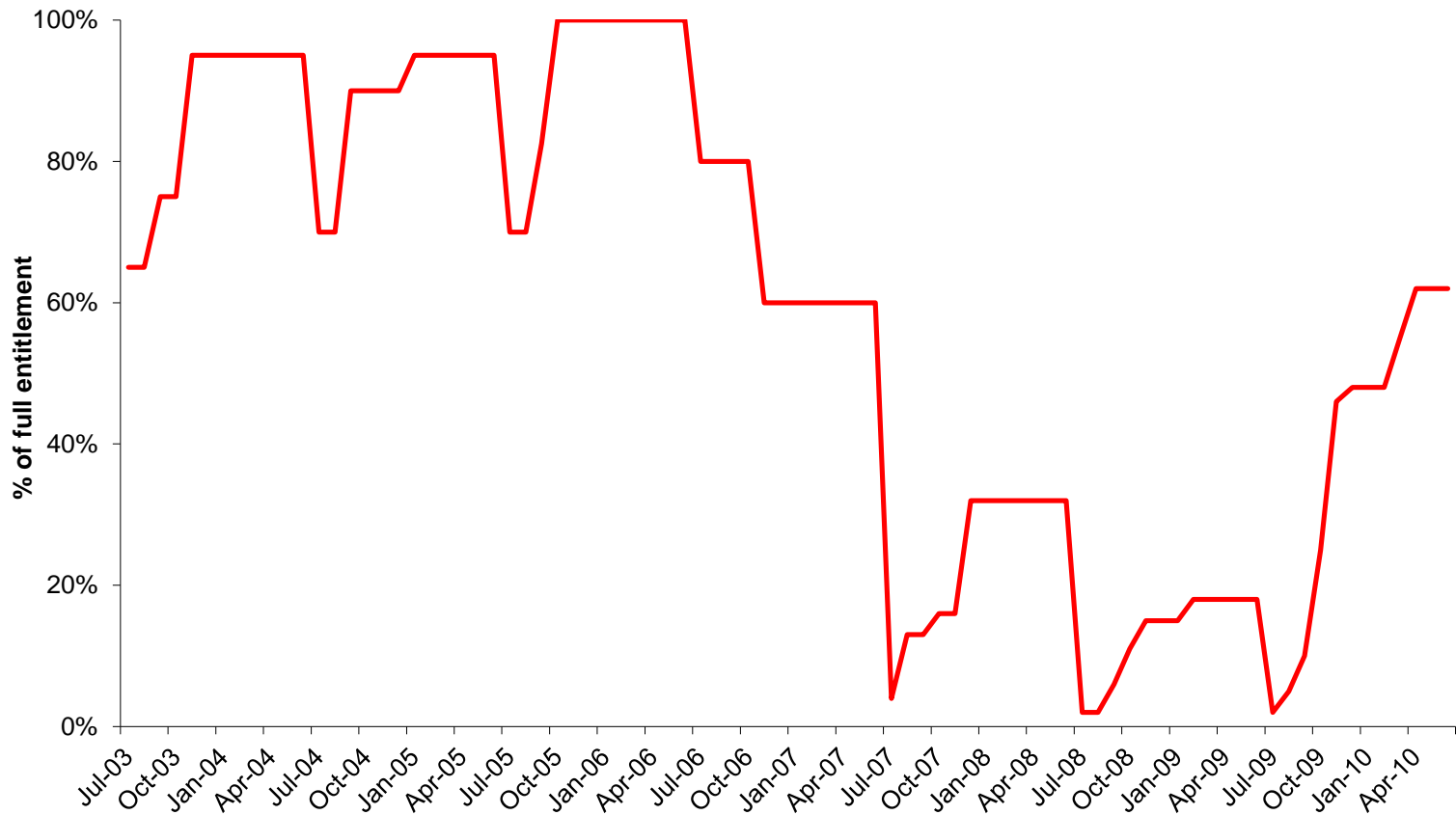
Water for a Healthy Country

Rosalind Bark, Darran King, Jeffrey Connor  
AARES, February 11th, 2011

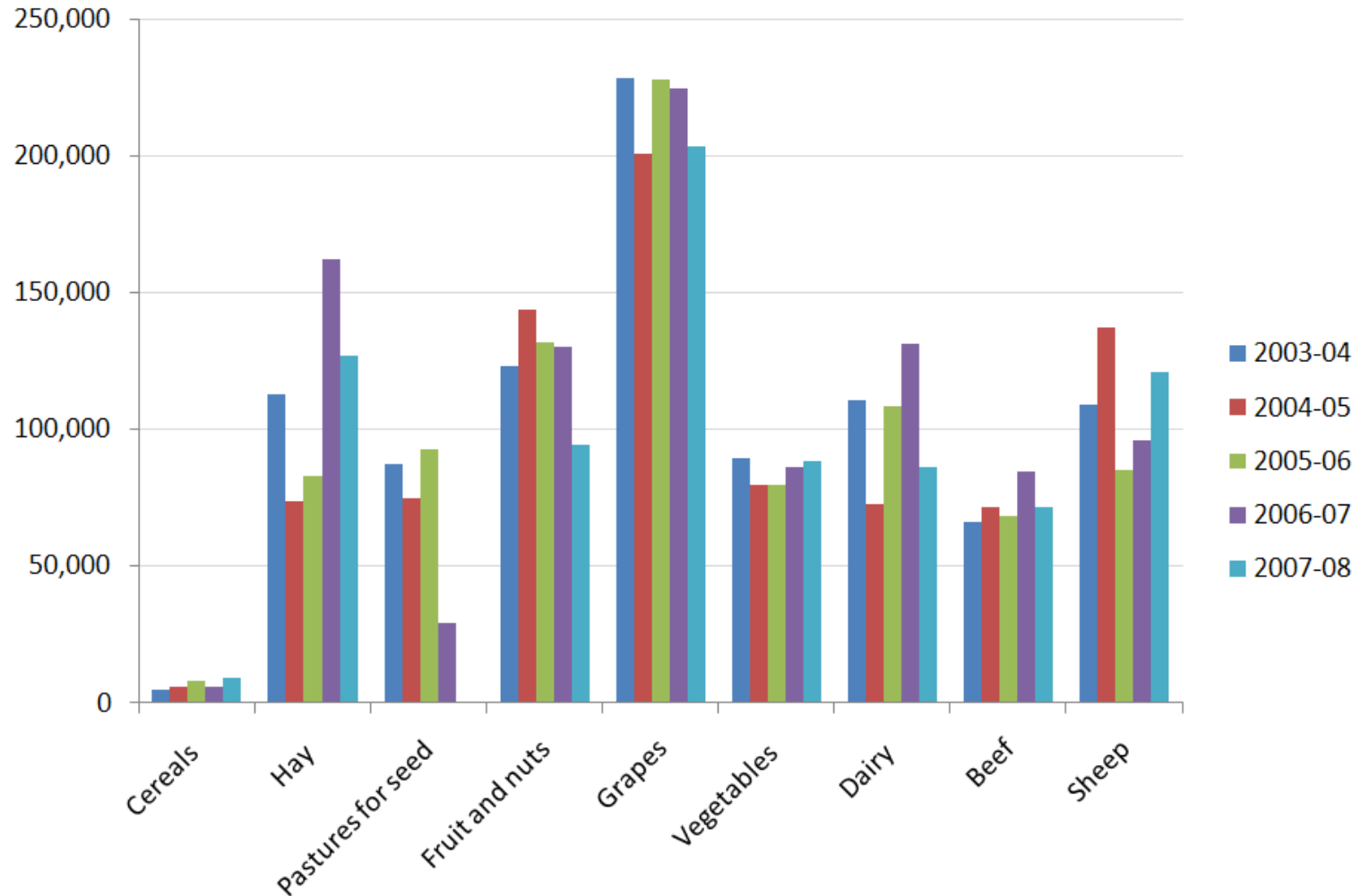
National Research  
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# Allocations to SA irrigators 2003-2010

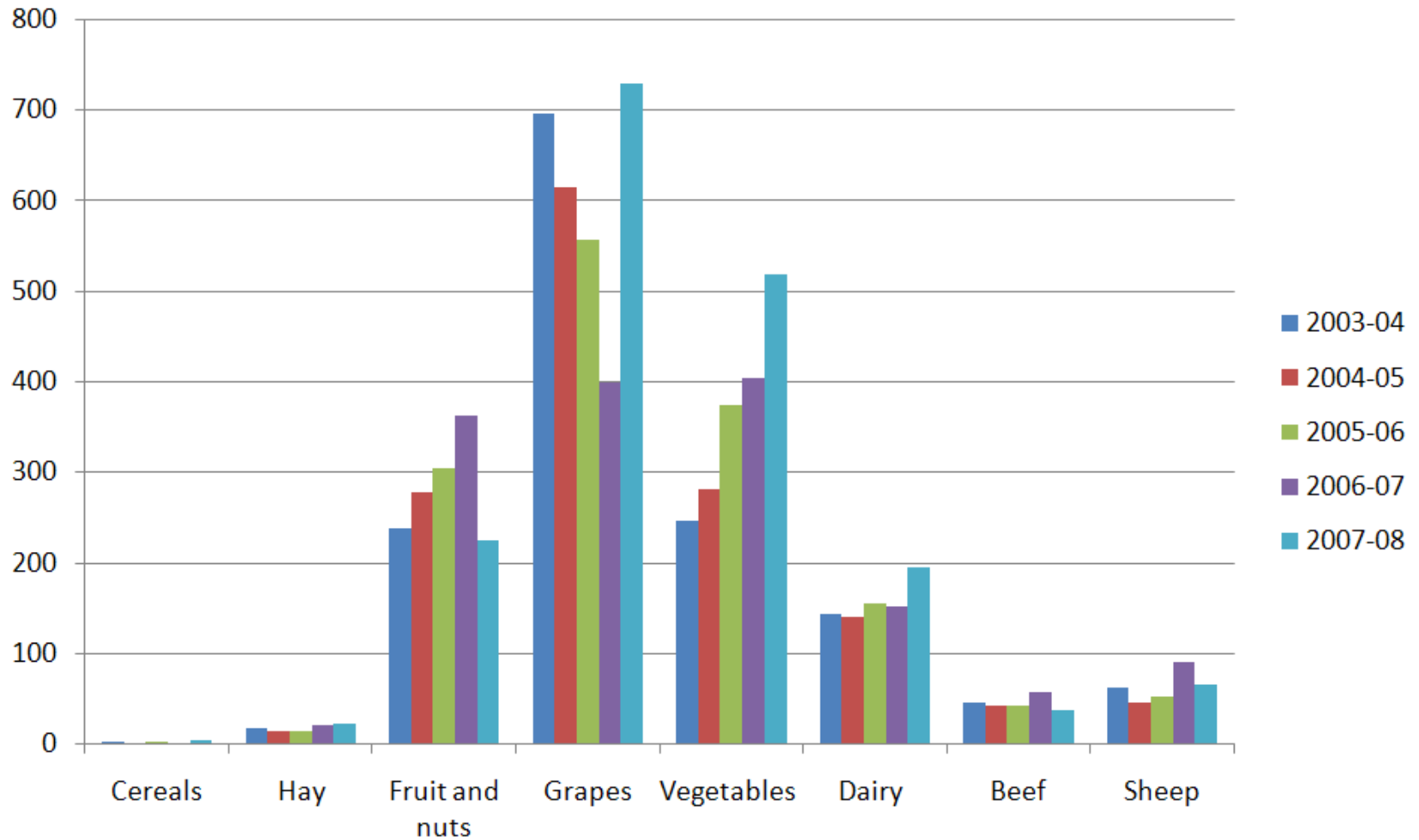


# Volume of irrigation water applied, ML



Source: Australian Bureau of Statistics

# GVIAP, \$m



Source: Australian Bureau of Statistics



South Australian Murray - Darling Basin  
Resource Information Centre Inc

# SAMRIC dataset

- Annual
  - 2003/04 through 2008/09
  - Paddock level
  - Geographically located
  - Crops
  - Irrigation system
- Data issues
  - Splits, joins, rezoning
  - Richer dataset 2007/08
  - Change in format 2008/09

# Summary data

	Records	Land in transition	Land not picked/producing	Productive land
2003/04	N=36,163 56,791 ha	6,314 ha ~11%	1,596 ha ~3%	48,881 ha ~86 %
2007/08	N=40,947 68,404 ha	14,897 ha ~22%	4,123 ha ~6%	49,384 ha ~72%

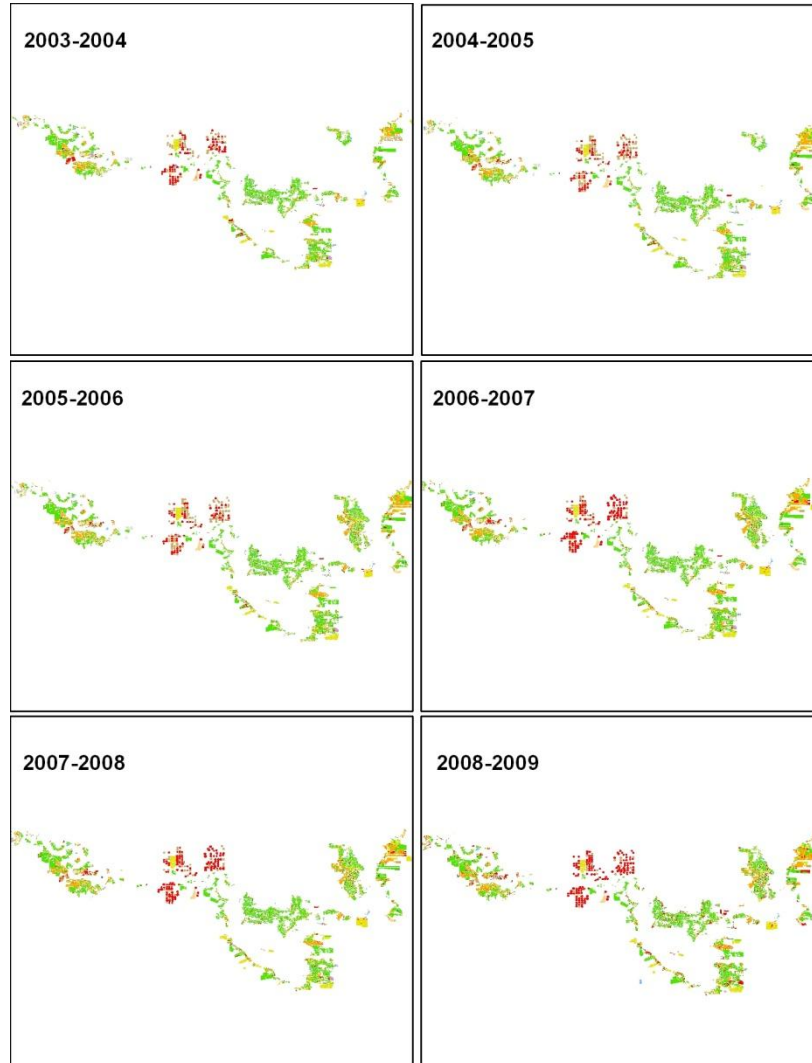
# Other data

- **Water**
  - Availability in SA Murray
  - ABS estimates of water applied by crop
  - License data (?)
    - Water crop production functions
- **Ag**
  - Crop prices
  - Crop production
- **Other**
  - Salinity
  - Weather
- **No data**
  - Irrigator characteristics

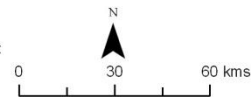
# Inform ag sector economic models

- Trends in local ag land use
  - Calibrate ag sector models at the sub-regional scale
  
- Trends in adaptation
  - Compare econometrically-derived coefficients with coefficients in mathematical programming models
    - Irrigation water yield production functions
    - Shifting land use (dryland, perennial to annual, Connor et al., 2009)

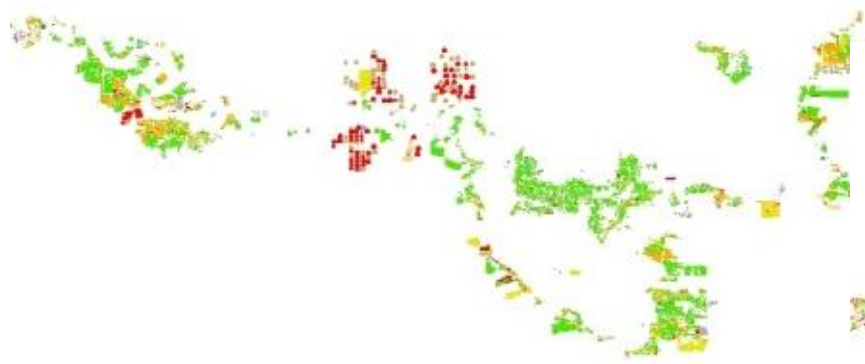
# Riverland



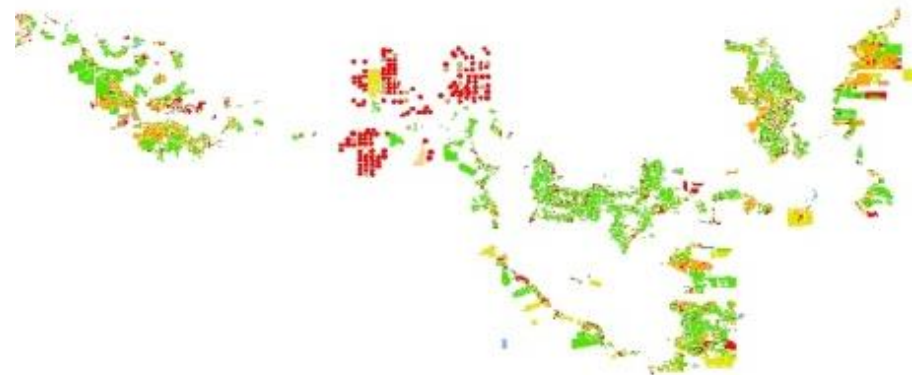
## Landuse



2003-2004

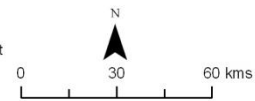


2008-2009

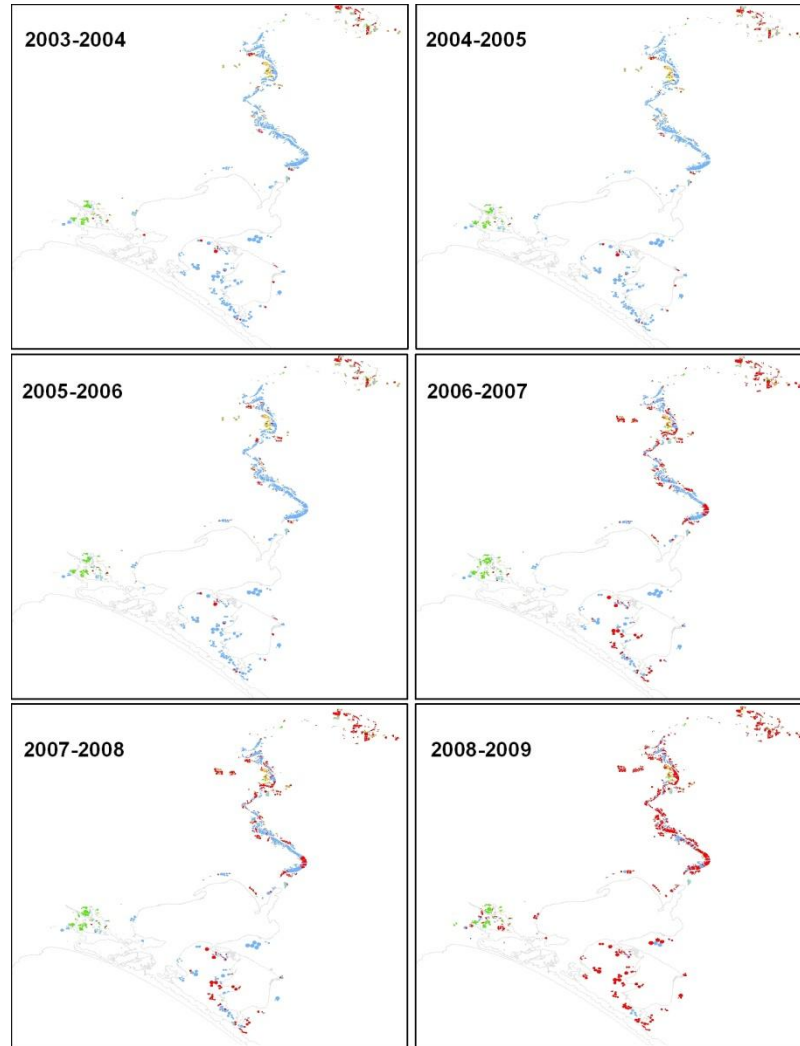


**Landuse**

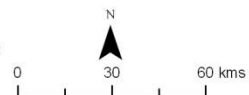
- |              |                    |             |             |
|--------------|--------------------|-------------|-------------|
| Unknown      | Livestock          | Nut Trees   | Vine Fruit  |
| Citrus Fruit | Land in Transition | Vegetables  | Stone Fruit |
| Field Crops  | Forest             | Stone Fruit |             |



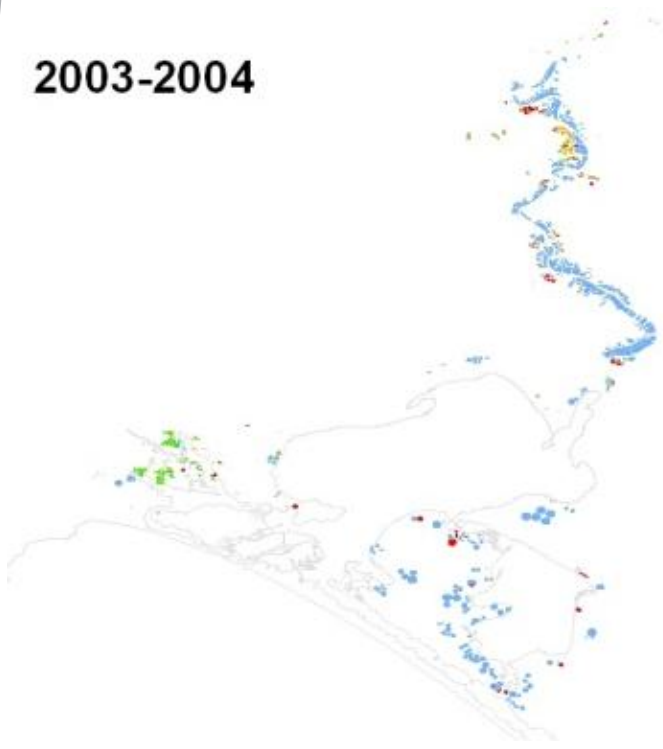
# Below Blanchetown



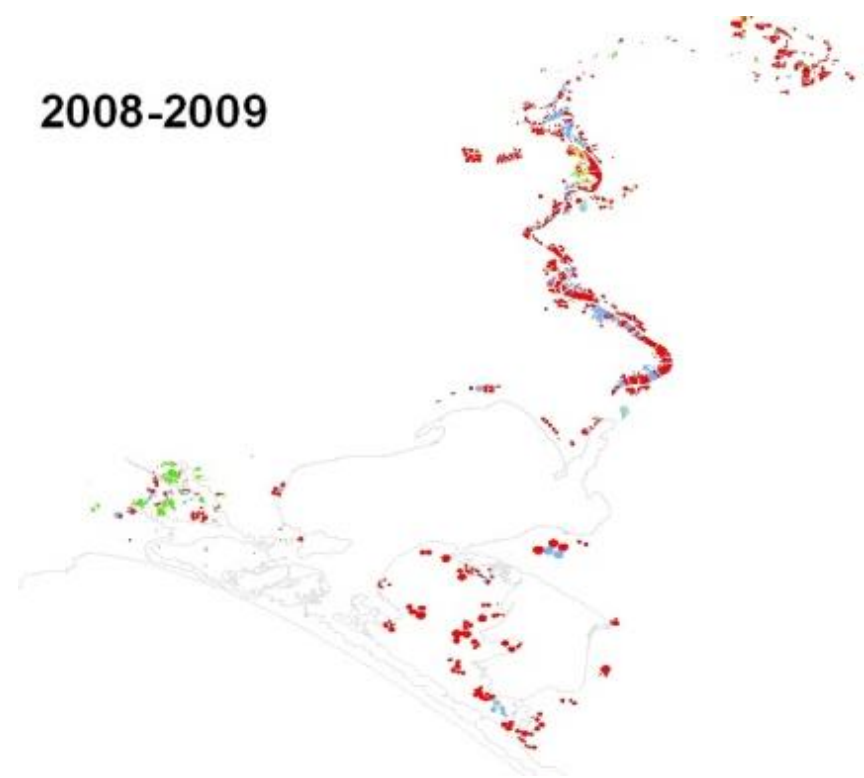
## Landuse



2003-2004

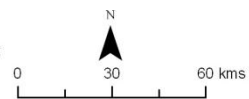


2008-2009



**Landuse**

- |              |                    |             |            |
|--------------|--------------------|-------------|------------|
| Unknown      | Livestock          | Nut Trees   | Vine Fruit |
| Citrus Fruit | Land in Transition | Vegetables  |            |
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# Land use change/transition and adaptation

- **Water availability**

- $H_0$  = productive ag land decline
- $H_0$  = productivity of ag land decline
- $H_0$  = greater variability in water supply lead farmers to plant higher value crops that can be fallowed
- $H_0$  = increase in dry land cropping

- **Irrigation system/efficiency**

- $H_0$  = for same crop and same region irrigation trust growers fare differently from private irrigators
- $H_0$  = increased efficiency in irrigation technology (by commodity) in response to reduced water availability and higher water prices

- **Regional variation**

- $H_0$  = Lower Lakes first region to transition (dairy and salinity effect)
- $H_0$  = Langhorne Creek wine area fares differently from other wine areas because of salinity

# Land use change by region, 2003/04–2007/08

- Riverland

- Ag land: 40,152 ha – 47,927 ha
  - In transition: 4,479 ha – 7,068 ha
    - 11% – 15%

- Murray Marsh

- Ag land: 11,030 ha – 14,295 ha
  - In transition: 1,398 ha – 6,193 ha
    - 13% – 43%

- Lower Lakes

- Ag land: 5,610 ha – 6,170 ha
  - In transition: 437 ha – 1,636 ha
    - 8% – 27%

# Land use change by crop, 2003/04–2007/08

- Dairy
  - 6,086 ha – 5,904 ha
- Feed
  - 2,404 ha – 4,119 ha
- Fresh vegetables
  - 1,960 ha – 3,090 ha
- Bulk wine
  - 4,682 ha – 4,675 ha
- Premium wine
  - 14,501 ha – 14,302 ha

Connor et al., 2009 AJARE

# Summary

- Natural experiment
  - Ag land use trends
  - Adaptive responses
  
- Inform
  - Mathematical models: ag water demand, CGE
  - Transitional policies

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