Southern Basin Community Modelling

Preliminary Data Analysis – Chart Pack

February 2018

KPMG Economics

Disclaimer

Inherent Limitations

This report has been prepared as outlined in the Order for Services MD003929. The services provided in connection with this engagement comprise an advisory engagement, which is not subject to assurance or other standards issued by the Australian Auditing and Assurance Standards Board and, consequently no opinions or conclusions intended to convey assurance have been expressed.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by, the Murray-Darling Basin Authority's management and personnel consulted as part of the process.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

KPMG is under no obligation in any circumstance to update this report, in either oral or written form, for events occurring after the report has been issued in final form.

The findings in this report have been formed on the above basis.

Third Party Reliance

This report is solely for the purpose set out in the Background Section and for the Murray-Darling Basin Authority's information, and is not to be used for any other purpose.

This report has been prepared at the request of the Murray-Darling Basin Authority in accordance with the terms of the Deed of Variation 2 dated 26 October 2017. Other than our responsibility to the Murray-Darling Basin Authority, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

1 Background

The specific purpose of the community modelling work is to simulate the employment impacts of water recovery policies. To be fit-for-purpose the simulation model needs sufficient detail to capture the key relationships that relate water availability to employment. As a preliminary step KPMG has developed quantitative labour models for forty communities across the Southern Murray-Darling Basin (SMDB). KPMG's community-specific models will provide insight into historical relationships between *employment* and *irrigated crop area/milk production*.

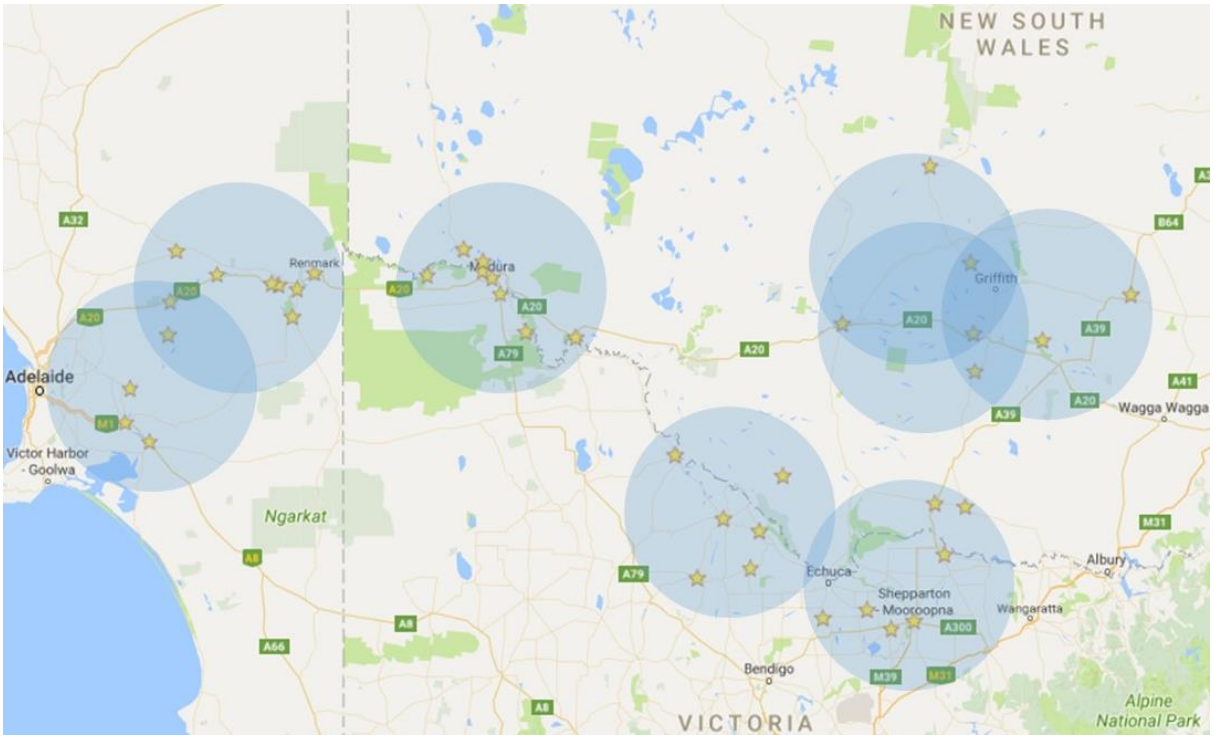
Key model inputs are the hectares of irrigated farmland and volume of irrigated milk production that would be supported by different water recovery scenarios. Model simulations are designed to answer the following question: how different would employment outcomes have been in history for these communities over the period 2001 to 2016, if there had been no water recovery for the environment; and with all other factors remaining unchanged.

Our model development has constantly evolved as we remain in active consultation with the Murray Darling Basin Authority (MDBA); overseen by an independent reviewer from the University of New England. We seek to address anomalies in our models by leveraging genuine community knowledge to achieve work that reflects, as best as possible, what has occurred 'on the ground', at the community level.

2 Purpose of this report

The communities in the Southern Murray-Darling Basin are identified in Figure 1 by yellow stars. The pale blue circles are scaled such that the radius represents 75 km. The Sunraysia region can be used to illustrate the clustering within commuting distance of communities in the Southern Basin. The circle with Mildura roughly in the centre is in the Sunraysia region and there are eight communities within this circle. Figure 1 reveals similar clusters in the Renmark and Murray Bridge areas in South Australia, in the Kerang and Shepparton-Mooroopna areas in Northern Victoria and in the Griffith area in Southern New South Wales.

Figure 1: Selected communities in the Southern Murray-Darling Basin



Source: Map data, Google (2018)

This report/chart pack acts as a brief overview of the preliminary analysis conducted by KPMG on employment and crop area/milk production relationships within the forty selected communities of the Southern Murray-Darling Basin. Employment data are drawn from ABS census points; extracted as per community specific boundaries by the University of Canberra. Crop area and milk production data are drawn from land-use models developed at MDBA.

3 Community Groupings

Table 1 lists the industry sectors that have been considered in this preliminary data analysis.

Table 1: Industry sectors

Dairy Cattle Farming
Dairy Processing
Rice Growing
Grape Growing
Vegetable Growing
Fruit, Nut and Citrus Growing

As indicated in Table 2, the forty SMDB communities can be roughly grouped into five broad groups according to geographic location and general crop activity. This grouping helps to visualise and understand the SMDB.

Table 2: Community groups by dominant activity & geographic location

Broadacre (NSW)	**Mixed Broadacre** (NSW)	**Dairy** (GMID, VIC)	**Perm. Plantings & Vegetables** (Sunraysia, VIC & Riverland, SA)	**Field Crop & Vegetable** (Lower SA)
Coleambally	Benerembah	Cobram	Berri	Lower Lakes
Deniboota	Berrigan-Finley	Kerang-Cohuna	Blanchetown	Murray Bridge
Denimein	Hay	Kyabram-Tatura	Cobdogla-Barmera	Tailem Bend
Hillston	Mirrool	Pyramid Hill-Boort	Colignan	
Tabbita	Yanco	Rochester	Coomealla	
Wah Wah	Benerembah	Shepparton	Cullulleraine	
Wakool	Berrigan-Finley		Loxton	
West Berriquin	Hay		Mannum	
	Mirrool		Merbein	
	Yanco		Mildura	
			Morgan	
			Red Cliffs	
			Renmark	
			Robinvale	
			Swan Hill	
			Swan Reach	
			Waikerie	
			Wentworth	

Moving down the river in direction of water flow:

- Eight communities have significant exposure to broadacre (specifically, irrigated rice and or cotton production). These communities are located around the NSW Murray and Murrumbidgee Irrigation Area (MIA);
- A further five communities, whilst also having a strong focus on broadacre, boast a wide variety of additional crop activity. Dominant crop types are temporary mixed-broadacre crops, such as rice; cotton; summer and winter crops accompanied by a mix of permanent plantings such as grape and citrus. These communities are also located around the NSW Murray and MIA.
- Six communities are dairy producers of the Goulburn-Murray Irrigation District (GMID), an area in Victoria heavily dependent on dairy production for economic prosperity;

- Eighteen communities have significant exposure to permanent crops such as citrus, nuts and, most notably, grape production (wine and or table). These communities are located around Sunraysia (VIC/NSW), Riverland (SA) and mid SA Murray;
- Three communities in the lower section of the SA Murray had a strong dependence on field crops prior to the drought of 2008/09. Vegetable plantings have increased in recent years.

4 Charts

The relationships between water availability and employment is analysed through two sets of charts: scatter charts and stacked bar charts.

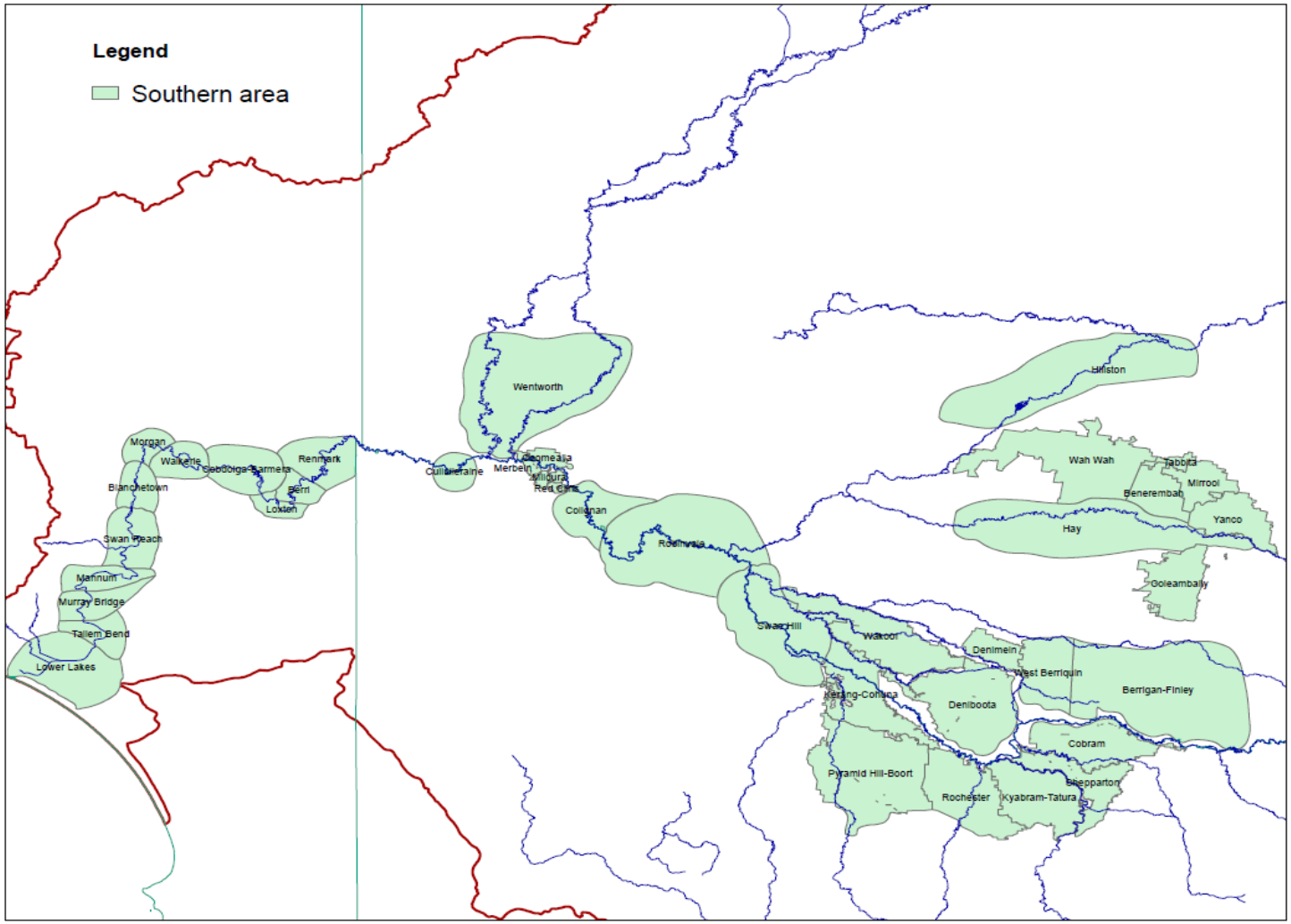
Scatter charts detail the relationships between irrigated farm activity and related job numbers, across communities, across each census year. They are reported in the first part of this section for all activities listed in Table 1, namely, *Dairy Cattle Farming*, *Dairy Processing*, *Rice Growing*, *Grape Growing*, *Vegetable Growing* and *Fruit, Nut and Citrus Growing*. For each activity a scatter chart is provided for each of the four census years – 2001, 2006, 2011 and 2016 – followed by a larger scatter chart with all of the years combined.

The second part of this section presents an overview of crop diversity across all communities in the basin, across each census year. Stacked bar charts clearly show which communities are dependent on what crop activities, on the basis of the proportion of local 'irrigated agriculture' employees[1] dedicated to each crop activity.

A list of all the charts is given on the following page.

[1] Full Time Equivalents (FTE).

Figure 2: Southern Murray Darling Basin Communities



Source: Murray Darling Basin Authority

Milk Production vs Dairy Cattle Farming jobs

Figure 3: Milk Production vs Dairy Cattle jobs - 2001

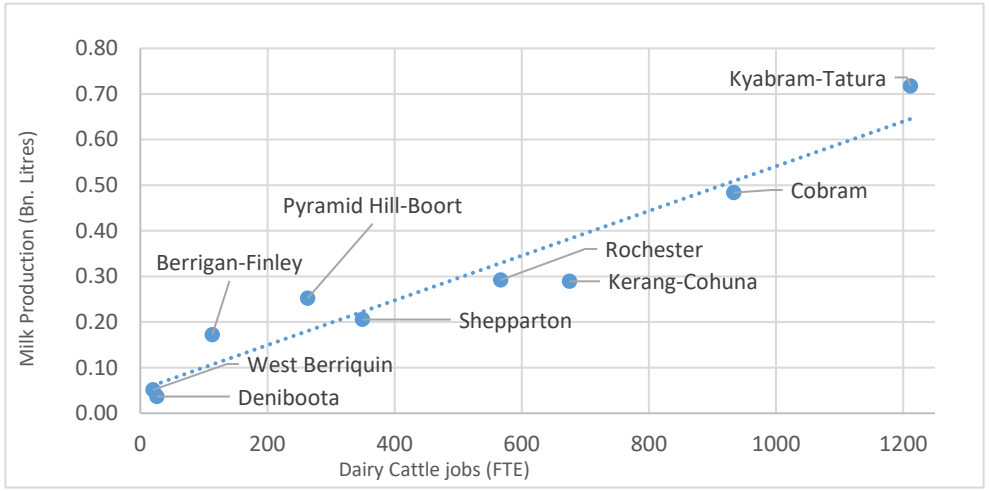


Figure 4: Milk Production vs Dairy Cattle jobs - 2006

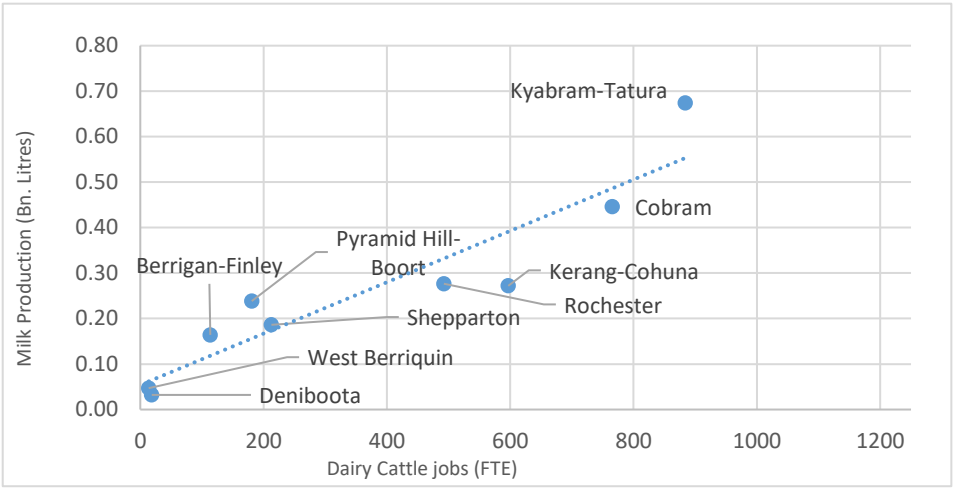


Figure 5: Milk Production vs Dairy Cattle jobs - 2011

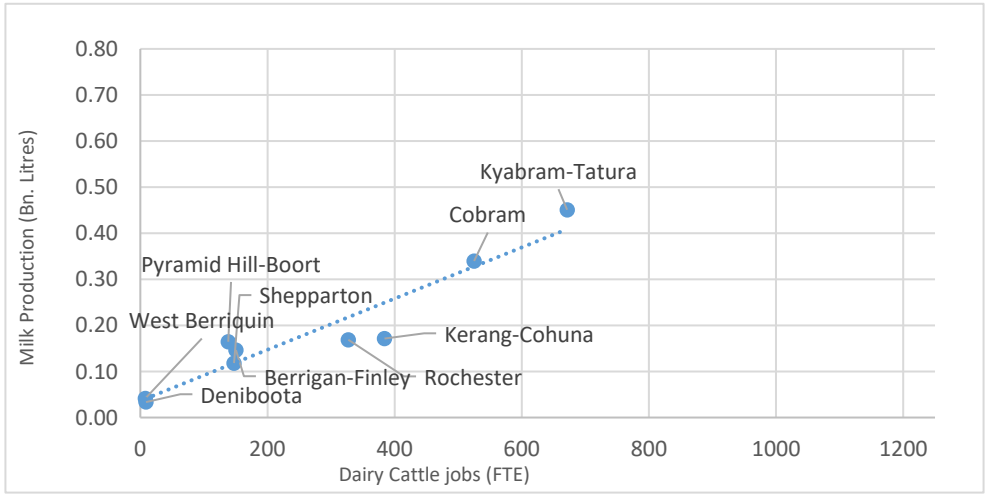


Figure 6: Milk Production vs Dairy Cattle jobs - 2016

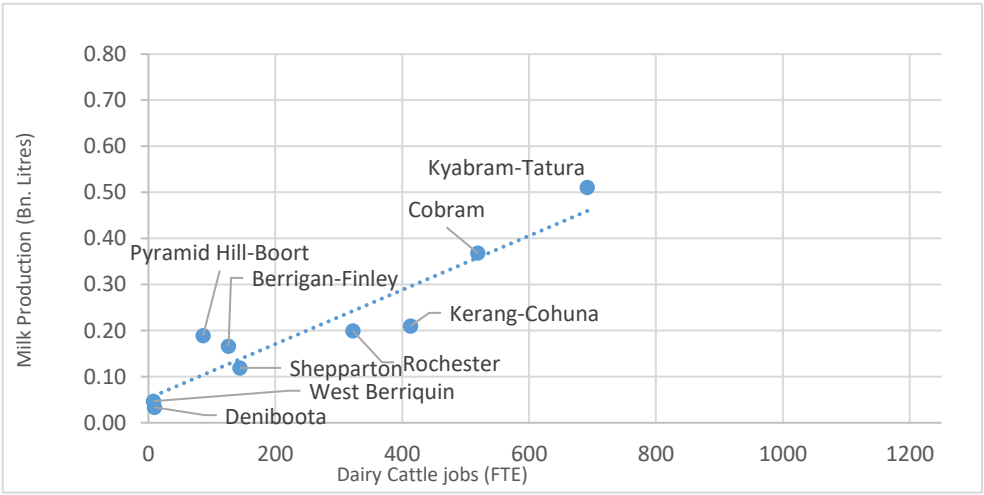
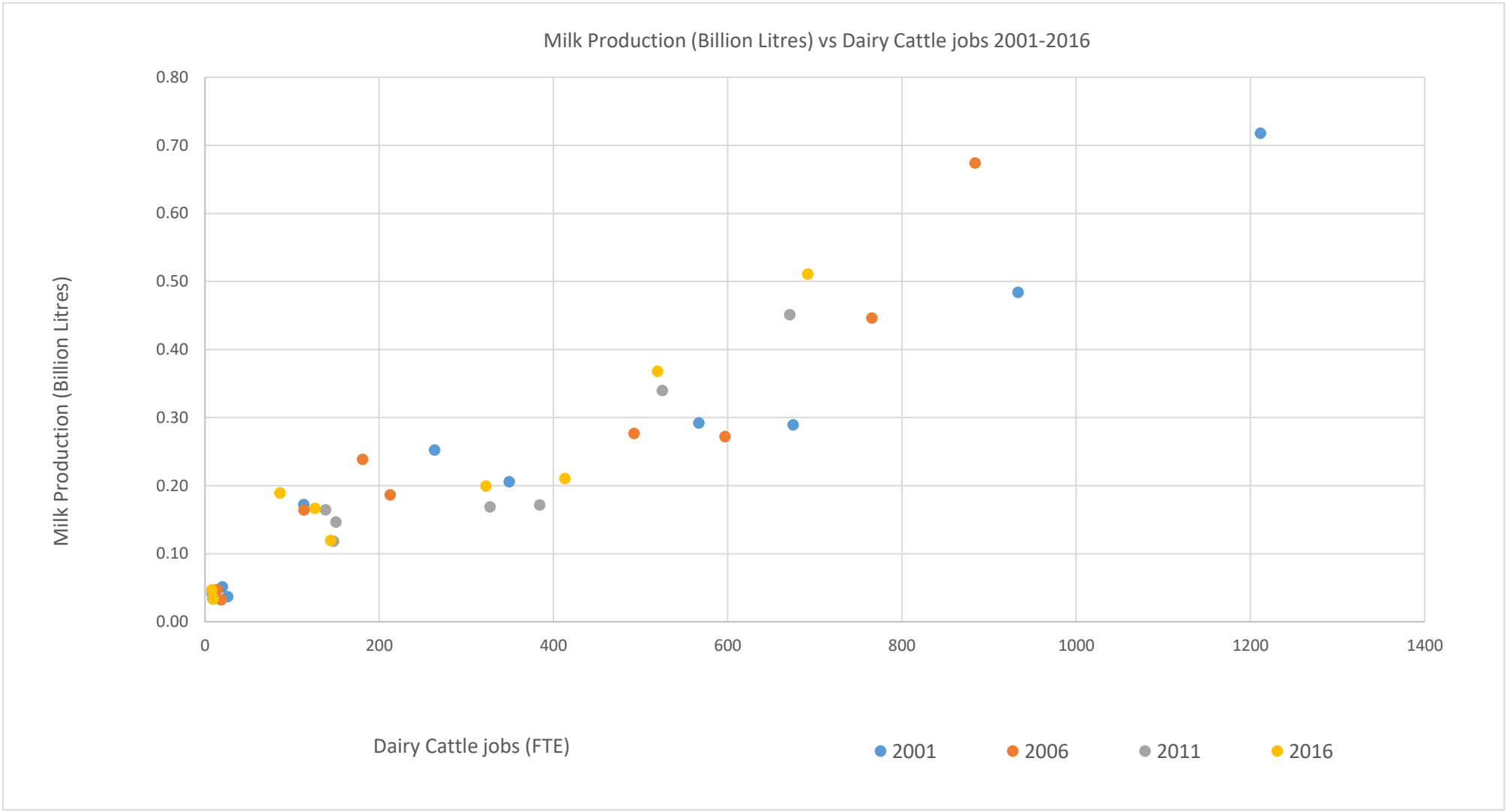


Figure 7: Milk Production vs Dairy Cattle jobs 2001-2016



Milk Production vs Dairy Processing jobs

Figure 8: Milk Production vs Dairy Processing jobs - 2001

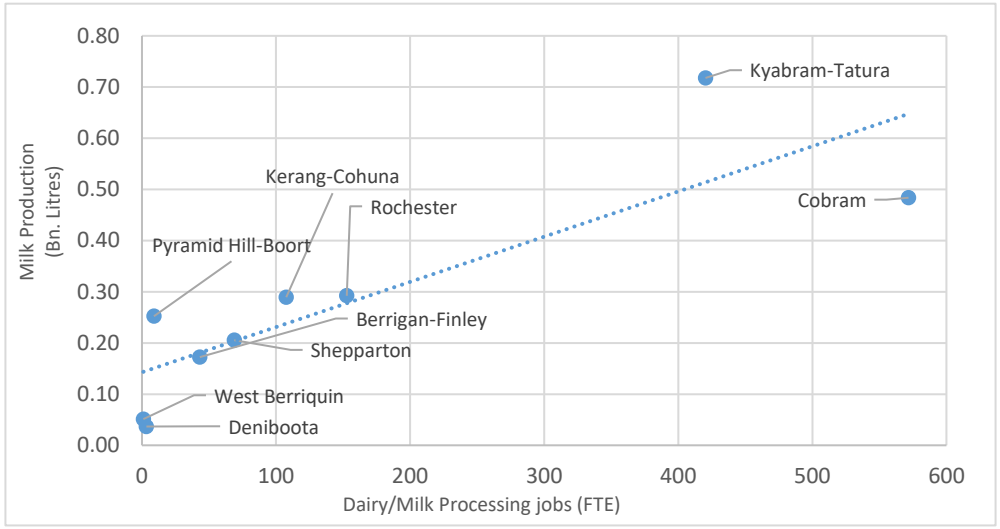


Figure 9: Milk Production vs Dairy Processing jobs - 2006

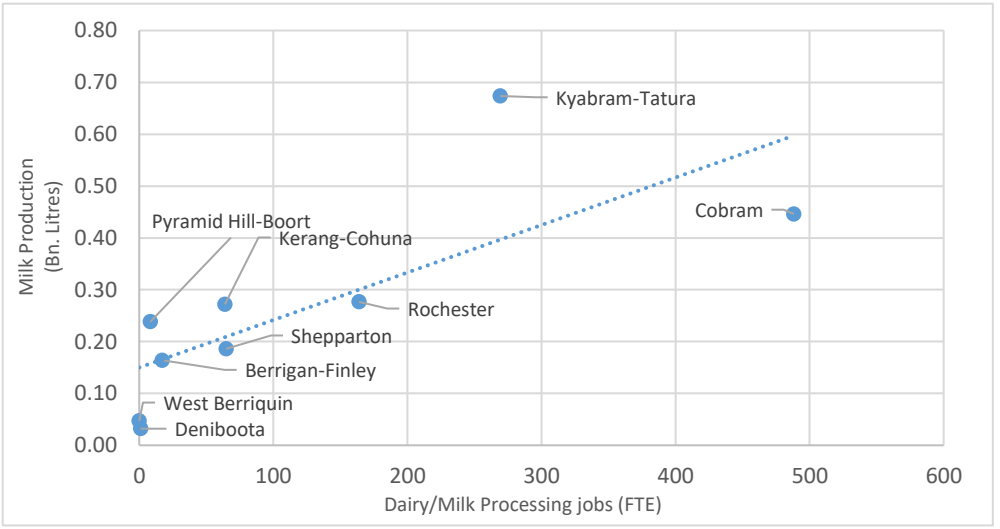


Figure 10: Milk Production vs Dairy Processing jobs - 2011

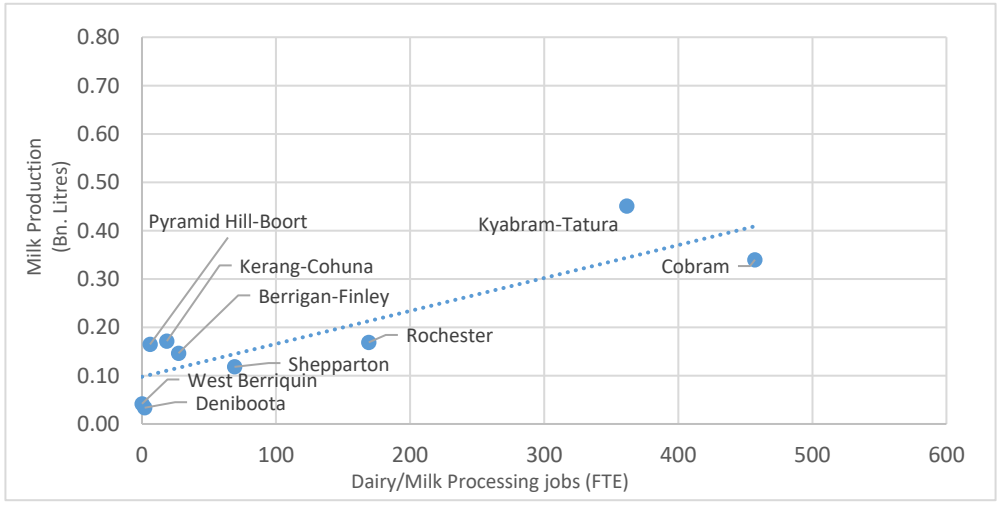


Figure 11: Milk Production vs Dairy Processing jobs - 2016

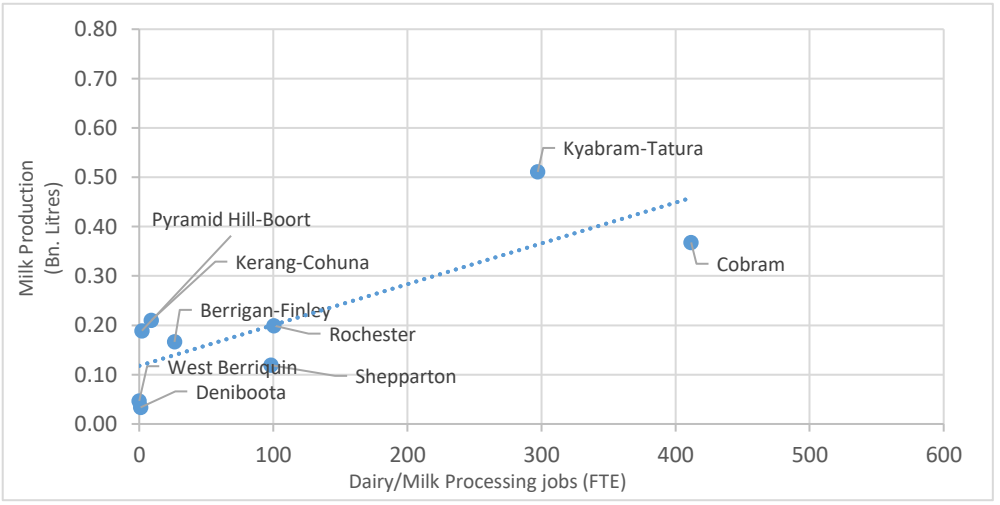
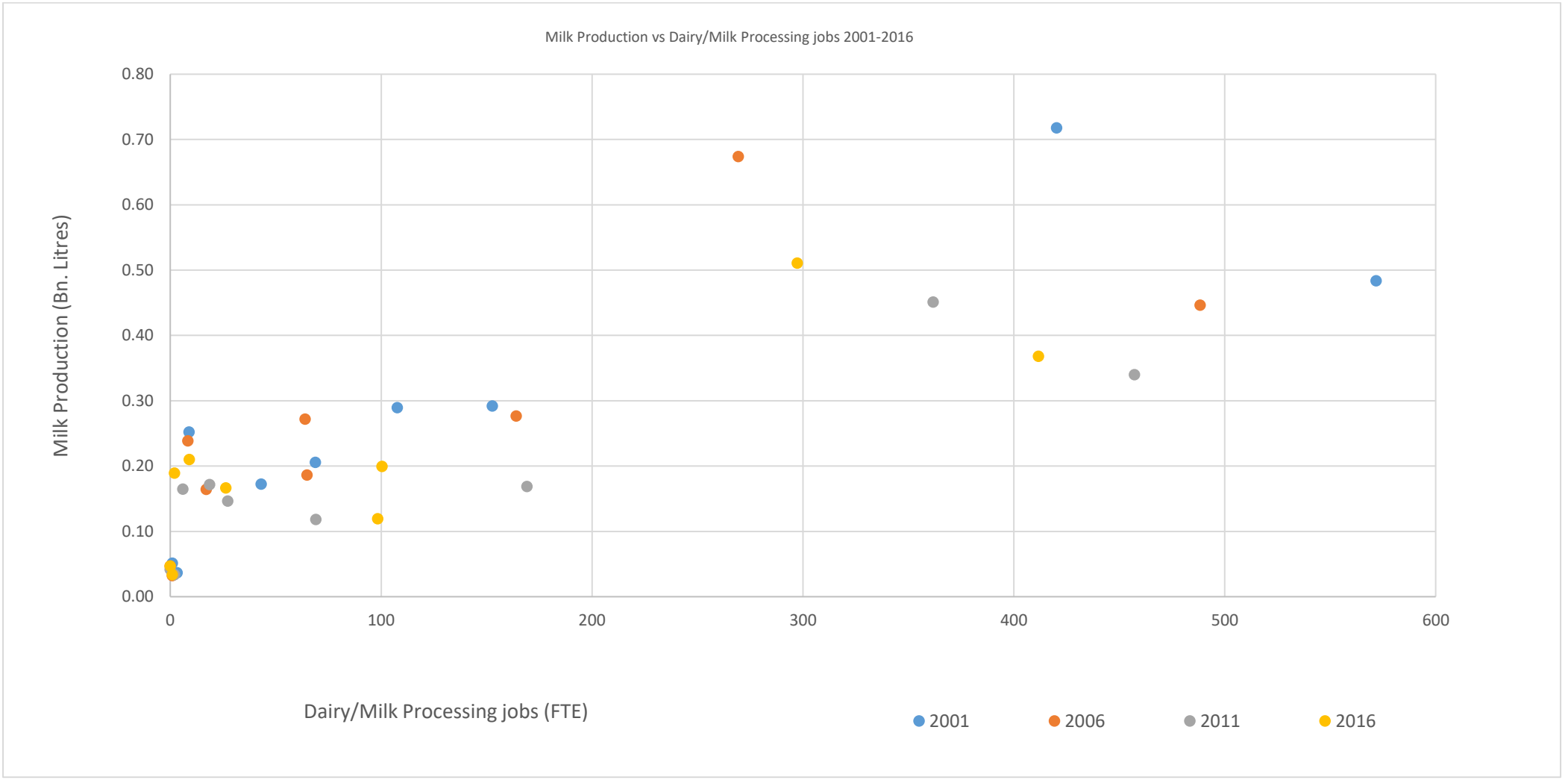


Figure 12: Milk Production vs Dairy Processing jobs 2001-2016



Rice Area vs Rice Growing jobs

Figure 13: Rice Area vs Rice Growing jobs - 2001

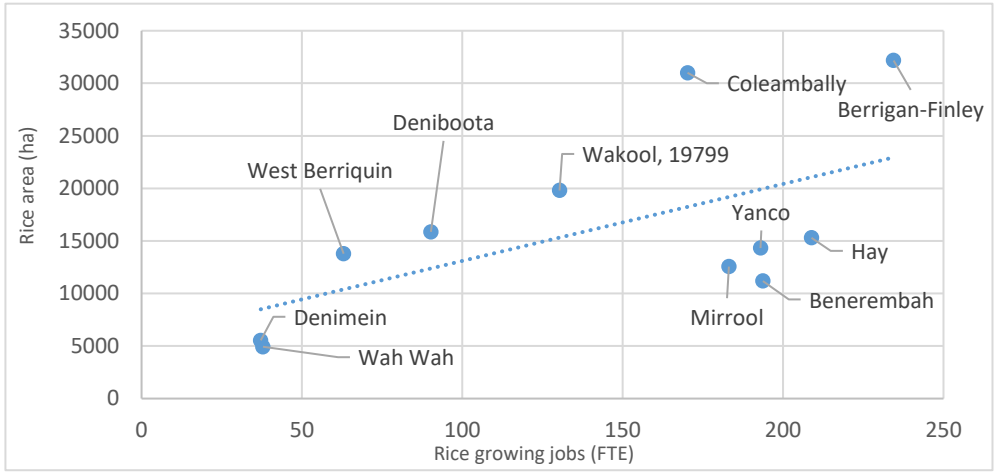


Figure 14: Rice Area vs Rice Growing jobs - 2006

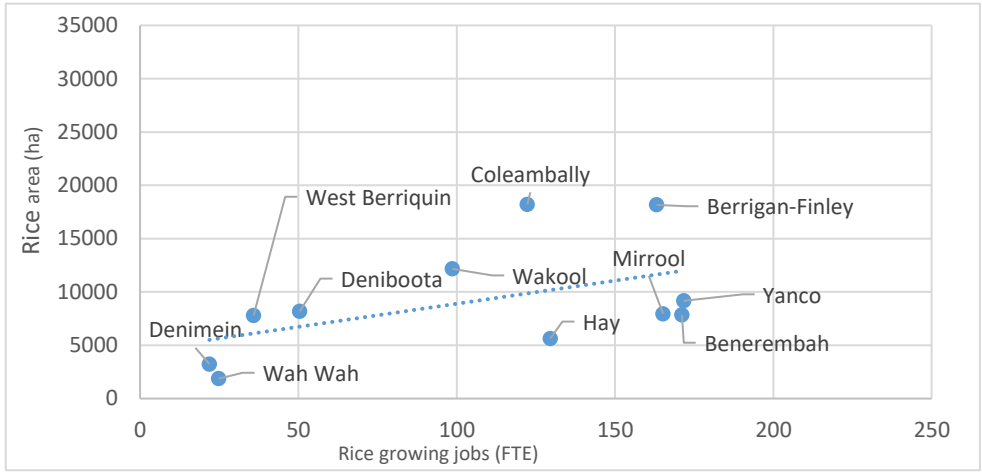


Figure 15: Rice Area vs Rice Growing jobs - 2011

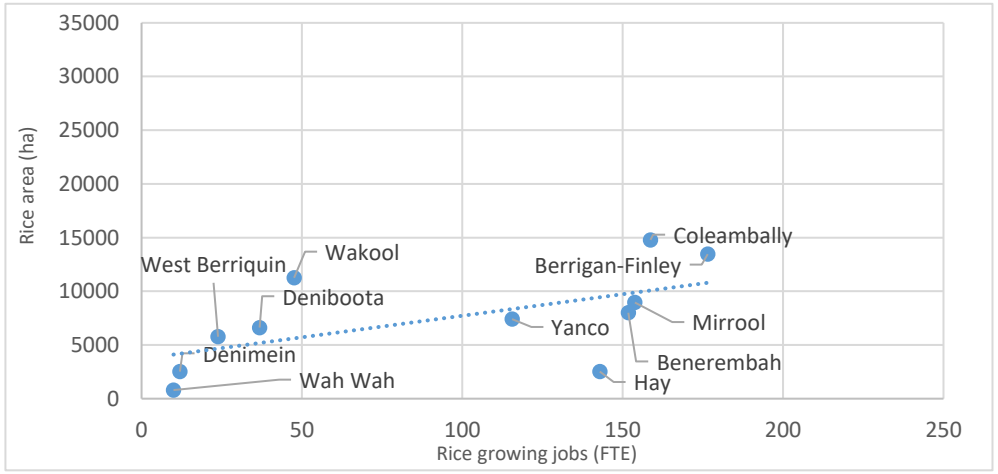


Figure 16: Rice Area vs Rice Growing jobs - 2016

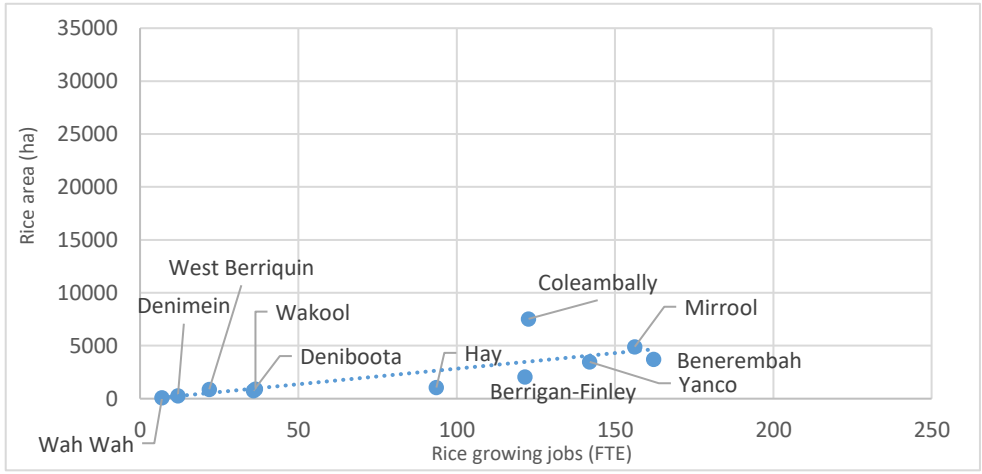
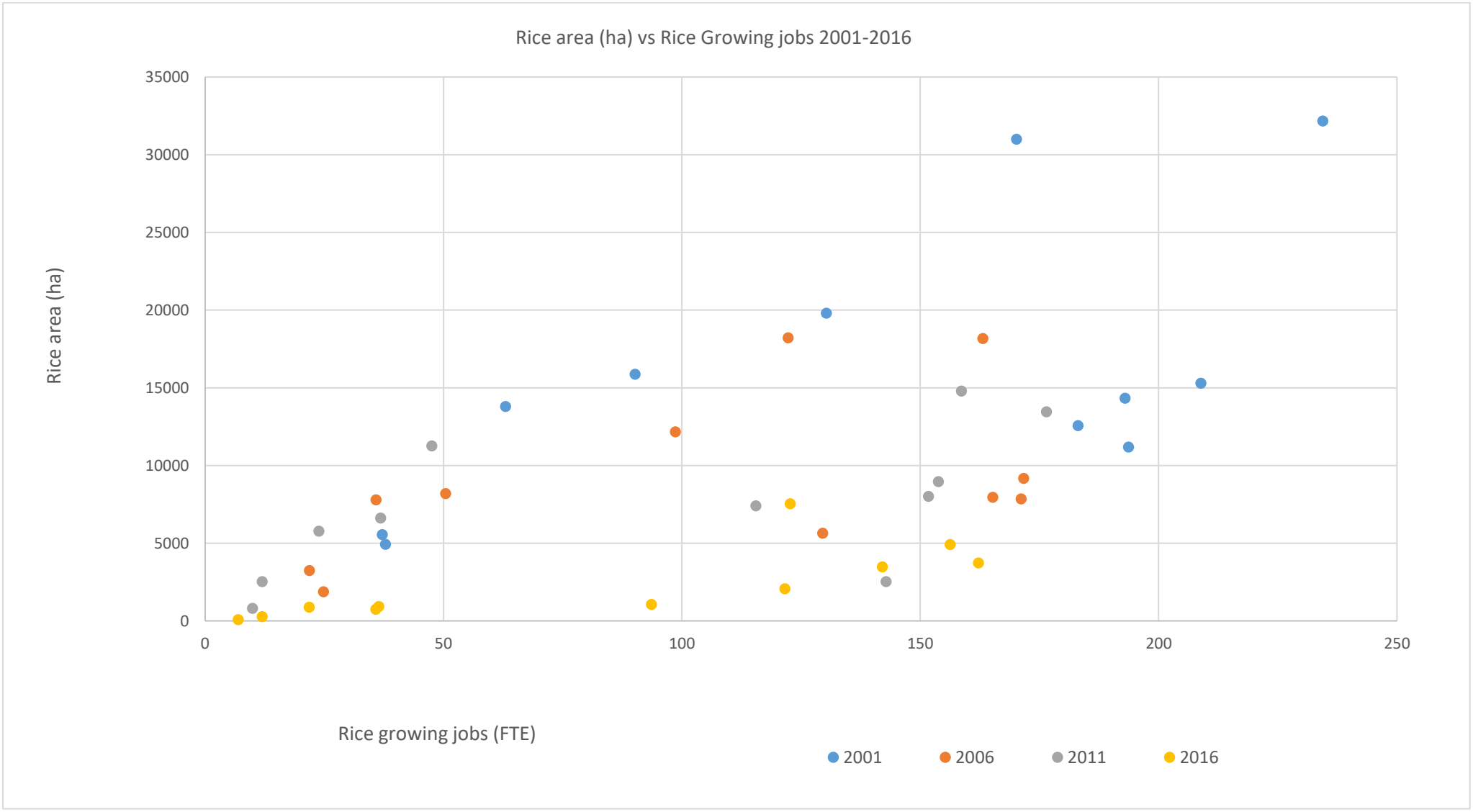


Figure 17: Rice Area vs Rice Growing jobs 2001-2016



Grape Area vs Grape Growing jobs

Figure 18: Grape Area vs Grape Growing jobs - 2001

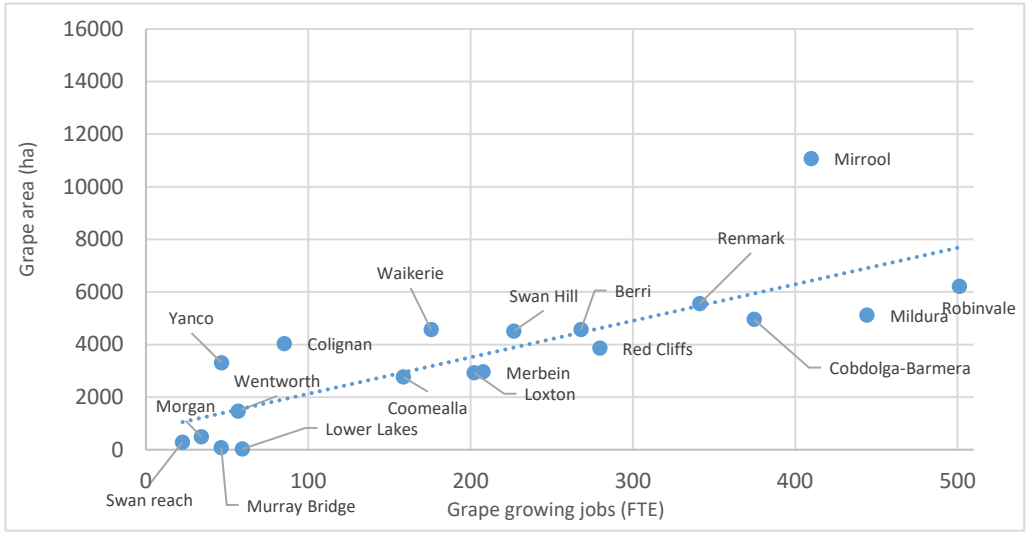


Figure 19: Grape Area vs Grape Growing jobs - 2006

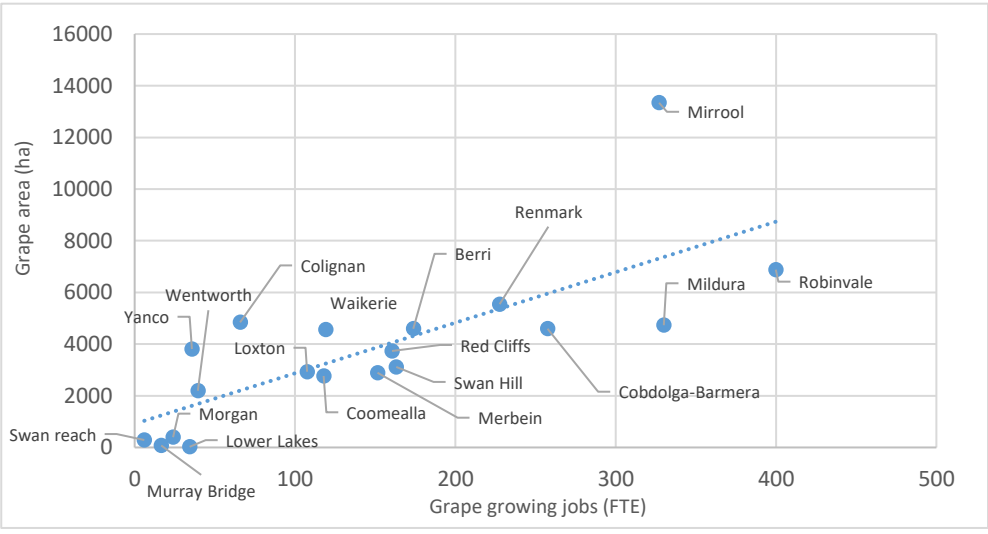


Figure 20: Grape Area vs Grape Growing jobs - 2011

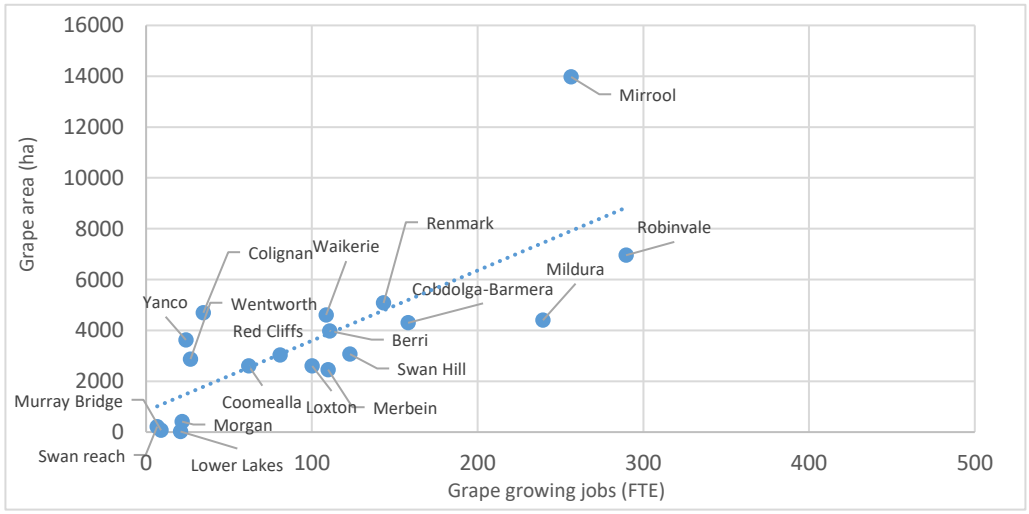


Figure 21: Grape Area vs Grape Growing jobs - 2016

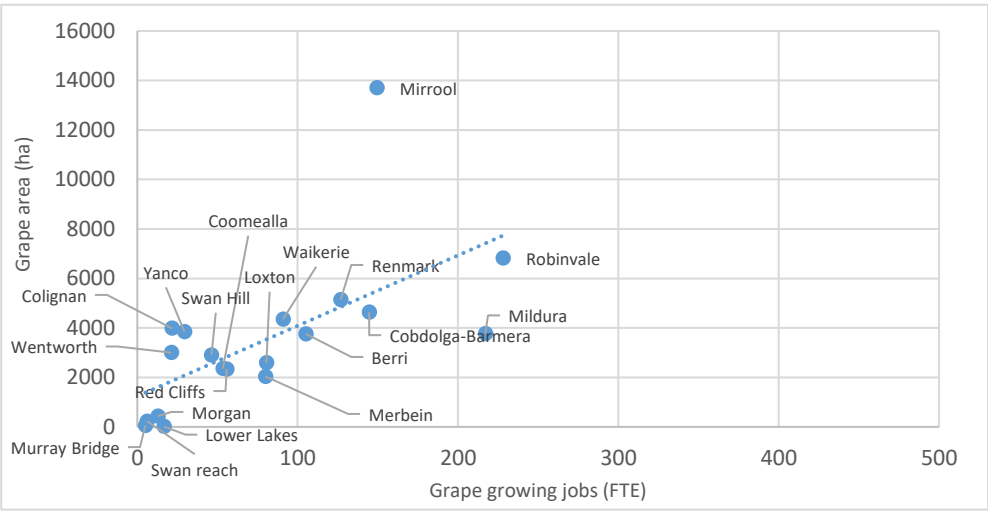
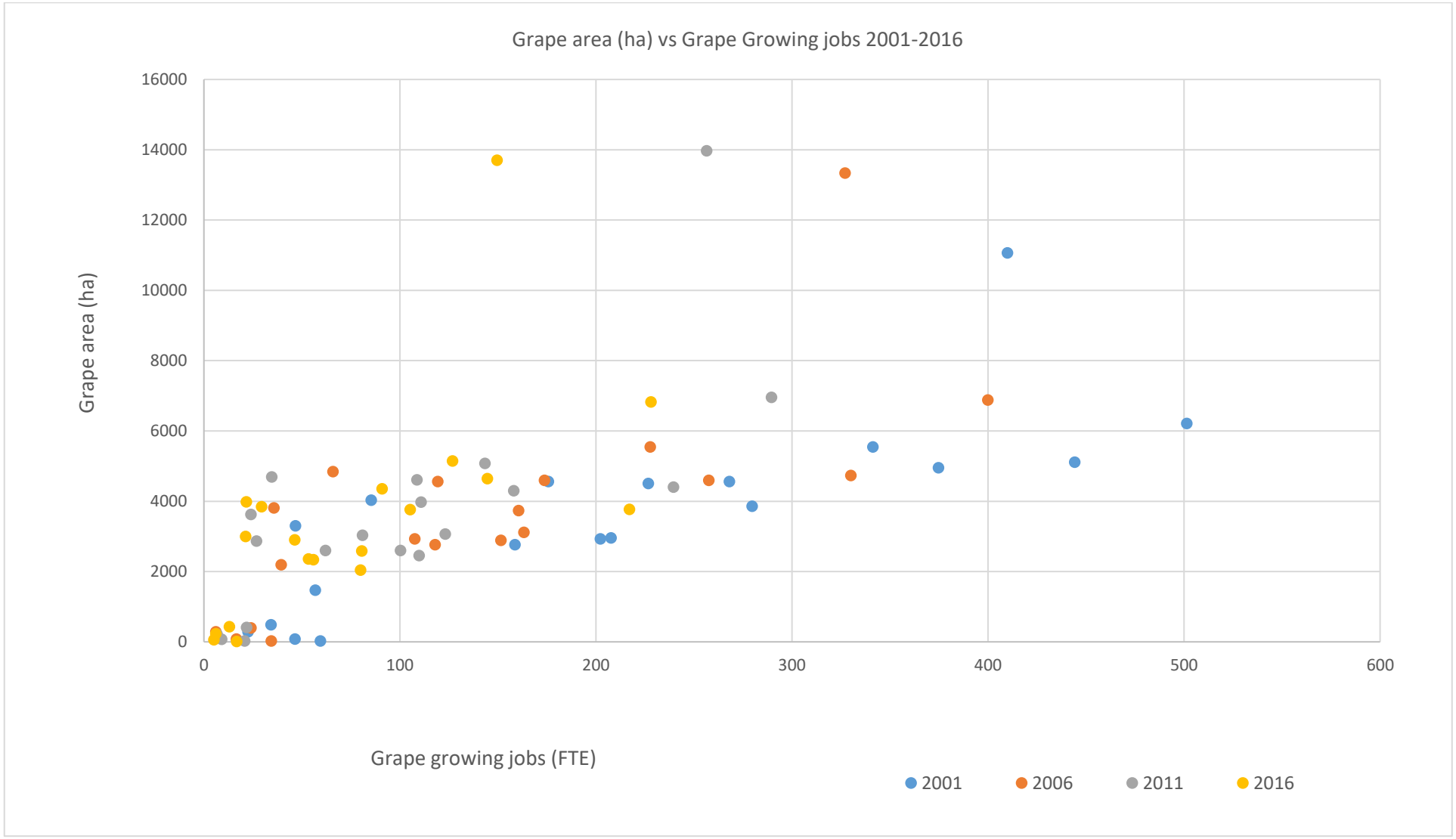


Figure 22: Grape Area vs Grape Growing jobs 2001-2016



Vegetable Area vs Vegetable Growing jobs

Figure 23: Vegetable Area vs Vegetable Growing jobs - 2001

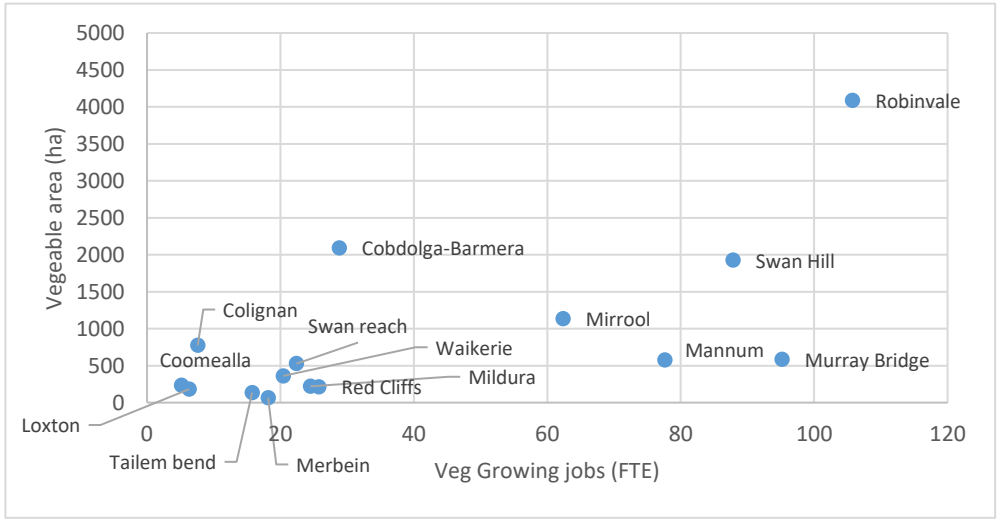


Figure 24: Vegetable Area vs Vegetable Growing jobs - 2006

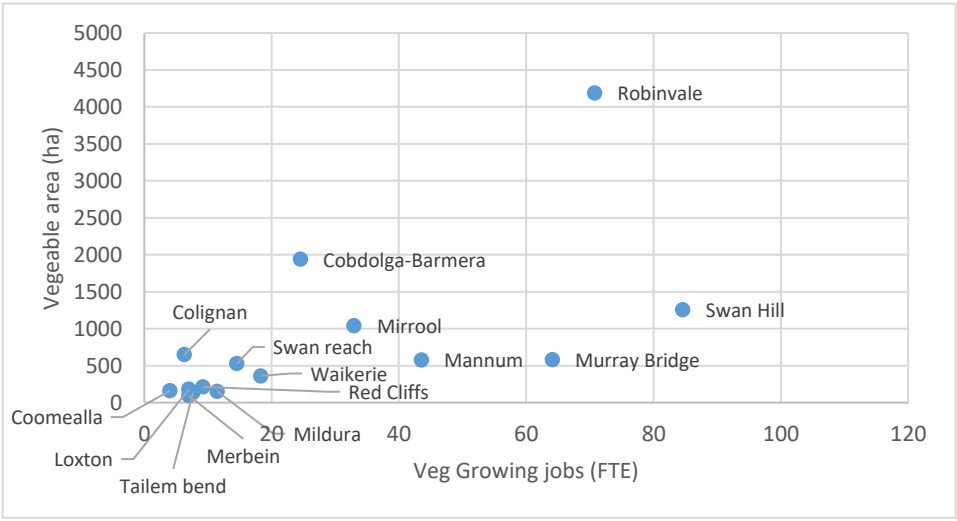


Figure 25: Vegetable Area vs Vegetable Growing jobs - 2011

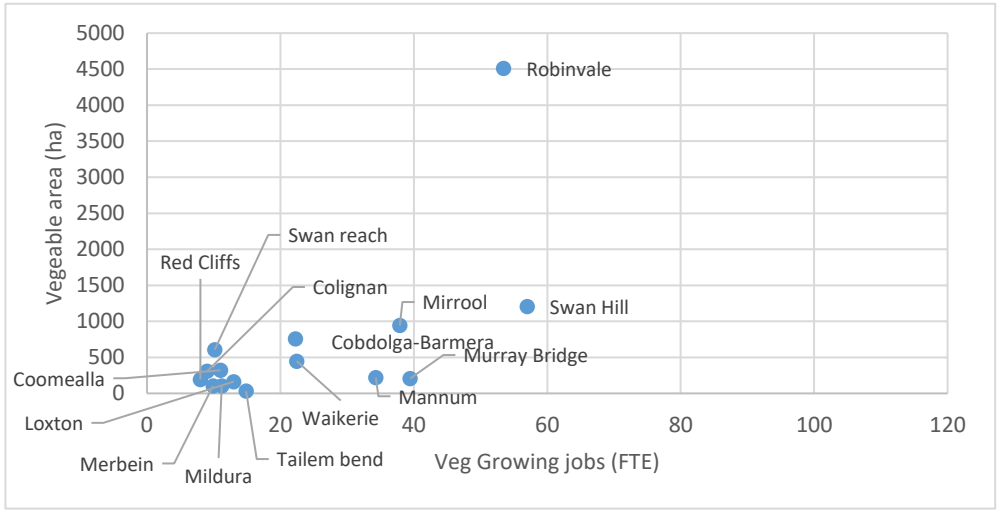


Figure 26: Vegetable Area vs Vegetable Growing jobs - 2016

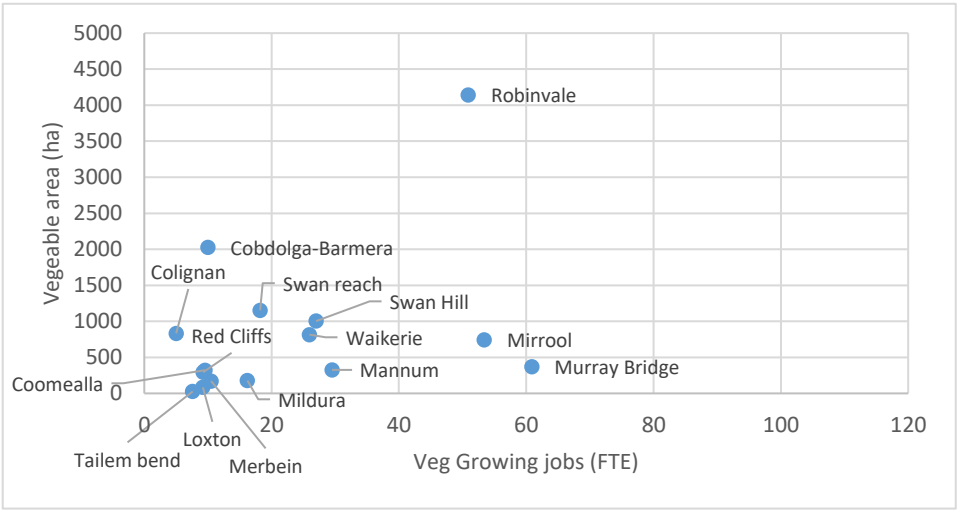
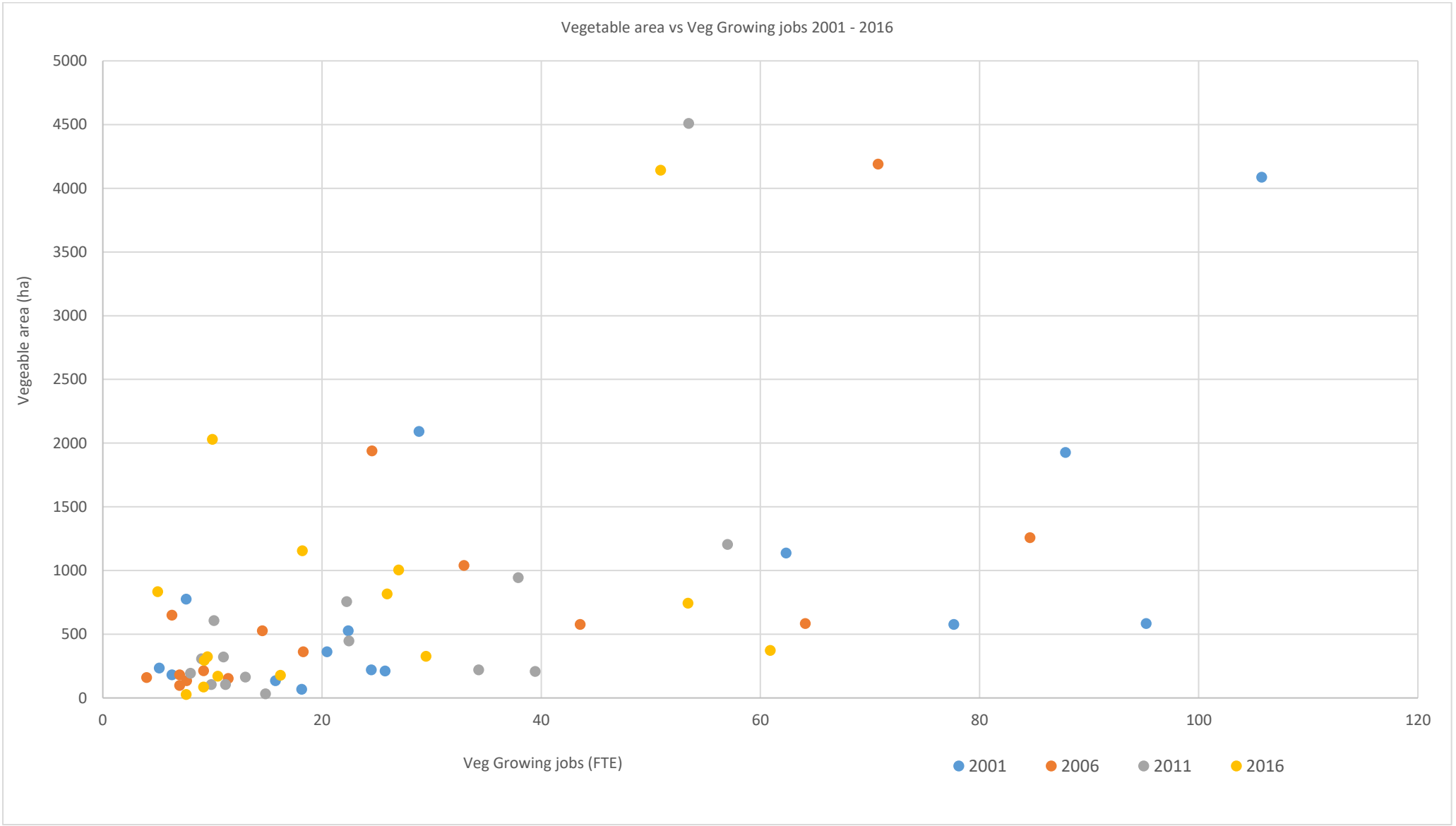


Figure 27: Vegetable Area vs Vegetable Growing jobs 2001-2016



Fruit, Nut & Citrus Area vs Fruit, Nut & Citrus jobs

Figure 28: Fruit, Nut & Citrus Area vs Fruit, Nut & Citrus jobs - 2001

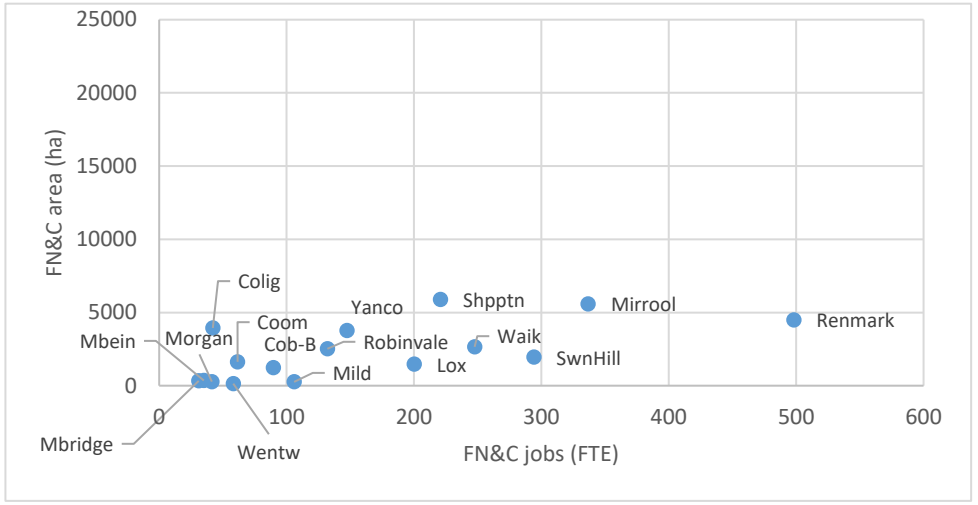


Figure 29: Fruit, Nut & Citrus Area vs Fruit, Nut & Citrus jobs - 2006

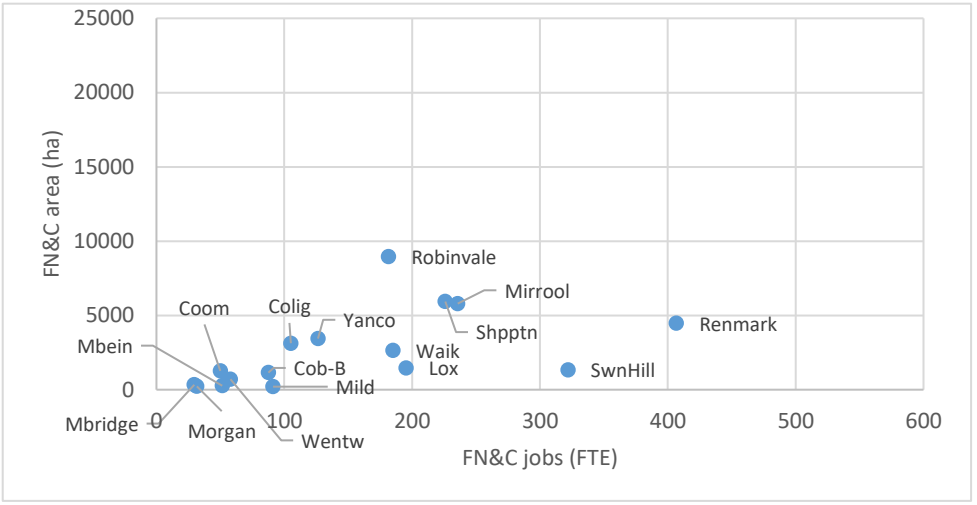


Figure 30: Fruit, Nut & Citrus Area vs Fruit, Nut & Citrus jobs - 2011

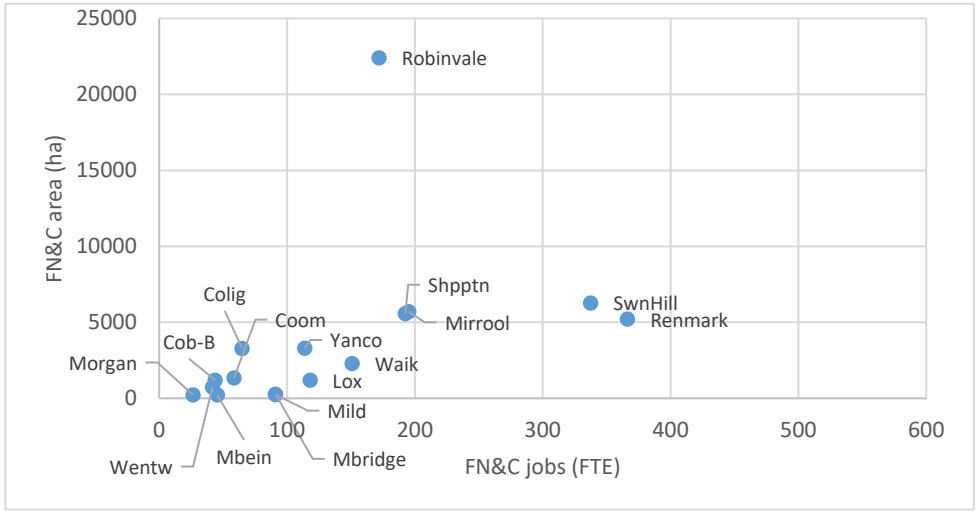


Figure 31: Fruit, Nut & Citrus Area vs Fruit, Nut & Citrus jobs - 2016

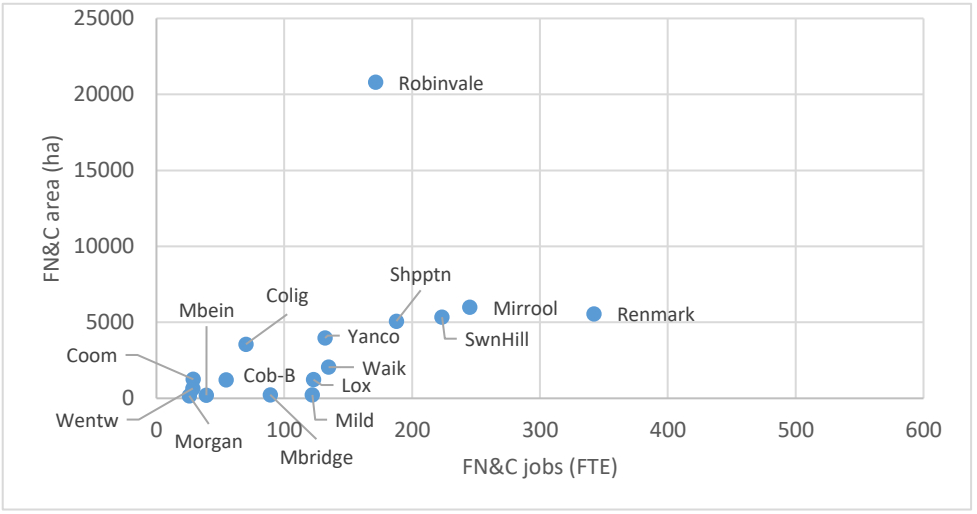
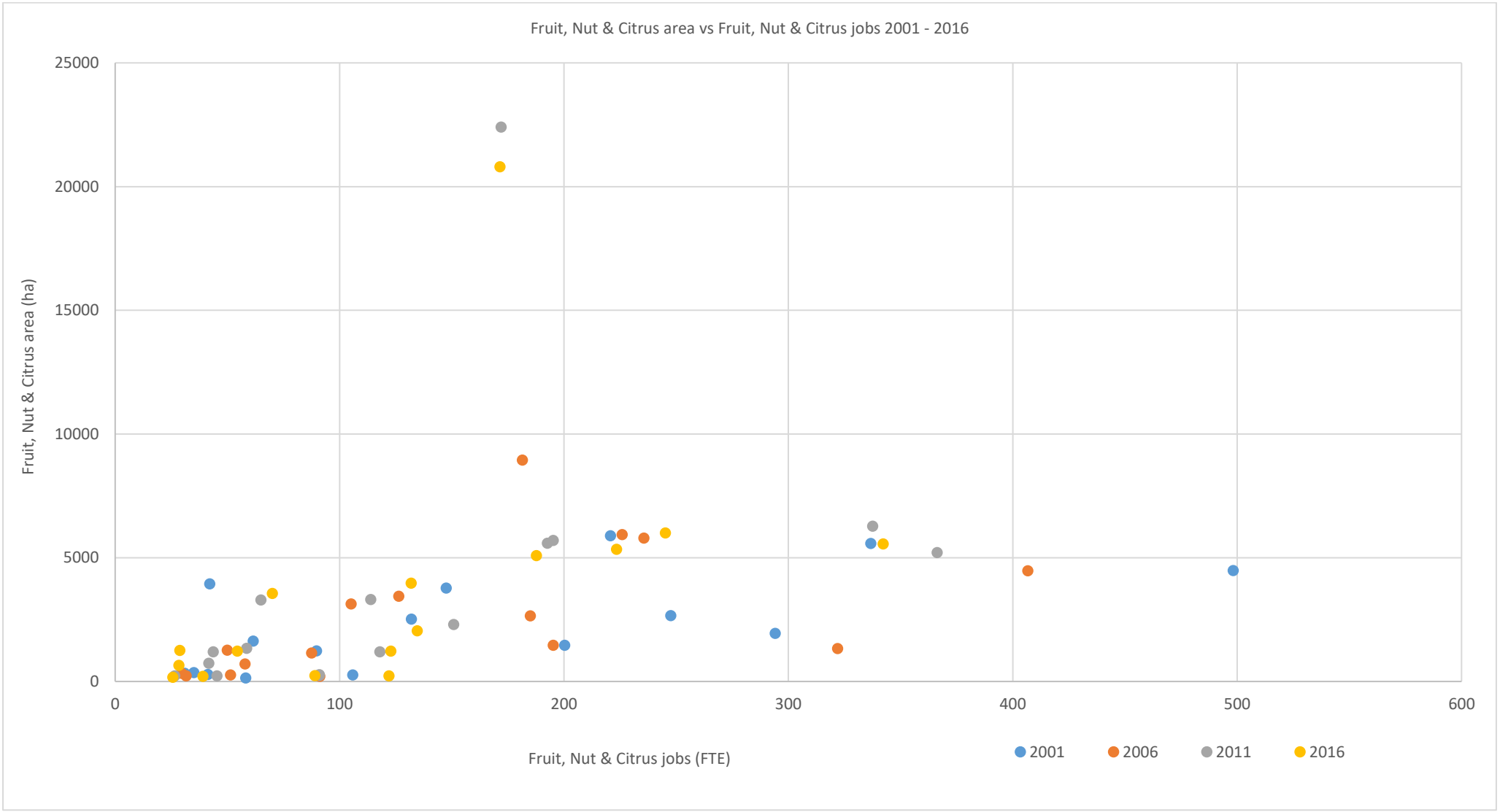


Figure 32: Fruit, Nut & Citrus Area vs Fruit, Nut & Citrus jobs 2001-2016



Community Crop-Mix by Labour Activity Maps: Sorted by Crop Type

Figure 33: SMDB Communities - Crop Labour Activity, 2001

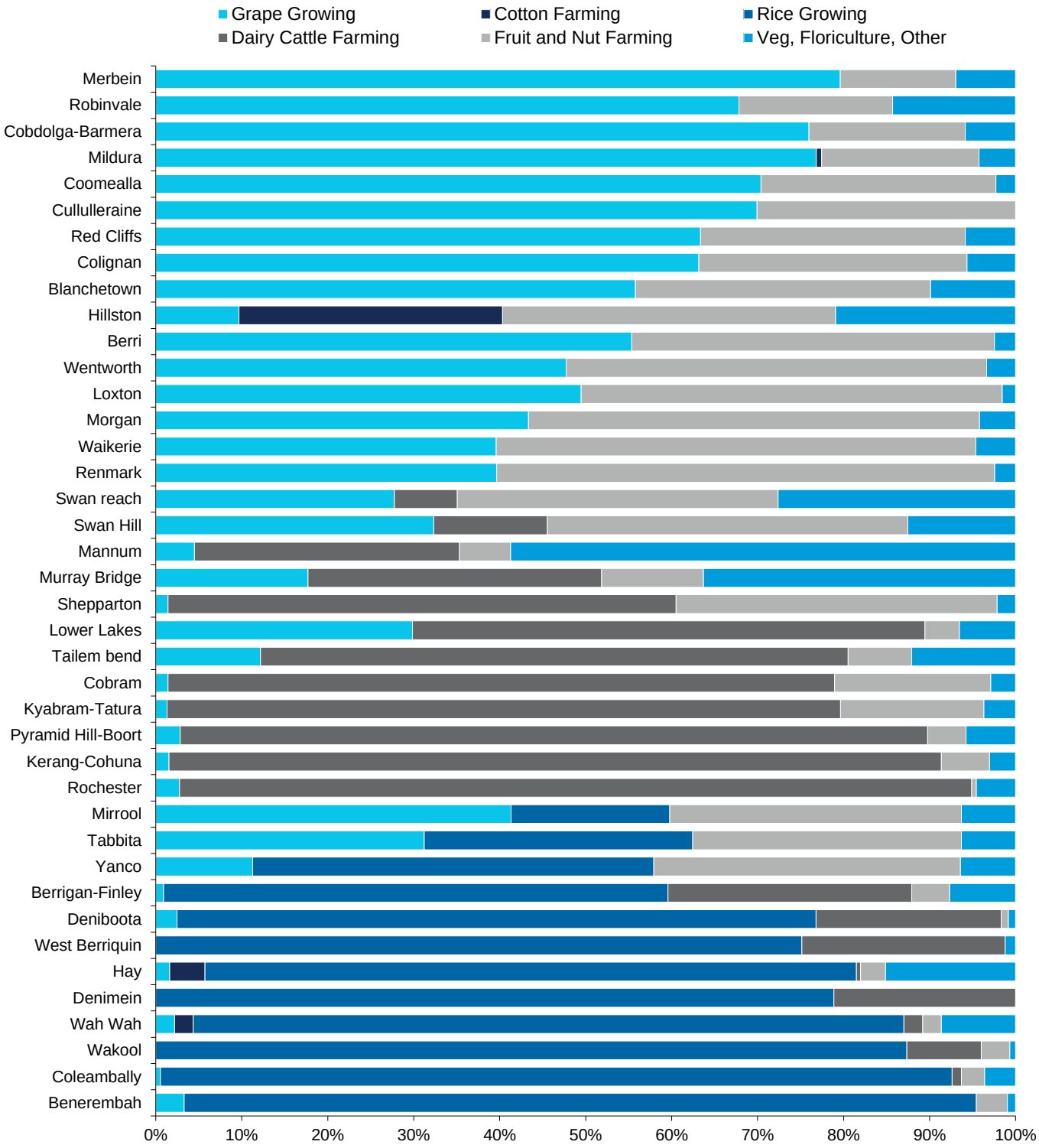


Figure 34: SMDB Communities - Crop Labour Activity, 2006

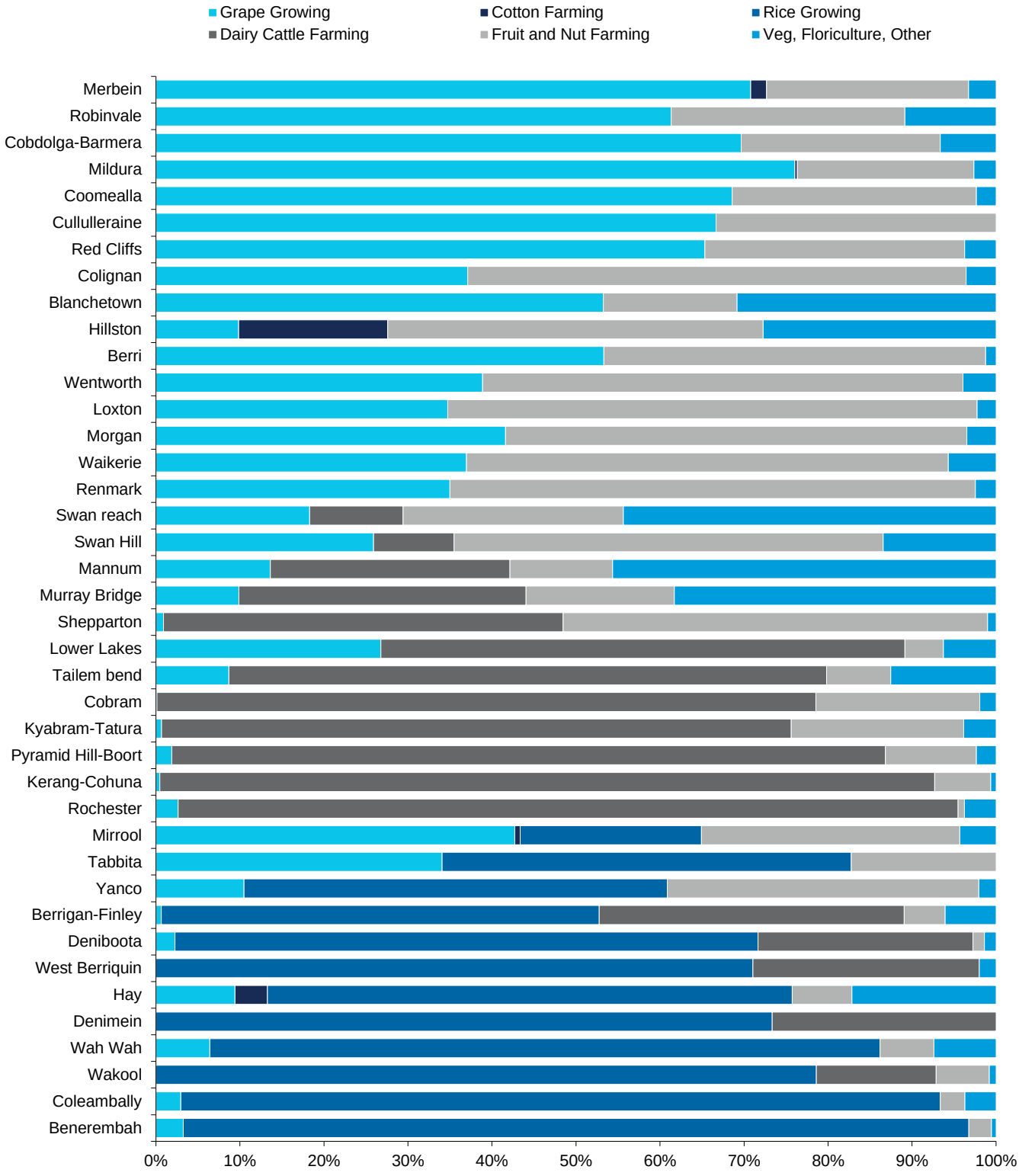


Figure 35: SMDB Communities - Crop Labour Activity, 2011

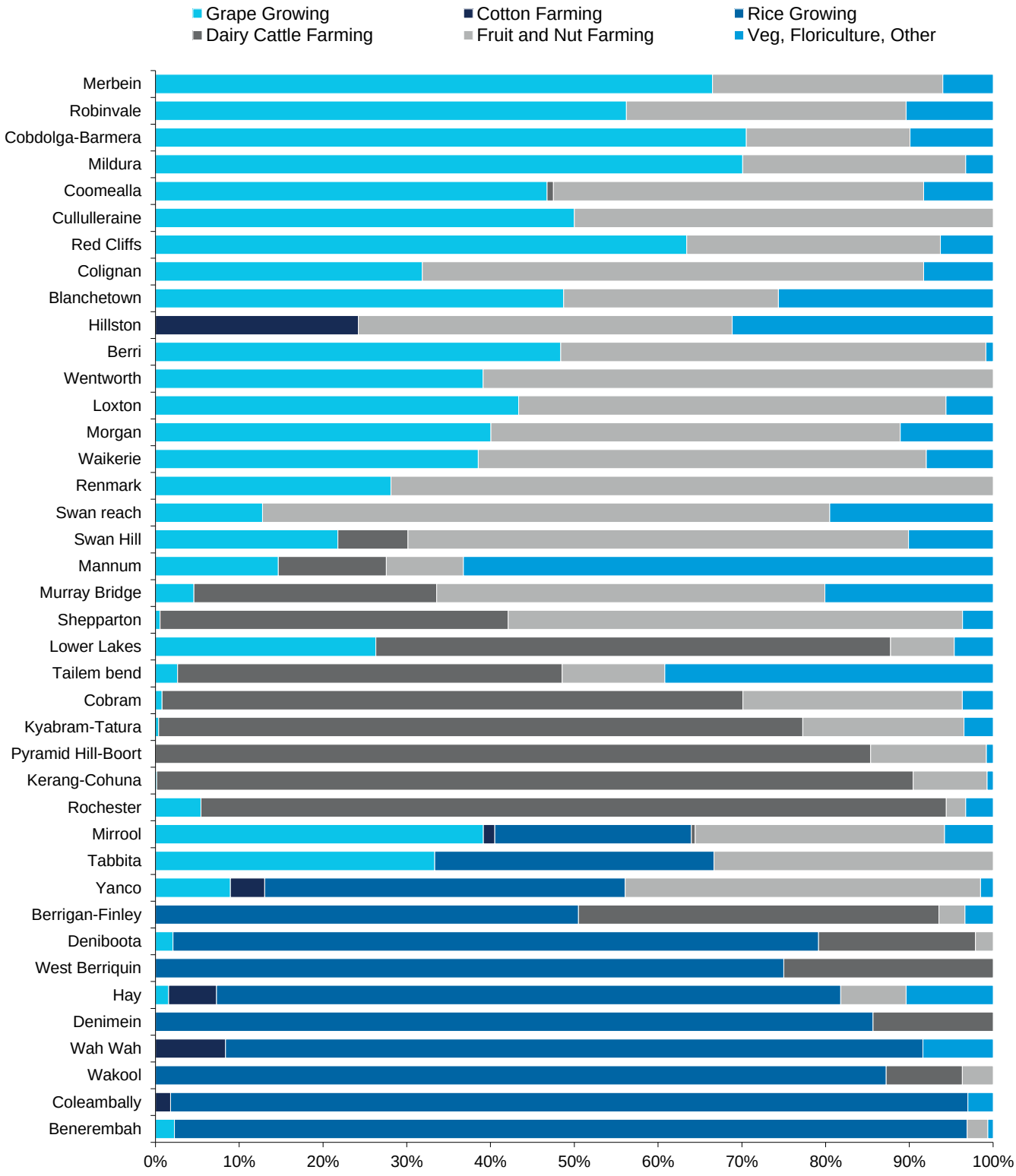
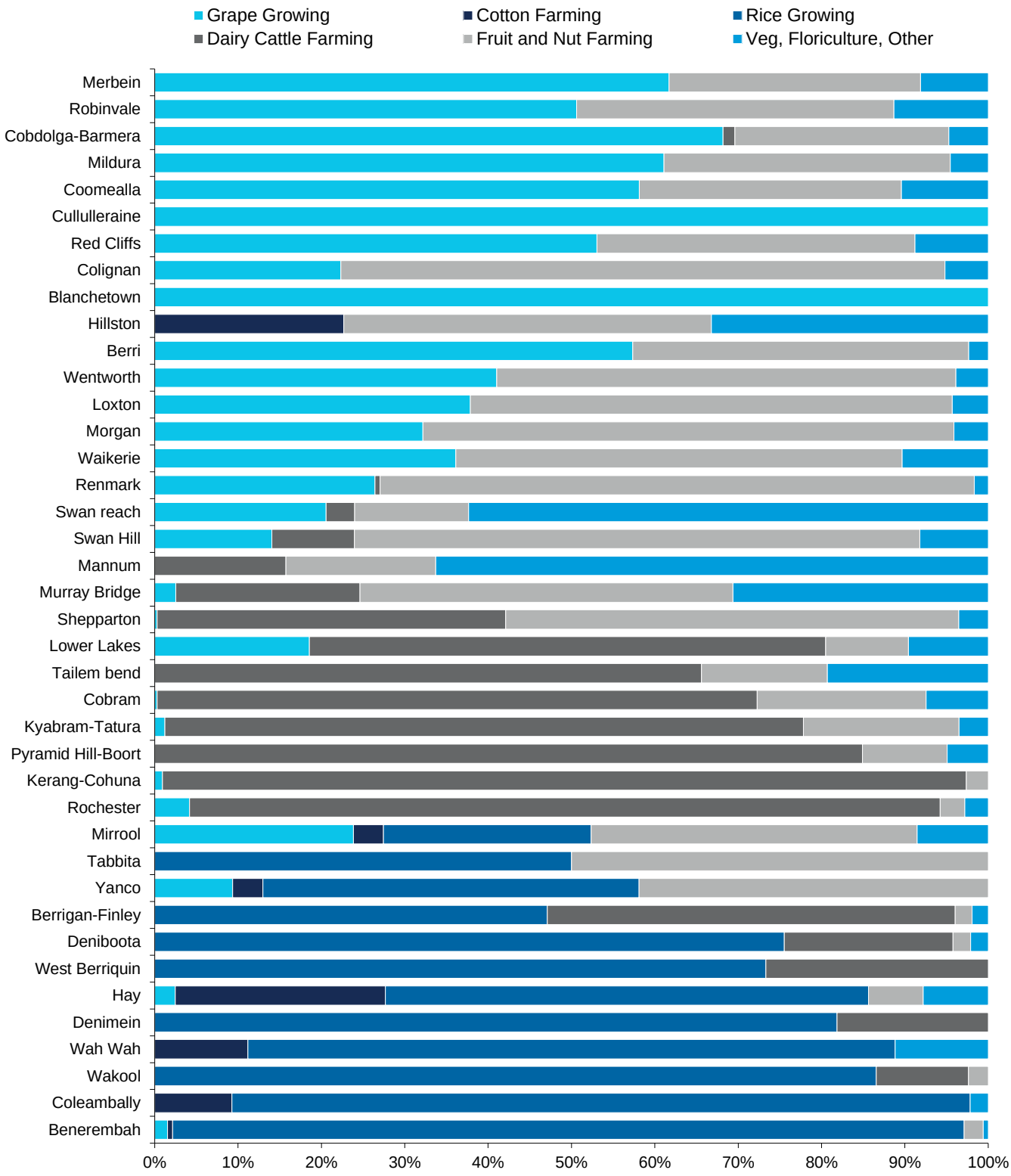


Figure 36: SMDB Communities - Crop Labour Activity, 2016



Community Crop-Mix by Labour Activity Maps: Sorted Alphabetically

Figure 37: SMDB Communities - Crop Labour Activity, 2001 (alphabetically)

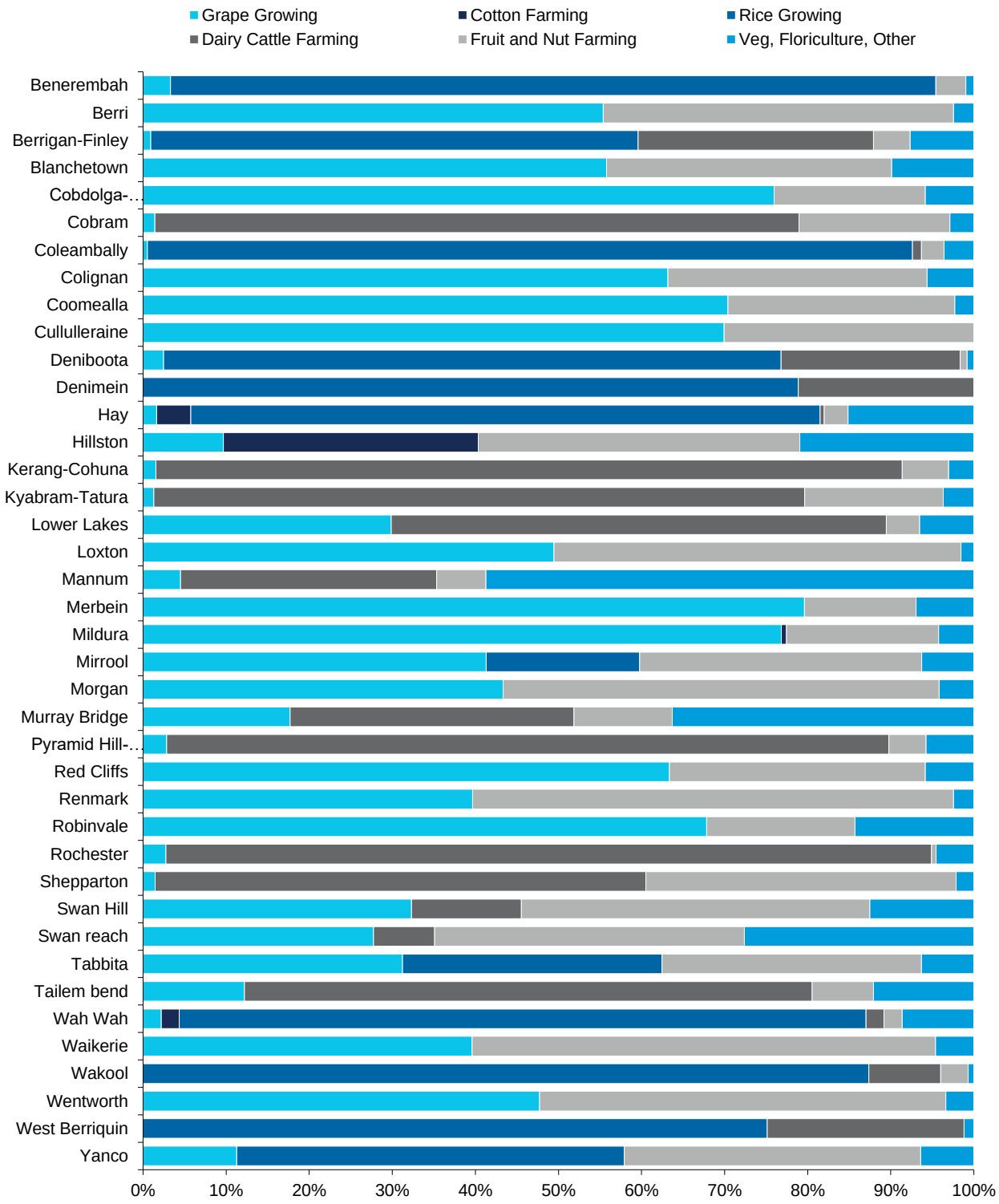


Figure 38: SMDB Communities - Crop Labour Activity, 2006 (alphabetically)

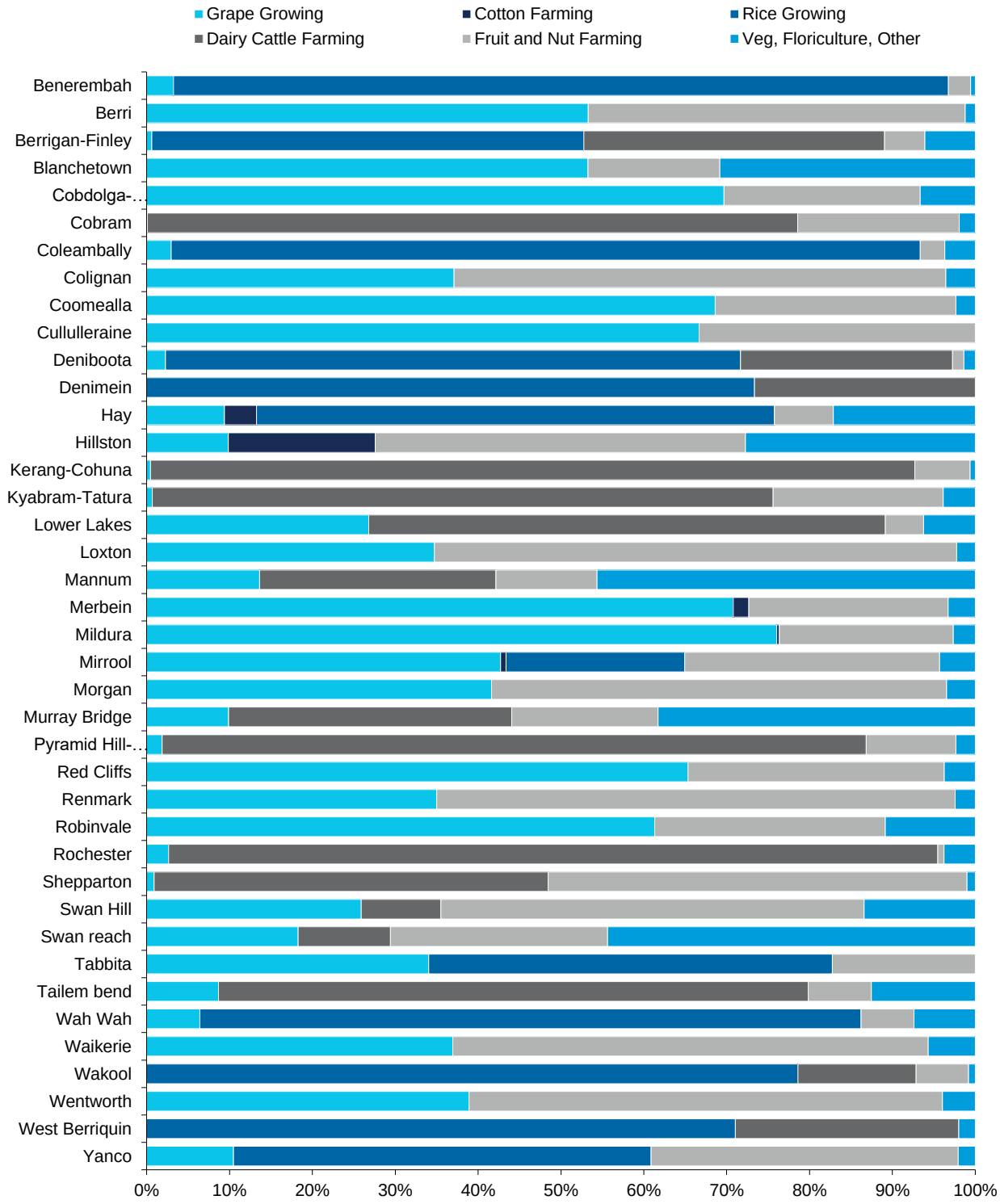


Figure 39: SMDB Communities - Crop Labour Activity, 2011 (alphabetically)

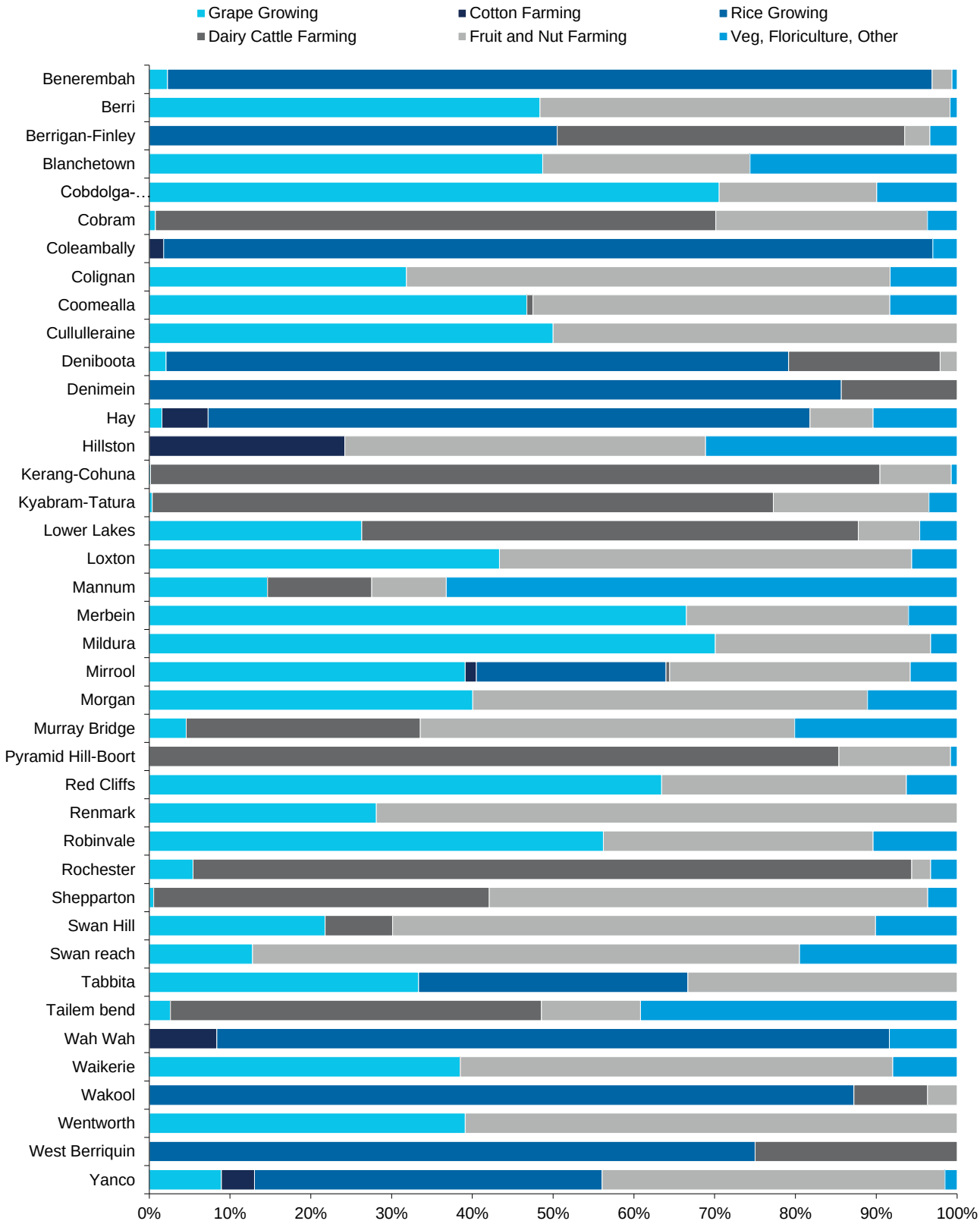
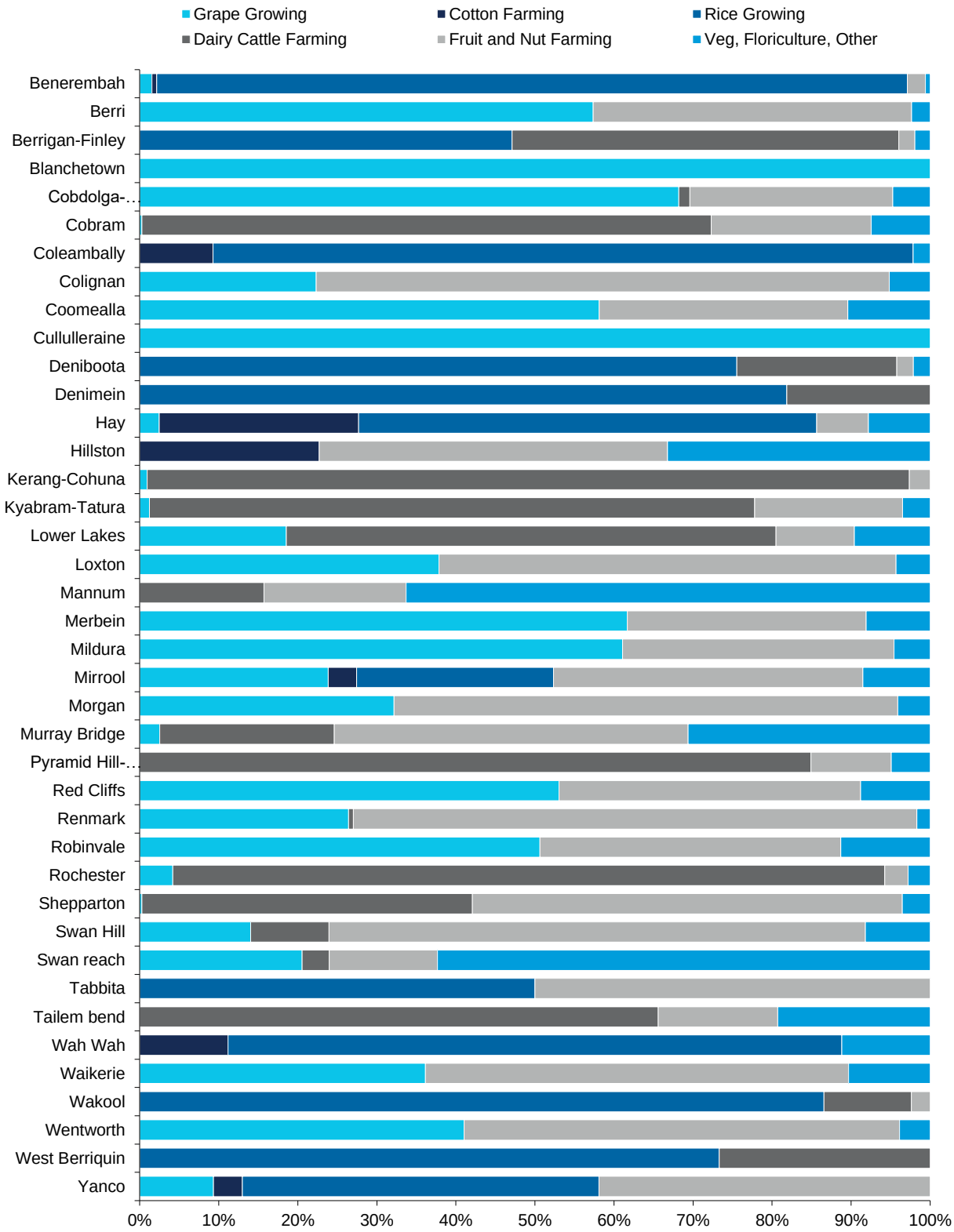


Figure 40: SMDB Communities - Crop Labour Activity, 2016 (alphabetically)



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