

### **Preliminary report on Household Relocation from and within the Canterbury Region**

**22 February – 10 March 2011**

#### **Summary of key findings** (two weeks after the Canterbury earthquake)

- Total migration (from NZ Post) data indicates 3925 households and 11319 people (including 918 children) have shifted (as at 10/03/11)
- Domestic migration increased significantly, with about 6.5 times more frequent post-earthquake movements
- Over 1 in 4 households made temporary moves, and mail redirection durations indicate that the majority of temporary movers would be away for less than 2 months
- 1 in 5 households moved outside of the Canterbury region (perhaps indicative of aftershock avoidance)
- Key destination locations outside of the Canterbury region are Otago and Wellington regions
- Key evacuation locations within the Christchurch City TA are the Burwood-Pegasus and Hagley-Ferrymead wards
- There do not appear to be key destinations within the Christchurch City wards, indicating that people are relocating themselves relatively evenly within the city

#### **Purpose of this research**

This preliminary report examines NZ Post relocation data to provide an indicator of the amount and type of initial movement around and away from the Canterbury region following the February 22<sup>nd</sup> 2011 Canterbury earthquake.

#### **Data source**

Data was provided by New Zealand Post of all people who had indicated a change of address that would come in to effect between 22<sup>nd</sup> February and 10<sup>th</sup> March.<sup>1</sup>

A control sample was also developed to differentiate between those that moved in this period due to the earthquake of the 22<sup>nd</sup> February 2011 and those that were moving for other reasons (e.g. earlier sale of their property or movements based on the 4<sup>th</sup> September 2010 Canterbury earthquake). The control sample used a similar time period, between 2<sup>nd</sup> February and 18<sup>th</sup> February.

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<sup>1</sup> For limitations on the data please refer to Appendix A.

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## Results

### 1. Summary Data of Household Movements

Table 1 below presents the overall number of listings provided in this dataset, indicating that relocations are about 6.5 times higher during the post earthquake period compared with earlier in the month.

Post-earthquake household movement trends indicate that<sup>2</sup>:

- 1) Cantabrians were significantly more likely to move further away from Canterbury:
  - There were more moves outside of Canterbury and also more moves of a further distance (i.e. to a region in the North Island)
- 2) Cantabrians were significantly more likely to make a temporary move:
  - There were fewer permanent moves and shorter redirection durations (indicating an expected shorter duration away)

Table 1. NZ Post household and individual data in the control and post-earthquake samples

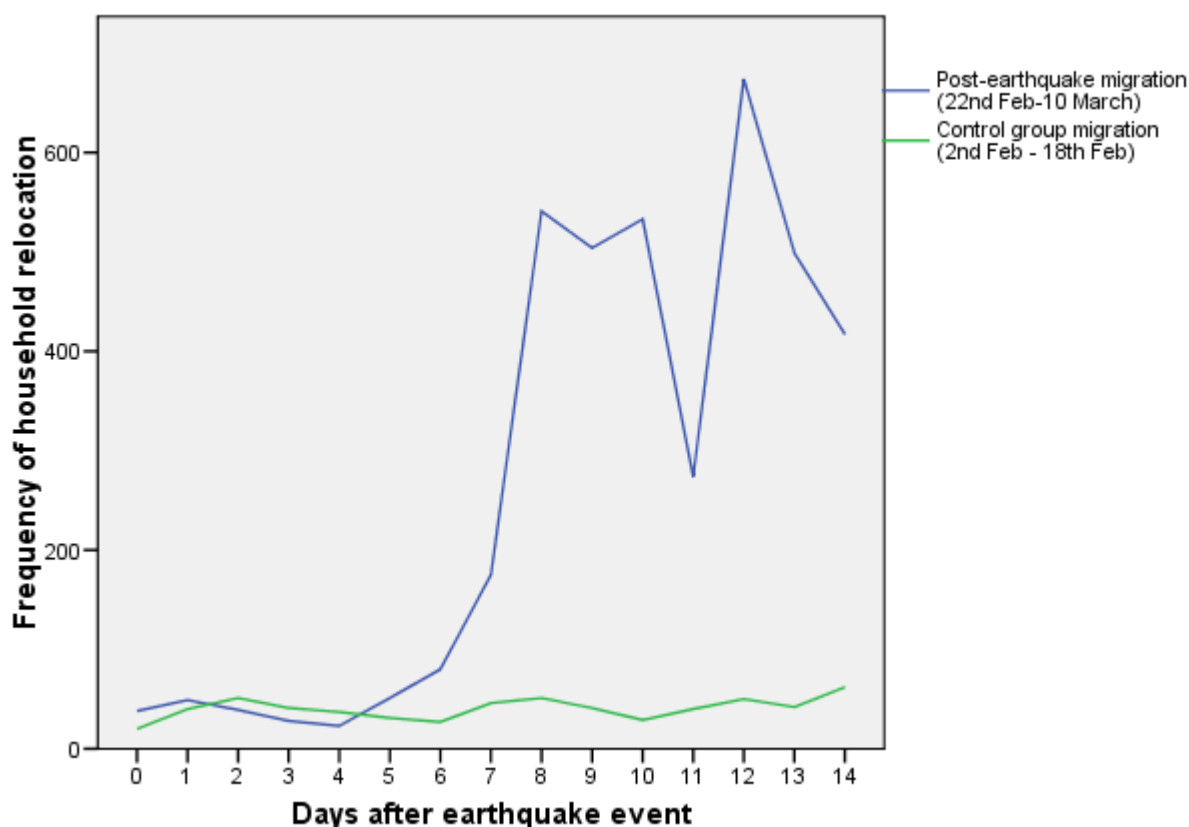
Key Variable	Household migration group	
	Control sample (2 <sup>nd</sup> Feb – 18 <sup>th</sup> Feb 2011)	Post-earthquake sample (22 <sup>nd</sup> Feb – 10 <sup>th</sup> Mar 2011)
Relocation frequencies		
Number of households relocated	608	3925
Number of people relocated	1848	11319
Average number of people in household	3.04	2.88
Relocation permanence		
Permanent	580 (95.4%)	2839 (72.3%)
Temporary	28 (4.6%)	1086 (27.7%)
Redirection duration (for temporary moves)		
2 months	16 (57.1%)	658 (60.6%)
4 months	6 (21.4%)	363 (33.4%)
6 months	3 (10.7%)	36 (3.3%)
12 months	3 (10.7%)	29 (2.7%)
Average duration of relocation (months)	3.93	3.07
Age group		
People under 16 years	253 (13.7%)	918 (8.1%)
Other (age not specified)	1595 (86.3%)	10401 (91.9%)
Gender		
Males	743 (40.2%)	4113 (36.3%)
Females	877 (47.5%)	4619 (40.8%)
Other (gender not specified)	228 (12.3%)	2587 (22.9%)
Household ownership		
Owned	198 (32.6%)	1308 (33.3%)
Rented	235 (38.7%)	918 (23.4%)
Other (ownership not specified)	175 (28.8%)	1699 (43.3%)
Relocation destination location		
Canterbury region	520 (85.5%)	3063 (78.0%)
Other New Zealand region	77 (12.7%)	831 (21.2%)
Overseas	11 (1.8%)	31 (0.8%)

<sup>2</sup> Chi-square analyses were run to establish significance (see Appendix B for more information on this test).

## 2. Temporal Analysis

Figure 1 shows the overall frequency of household relocation post-earthquake across the Canterbury region over time (compared with an early February control group). Initial low numbers post-earthquake most likely relate to postal issues taking a low priority amongst residents and NZ Post operating in a limited capacity for the first week.

Figure 1. The frequency of household relocation in and from the Canterbury region for two weeks after the 22<sup>nd</sup> February earthquake (compared with a baseline relocation in early February).



## 3. Spatial Analysis

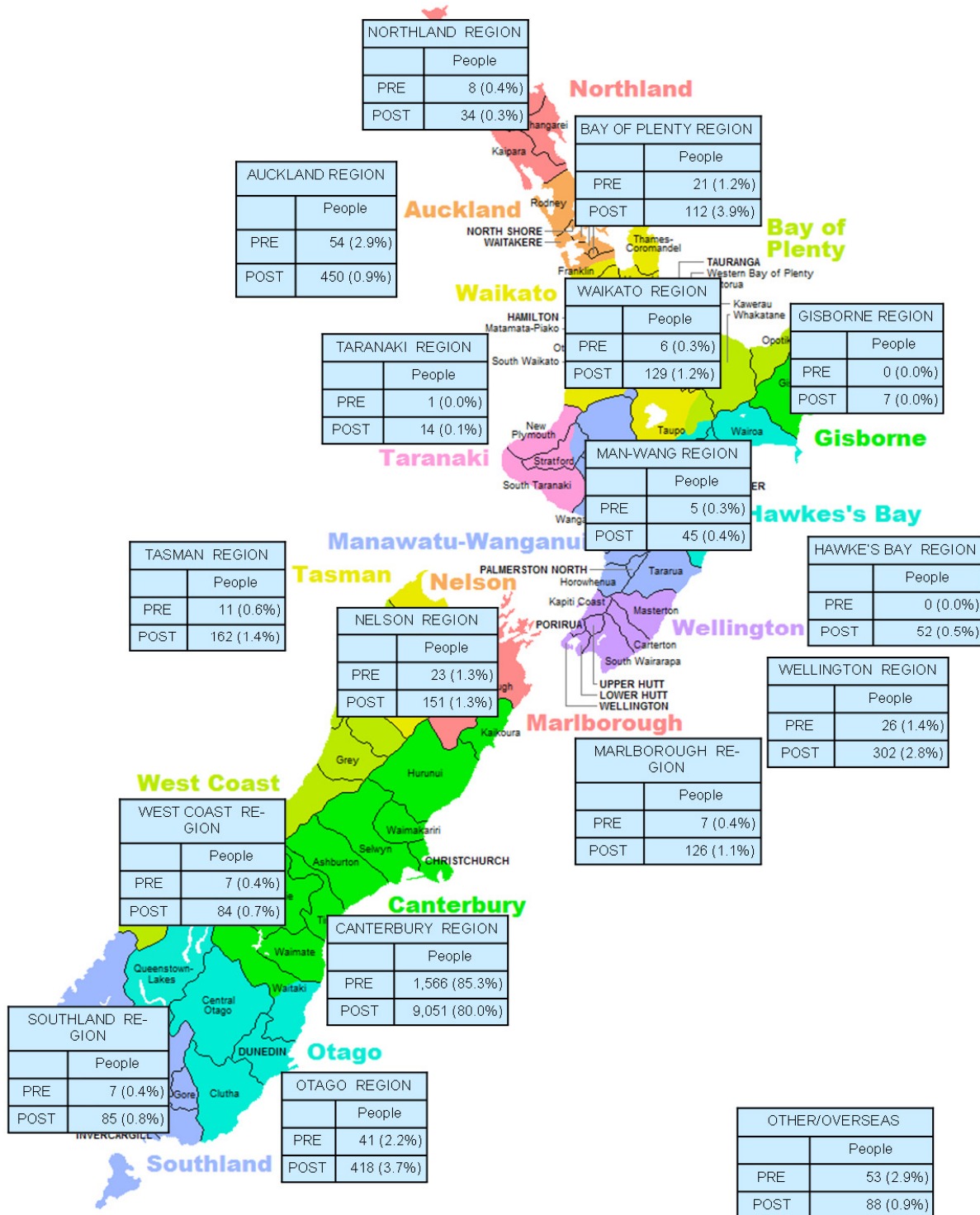
### National Analysis

Figure 2 below shows the household relocation frequencies by region (and overseas) as well as the proportion of shifts by regional location both before (control group) and after the earthquake event. Household relocation destinations for Cantabrians at the national level indicate that (relative to normal migration movements in early February 2011):

- Relocations to Otago and Wellington have increased significantly
- Relocations to overseas locations and to within Canterbury have decreased significantly

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Figure 2. The number of people moved from the Canterbury Region prior to (control sample) and post earthquake by New Zealand region.



New Zealand Regional Map Source: [www.wikipedia.org](http://www.wikipedia.org)

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### Canterbury Analysis by Territorial Authority

Figure 3 shows the aggregated raw numbers of people moving in the post-earthquake sample and pre-earthquake (control) sample. Almost all of the post-earthquake household relocations (98.1%) were from the Christchurch City Territorial Authority.

### Christchurch City Territorial Authority Analysis

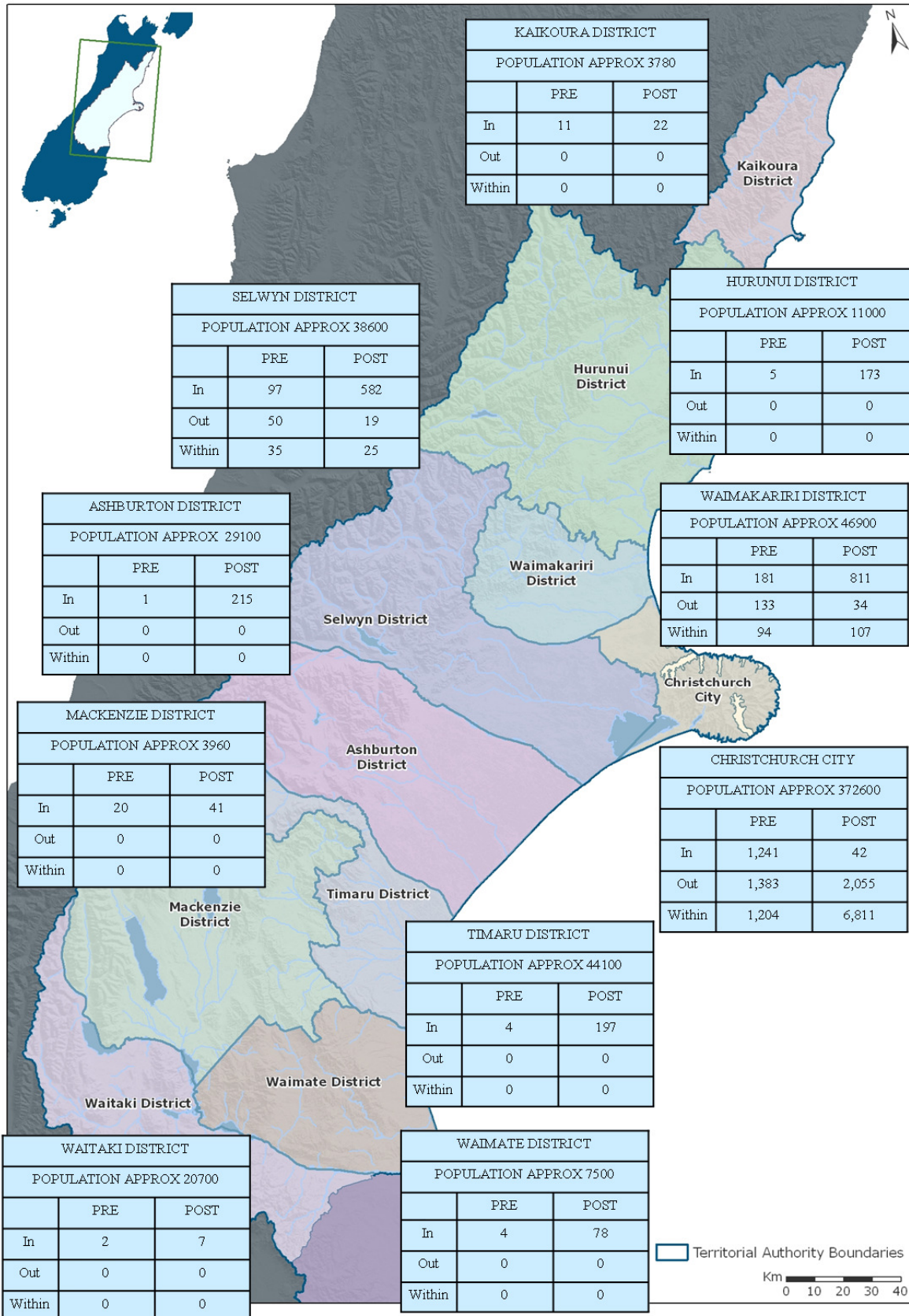
The majority of household relocations were within the city (59.5%), with the next common move to somewhere in the Canterbury region (18.4%), and the remaining moves were to other locations in the South Island (9.6%), the North Island (11.6%) or overseas (0.8%). The permanence of these relocations (see Table 2) shows that moves to more distant locations were more likely to be temporary.

Table 2. The frequency and percentage of household relocations by destination for permanent, temporary and overall relocations.

Relocation destination	Total number of households relocating	Permanent relocations		Temporary relocations	
		Frequency	%	Frequency	%
Within Christchurch City	2292	1680	73.3	612	26.7
Somewhere else in Canterbury	709	528	74.5	181	25.5
Somewhere else in the South Island	371	243	65.5	128	34.5
Somewhere in the North Island	448	289	64.5	159	35.5
Somewhere overseas	31	30	96.8	1	3.2
Total	3851	2770	71.9	1081	28.1

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Figure 3. Overall movement of people in, out and within TLAs in the Canterbury Region both pre-earthquake (control) and post-earthquake (22 February – 10 March 2010).



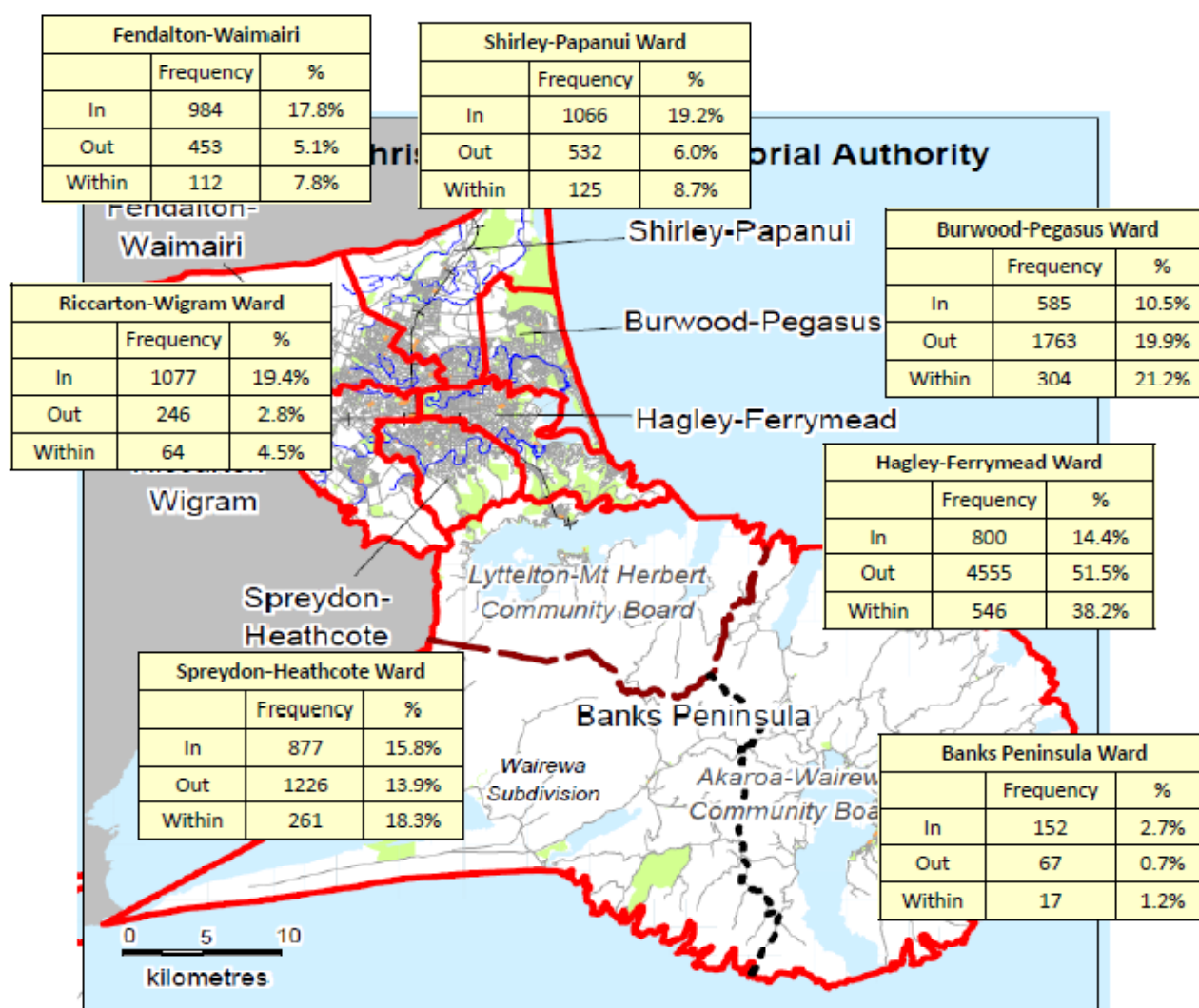
Base map sourced from Environment Canterbury <http://www.ecan.govt.nz/services/online-services/pages/maps-canterbury-region.aspx>  
 Population estimates based on Statistics New Zealand subnational population estimates 2006-2009

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A comparison between the pre-earthquake (control) and post-earthquake household relocations from each of the Christchurch City Council wards reveals that the Burwood-Pegasus and Hagley-Ferrymead wards show significantly greater outwards movement than would be expected (see Figure 4).

The wards chosen as relocation destinations within Christchurch City showed no significant differences following the earthquake. These findings suggest that the earthquake has caused particularly significant movement away from some areas of the city above what would usually be expected, but all of the wards are receiving similar levels of migrants coming into the area (i.e. no particular wards are being inundated with people).

Figure 3. Overall post-earthquake movement frequencies and percentages of people in, out and within wards in the Canterbury Region (22 February – 10 March 2010).



Map sourced from Christchurch City Council website <http://www.ccc.govt.nz/thecouncil/howthecouncilworks/wards.aspx> 11

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### 4. New Zealand Post Mail Hold Data

New Zealand Post data related to mail 'holds' was also examined. This is a service offered by New Zealand Post aimed at people who will be away from their residence for a prescribed amount of time. Therefore, this is an indicator of a temporary change of address rather than a permanent move. Holds can be requested for any length of time between 1 day and 12 weeks. During the hold period, all mail sent to the address is retained at the local post office to be delivered in bulk at the date specified.

Mail addressed to many Canterbury households has been automatically held for residents due to damage to their properties caused by the earthquake. Data relating to only those holds formally requested and paid for online could be accessed and analysed, yielding a relatively small sample (N = 140). Of these holds, the average duration requested was 15.6 days, ranging from 1 – 83 days (nearly 12 weeks). The duration most often requested (mode) was 6 days. This may provide some insight into the expected length of temporary location shifts of the residents of Canterbury (although the numbers of holds are low, so this should be interpreted with care).

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## **Appendix A: Limitations on the data**

As this analysis is based on the NZ Post relocation data, there are a number of limitations. The first is that not every person that moves location notifies NZ Post. For example, it is possible that some may have relocated but continue to collect their mail from their previous address.

Due to the small numbers in some areas, we have only been able to perform statistical analyses at the TLA or Ward level, which removes some of the finer-grained differences at a neighbourhood (or meshblock) level.

It is likely that in the months following the event, relocation numbers will increase further because: 1) repairs to infrastructure and housing are likely to take some time and require alternative temporary accommodation, and 2) many people who have relocated have not yet made final decisions on their permanent or longer-term location.

## **Appendix B: Chi-square analysis**

The Chi-square goodness of fit statistic used here tests whether distributions of categorical variables differ from one another by examining whether the observed frequencies are the same as the expected or probable frequencies. A Chi-square test of independence is used as the data is nominal (i.e. there is no relationship between the categories, such that the order of the categories is arbitrary). The adjusted standardised residual of 1.96 is used to indicate a statistically significant difference. For more information on Chi-square tests see: Agresti, A. (1996). *An Introduction to Categorical Data Analysis*. John Wiley & Sons, Inc: New York.