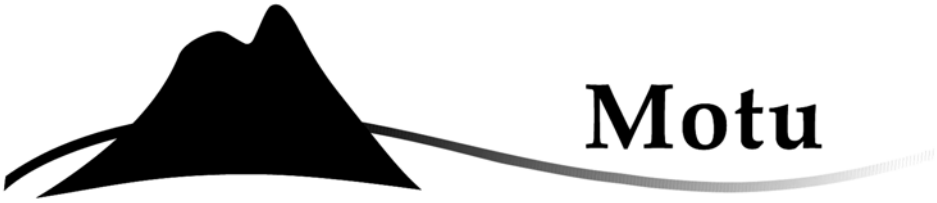

An Auckland Land Value Annual Database

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Motu Working Paper 07-04
Motu Economic and Public Policy Research

April 2007

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Acknowledgements
We thank the Foundation for Research, Science and Technology (programme on Infrastructure) for providing the funding to make this research possible. We also thank Quotable Value New Zealand for providing the data on which this research is based. Finally we thank our colleagues in the programme, David Mare, Steven Stillman, Philip McCann and Jacques Poot for comments on our initial thoughts on the construction of this database.

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Abstract

We construct an annual land value database at the meshblock (MB) level for the Greater Auckland region. The database provides a resource for research work that requires land values (per hectare) across the region. The data is based on valuation records sourced from Quotable Value New Zealand (QVNZ). It covers seven Territorial Authorities (TAs): Rodney District, North Shore City, Waitakere City, Auckland City, Manukau City, Papakura District and Franklin District. The valuation data, which are generally available on a three-yearly cycle for each TA, are interpolated to annual frequency using sale price data for residential vacant land at the TA level. The resulting database extends from 1990-2003 (annually) for MBs in all seven TAs. In some TAs, data are available for slightly longer periods depending on source data availability.

JEL classification
C81; Q24; R12

Keywords
Auckland; Land values; Database

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1 QVNZ Valuation Data

Quotable Value New Zealand (QVNZ) provides property valuation data for each year starting in June from 1990 to 2006. QVNZ provides the capital value,[1] land value,[2] improved value[3] of each property, as well as recording its land area and type. In general, valuations in Territorial Authorities (TA) are carried out on a three-year cycle unless it is specifically requested that a property be re-valued at an earlier date.[4] The records for each property are kept until new valuations become available and they can be updated.

The valuation data used in this project is measured at meshblock (MB) level, on Statistics New Zealand's (SNZ) 2001 boundaries. For each year, QVNZ assigns the most recent valuation to a property, and then aggregates all the properties at the MB level. For each MB, the valuation database contains the total number of assessments, the total capital value of all assessments, the total land value of all assessments, the total improved value of all assessments, and the total land area assessed for 36 categories of land types.[5]

2 QVNZ Sales Data

Another QVNZ dataset used in this project is sales price data at TA level. The sales data contains the same categories of land type as in the valuation data, but contains records for the properties sold each year instead of all properties. For each TA and each land type, the QVNZ sales database records the number of sales, the total capital values of all sales, the total land value of all sales, the total improved value of all sales, the total, mean and median sale prices for all sales, and the total land area of all sales. This information is available annually for each June year from 1981 to 2006.

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[1] Defined as the sum that an owner's estate or interest in the land, if unencumbered by any mortgage or other charge, might be expected to realise at the time of valuation if offered for sale on such reasonable terms and conditions as a bona fide seller might be expected to require. Does not include chattels, stock, plant or machinery which may normally be included when properties are sold.

[2] Defined as the sum that an owner's estate or interest in the land, if unencumbered by any mortgage or other charge, might be expected to realise at the time of valuation if: (a) offered for sale on such reasonable terms and conditions as a bona fide seller might be expected to impose; and (b) no improvements had been made on the land.

[3] Defined as the difference between the capital value and the land value of that type of property.

[4] According to a private communication between Steve Stillman and Richard Deakin (QVNZ), the following situations can result in a revaluation: "the property owner has requested a revaluation, a building consent has been issued for the property, the property has been subdivided or has otherwise changed its usage category, or a mistake has been found in the record."

[5] The 36 raw land types are listed in Table 1 of the Appendix.

3 Interpolation to QVNZ Data

In this project, we focus on the seven TAs across Greater Auckland: Rodney District; North Shore City; Waitakere City; Auckland City; Manukau City; Papakura District; and Franklin District.[6] We focus on the aggregated land value for each MB (i.e. we do not disaggregate the land types).

Each yearly raw extract from QVNZ repeats valuations for each MB until the new valuation becomes available. In the extract, the year in which the valuation was completed is recorded with the valuation. We define the valuation year in which most properties were valued in each TA as the cycle year for that TA. For example, in the 2000 valuation extract, the recorded valuation years in Rodney District were 1997, 1998 and 1999. 1998 was the valuation year in which the highest number of properties were valued, so we have defined it as a cycle year in Rodney. We repeated this for every yearly raw extract and ended up with 6 or 7 cycle years for each TA in Greater Auckland.[7] In these 7 TAs, not all the cycle years are 3 years apart, but none has a valuation cycle that exceeds 3 years.[8]

We require one record for a MB within each cycle. Therefore, we used the extracts one year after the actual cycle years to ensure the valuations completed in the cycle years are included. If a property was valued in a cycle year, we left its value as it appeared in the dataset. For all properties that were valued off cycle (for the preceding one or two years), we treated them as if they had been valued in the cycle year. For example, as mentioned above, 1998 is one of the cycle years in the Rodney District. In order to ascertain the district's 1998 valuation data, we used the 1999 extract for Rodney. In that extract, the valuation years are 1996, 1997 (preceding two years) or 1998 (the cycle year), so we treated the valuations as if they were all done in 1998 and aggregated to one record for each MB. There were three reasons for doing this:

- No information was available to identify the properties that were valued in off-cycle years. We could not therefore adjust the records in cycle years by updating values for corresponding properties.

[6] The Auckland Region only contains a proportion of the Franklin District. We include the whole of Franklin District in this project and define the 7 TAs as "Greater Auckland".
[7] This method was applied to both the data with detailed raw land types and the aggregated data, and the cycle years are always the same.
[8] See Table 2 in the Appendix for a list of cycle years for each TA in Greater Auckland.

- The off-cycle valuations in the chosen raw extract were all done after the last valuation year, which was 1995 in the example provided above. Thus, these valuations could not be recorded in the preceding cycle; instead, they had to appear in the following cycle which, in this example, occurred in 1998.

- The number of assessments and values from off-cycle valuations are very small. We included them in the database, so that the information would be complete.

This method gives us valuation data for each TA by cycle year. Based on the cycle-year datasets for the 7 TAs, we then interpolated between the cycle years to gain an annual database for land price per hectare for each MB across Greater Auckland. The main reason for doing so is that cycle years differ across TAs, so without interpolation to annual frequency we could not directly compare values in one TA with those from another for the same period.

3.1 General Annual Interpolation Method

The method used for between cycle interpolations is as follows (where j refers to the specific meshblock; A refers to the TA in which meshblock j is situated;[9] t refers to year):

Let:
L_{jt} = aggregated land value for properties in j;
L_{At} = aggregated land value for properties in A;
S_{At} = median sale price of residential vacant land in A;[10]

We observe L_{jt} and L_{At} periodically (e.g. in t=1, …4, … 7, …); we observe S_{At} annually (t=1, 2, 3, 4, …).

Let:
$\beta_{jt} = L_{jt}/L_{At}$ (observed periodically)
$\gamma_{jt} = L_{At}/S_{At}$ (observed periodically)

[9] TAs are used as the spatial units for sale prices since there are generally a large number of annual sales within a TA and thus the observed median price is not too noisy. At the same time, a TA is reasonably 'local' so it can be used to approximate general property price movements in the relevant area.
[10] The purpose for using the median sales price from residential vacant land is that there is always a reasonable number of sales for this type of land no matter which TAs are examined. This results in a reasonably smooth sales price trend, so it is the best indicator of changes in price between years. As well as this, it is vacant land, so it gives a good estimate of the land price.

Hence:
$L_{jt} = \alpha_{jt}.S_{At}$ (where $\alpha_{jt} = \beta_{jt}.\gamma_{jt}$)

We hypothesise that the ratios, β_{jt} and γ_{jt}, will evolve relatively smoothly over time since they are the ratios of two nominal variables and are therefore unaffected by general changes in nominal prices and values. Thus, we can assume that α_{jt} will also evolve reasonably smoothly over time. Accordingly, we linearly interpolate α_{jt} between valuation years (no matter what the valuation frequency) and apply this factor to the observed S_{At} in order to obtain estimated annual observations. Valuations will still move sharply between years in cases where S_{At} changes significantly on an annual basis, so general property price movements in the area will be reflected in our valuation estimates.[11]

3.2 Adjustments Before Interpolation

Before applying this method, we made some adjustments to the raw data. This was necessary because the valuation data received from QVNZ occasionally had some reporting flaws (mostly sporadic under-reporting of values for a specific land type – e.g. commercial land in 1998 for a particular MB). As well as this, some MBs were not valued in all cycle years.

There are 8803 MBs in Greater Auckland according to the boundaries defined in 2001. Of these 8803 MBs, 116 have no valuation information recorded for any year. These 116 MBs usually cover lakes, islands or have no properties on them. We therefore excluded these MBs from our analysis.[12] There are 1785 MBs with missing valuations in early cycles, 1 with a missing valuation in the last cycle year and 2 with missing valuations in both the beginning cycle years and the end cycle year. For these MBs, we only interpolate between the available cycles, other missing valuations remain as missing data points. There are 7 MBs with missing valuations in the middle part of the periods, so we have done the interpolation using the neighbouring cycle years (i.e. over 6 years instead of 3 years).

We then examined the ratio between the MB level aggregated land values (L_{jt}, labelled as lv_mb in our database) and the TA level aggregated land values (L_{At}, labelled as

[11] We tested this method against the alternative of linear interpolation on cycle year observations. We did the comparison using neighbouring cycle year observations (i.e. interpolation over 6 year periods) and found that this method gave a closer match to the known data points than did linear interpolation.

lv_ta in our database), which is the β_{jt} mentioned above (labelled as lv_mbta in our database) to verify its smoothness. We checked for obvious data flaws at the MB level as follows:

First, we identified any MB that had a between-cycle change of β_{jt} satisfying one of the following situations:

- a drop of over 20% and then an increase of over 20% in the next cycle; or
- an increase of over 20% and then a drop of over 20% in the next cycle

and treated this MB as suspicious. In this step, we found that because the number of MBs being valued every year within a TA fluctuates, some of the significant changes which are discernable in lv_mbta do not indicate actual data flaws. This situation is most prevalent in North Shore City and Waitakere City. In North Shore City, only 571 MBs out of 1424 were valued in the first cycle year – 1988. In 1990, the number of MBs with valuation data increased to 1341, stabilising from that point on. Therefore, it was not reasonable to compare lv_mbta for the 571 MBs valued in 1988 with this variable in later years because it would show a significant drop in the variable. So in this case, we grouped the initial 571 MBs together and calculated the ratio between the MB level land value and the aggregated land value for the 571 MBs from 1988 (first cycle) to 2005 (last cycle) and formed another group from the remaining MBs. Similarly, in Waitakere City, where there are 1126 MBs, 541 MBs were valued in 1989, 871 in 1992, while the rest were only valued from 1995 onwards. In order to measure the change in land value ratios, we divided this TA into 3 groups. The first group contains 541 MBs which have valuations available for all cycle years; the second group contains 330 MBs which have valuations available from 1992 onwards; the remaining MBs, which have valuations available from 1995, make up group 3. Suspicious MBs could then be tested based on the lv_mbta calculated within each of the three groups.[13]

Secondly, we plotted lv_mbta for suspicious MBs, identified according to the above rules, together with the aggregated land area in each cycle year in order to identify unreliable observations and adjust them accordingly. Land values in start or end cycle years that are extremely different from other cycle years were dropped from the time series and left

[12] See Table 3 in the Appendix for the list of these 116 MBs, as well as the Area Unit (AU) and TA to which they belong.
[13] See Figures 1 and 2 in the Appendix for the available land values in North Shore City and Waitakere City.

as missing.[14] Land values in the middle period that are significantly different from other cycle years were linearly interpolated using the data from neighbouring cycle years. For example, if we considered that the land value for MB x in 1994 in Auckland was suspicious, then we would linearly interpolate the lv_mbta in 1994 between 1991 and 1997 for that MB, then apply the interpolated 1994 lv_mbta to 1994 lv_ta to get the interpolated 1994 lv_mb.[15] The rules we used to identify offending observations in the middle cycles are as follows:

- the lv_mbta follows an "up-down-up" trend and the "down" change exceeds 20% and at least one of the "up" changes exceeds 20%, and the area of the corresponding years follows the same "up-down-up" pattern, and the changes in area are material; or
- the lv_mbta follows "down-up-down" trend and the "up" change exceeds 20% and at least one of the "down" changes exceeds 20%, and the area of the corresponding years follows the same "down-up-down" pattern, and the changes in area are material; or
- the change of lv_mbta is dramatic, (e.g. drop of more than 40% or increase of more than 80%) and the total area remains broadly stable during the same period.

The changes resulted from the above process for each TA in the Greater Auckland are listed in Table 4 in the Appendix. This approach led us to clean 1.6% of the observations across the seven TAs over all cycle years.

4 Final Data

Applying the interpolation method to the adjusted QVNZ dataset, we get a time-series of land values in each MB from 1990 onwards for all 7 TAs in Greater Auckland. The final data point differs across TAs depending on their final available cycle year. Data extends to 2003 for Papakura and Franklin, to 2004 for Rodney and Waitakere, and to 2005 for North Shore, Auckland City and Manukau. For some TAs, the data begin earlier than 1990 (e.g. 1987 for Manukau City) but our concentration here is on the data from 1990 onwards.

[14] For example, if lv_mbta in the last cycle year is over 80% higher than the previous cycle year, where the land area covered by properties is approximately the same, we dropped the last observation and made the time-series stop at the second to last cycle year.

[15] Note the lv_mbta for the TA will not add exactly to 1 after the interpolation, and the lv_ta will also be fractionally different if we add up the interpolated lv_mb.

To observe relative land price by MB, we map the price for each MB relative to the price for Greater Auckland in each year. By relative price, we mean the ratio between the per hectare price for the MB and the per hectare price for all 7 TAs in Greater Auckland. The per hectare land price in a MB is calculated by using the land value in each MB divided by the total geographic land area defined by SNZ; and the per hectare land price for Greater Auckland is calculated by using the total land price in Greater Auckland divided by the total SNZ land area covered by all valued MBs in Greater Auckland. MBs with no valuation data are not included in the area calculation. The reason for using the SNZ area is that it is constant across time. By contrast, the land area recorded in the QVNZ valuation dataset varies, and sometimes exceeds the SNZ MB area. A possible reason for this is that the recorded land area includes a big property where only part of its land is within the MB. Since we have no way to adjust the QVNZ land areas, we chose to use the constant SNZ MB area instead.

Maps in Figure 3 in the Appendix show the relative land prices for 4 groups of TAs: group 1, Rodney District; group 2, Waitakere City and North Shore City; group 3, Auckland City, Manukau City and Papakura District; and group 4, Franklin District. These maps cover the years 1991 to 2003 and are presented at three yearly intervals (to save space); data and maps for every year from 1990 onwards are available.

Appendix

Table 1 QVNZ land types [16]

QVNZ Land Types
Arable Irrigated
Arable Non Irrigated
Arable Pre 1995
Arable Total
Commercial - built on
Commercial / Industrial Vacant
Dairying Factory
Dairying Pre 1995
Dairying Total
Dairying Town Supply
Forestry Exotic
Forestry Indigenous / Protected
Forestry Total
Forestry Total of planted forestry
Forestry Vacant
Horticulture Total
Industrial - built on
Lifestyle Improved
Lifestyle Total
Lifestyle Vacant
Mining Total
Other Total
Pastoral Fattening / Stud
Pastoral Grazing
Pastoral Run
Pastoral Total
Residential Built On
Residential Converted Flat
Residential Dwelling
Residential Flat / Own Your Own
Residential Home and Income
Residential Parents of Mixed Use
Residential Purpose Built Flat
Residential Vacant
Specialist Aquaculture
Specialist Deer
Specialist Horses
Specialist Other
Specialist Pigs
Specialist Poultry
Specialist Pre 1995
Specialist Total

[16] Not all the land types listed here are included in our aggregated data. First, we dropped the sub-group totals since they repeat the values of each type within the sub-group. The dropped sub-groups totals are Dairying Total, Forestry Total, Lifestyle Total, Pastoral Total and Specialist Total. Second, we drop Arable irrigated, Arable Non-irrigated and Arable Pre 1995 but keep Arable Total because the three detailed types are not well-defined.

Table 2 Cycle Years by TA

TA ID	TA Name	# of MBs	Cycle Years						
4	Rodney District	563	1989	1992	1995	1998	2001	2004	
5	North Shore City	1,424	1988	1990	1993	1996	1999	2002	2005
6	Waitakere City	1,126	1989	1992	1995	1998	2001	2004	
7	Auckland City	3,088	1990	1991	1994	1997	1999	2002	2005
8	Manukau City	1,859	1987	1990	1993	1996	1999	2002	2005
9	Papakura District	280	1988	1991	1994	1997	2000	2003	
10	Franklin District	463	1989	1992	1995	1998	2001	2003	
	Total	**8,803**							

Table 3 MBs in Greater Auckland that do not have any valuation data

mb01	au01_desc	ta01_desc	mb01	au01_desc	ta01_desc
496102	Abbotts Park	Auckland City	835700	Waiuku	Franklin District
432500	Auckland Central West	Auckland City	836703	Waiuku	Franklin District
434901	Auckland Central West	Auckland City	837900	Waiuku	Franklin District
435202	Auckland Central West	Auckland City	720500	Ambury	Manukau City
435300	Auckland Central West	Auckland City	719000	Beachlands-Maraetai	Manukau City
544301	Eden Terrace	Auckland City	717000	Clevedon	Manukau City
413200	Freemans Bay	Auckland City	684701	Edgewater	Manukau City
415200	Freemans Bay	Auckland City	729700	Favona	Manukau City
417200	Freemans Bay	Auckland City	750100	Favona	Manukau City
417400	Freemans Bay	Auckland City	608342	Inlet-Manukau Harbour	Manukau City
476500	Glen Innes West	Auckland City	608344	Inlet-Manukau Harbour	Manukau City
440104	Inlet-Hobson Bay	Auckland City	608350	Inlet-Manukau Harbour	Manukau City
516900	Islands-Motutapu, Rangitoto, Rak	Auckland City	608352	Inlet-Manukau Harbour	Manukau City
517101	Islands-Motutapu, Rangitoto, Rak	Auckland City	608354	Inlet-Manukau Harbour	Manukau City
517200	Islands-Motutapu, Rangitoto, Rak	Auckland City	634336	Inlets-Tamaki	Manukau City
517300	Islands-Motutapu, Rangitoto, Rak	Auckland City	634340	Inlets-Tamaki	Manukau City
517600	Islands-Motutapu, Rangitoto, Rak	Auckland City	634344	Inlets-Tamaki	Manukau City
529100	Kingsland	Auckland City	634366	Inlets-Tamaki	Manukau City
584401	Lynfield North	Auckland City	634372	Inlets-Tamaki	Manukau City
439400	Mokohinau Island	Auckland City	726600	Mangere South	Manukau City
546200	Mt Eden North	Auckland City	726700	Mangere South	Manukau City
637802	Mt Wellington South	Auckland City	727300	Mangere South	Manukau City
412900	Newton	Auckland City	727800	Mangere South	Manukau City
623000	One Tree Hill Central	Auckland City	749300	Mangere Station	Manukau City
623300	One Tree Hill Central	Auckland City	749400	Mangere Station	Manukau City
455000	Orakei North	Auckland City	786400	Middlemore	Manukau City
496400	Orakei North	Auckland City	786500	Middlemore	Manukau City
496500	Orakei North	Auckland City	679812	Pigeon Mountain North	Manukau City
788102	Otahuhu East	Auckland City	760142	Redoubt South	Manukau City
790300	Otahuhu East	Auckland City	760200	Redoubt South	Manukau City
786300	Otahuhu West	Auckland City	760801	Redoubt South	Manukau City
520300	Owairaka East	Auckland City	717903	Shelly Park	Manukau City
522703	Owairaka East	Auckland City	716800	Turanga	Manukau City
457200	Parnell East	Auckland City	717100	Turanga	Manukau City
457300	Parnell East	Auckland City	772902	Wattle Farm	Manukau City
457500	Parnell East	Auckland City	357200	Birkenhead East	North Shore City
622100	Penrose	Auckland City	351402	Chelsea	North Shore City
391601	Point Chevalier West	Auckland City	352800	Chelsea	North Shore City
393702	Point Chevalier West	Auckland City	185004	Glendhu	North Shore City
428500	Ponsonby West	Auckland City	331000	Mt Victoria	North Shore City
390300	Rosebank	Auckland City	179501	Paremoremo East	North Shore City
390402	Rosebank	Auckland City	366601	Tuff Crater	North Shore City
536100	Sandringham North	Auckland City	808602	Rosehill	Papakura District
423800	St Marys	Auckland City	142000	Algies Bay-Mahurangi	Rodney District
291102	Crum Park	Waitakere City	175300	Army Bay	Rodney District
253502	Edmonton	Waitakere City	138809	Cape Rodney	Rodney District
222000	Hobsonville	Waitakere City	147314	Cape Rodney	Rodney District
222100	Hobsonville	Waitakere City	147316	Cape Rodney	Rodney District
222200	Hobsonville	Waitakere City	209200	Helensville	Rodney District
222300	Hobsonville	Waitakere City	209902	Helensville	Rodney District
222400	Hobsonville	Waitakere City	213300	Inlet-Kaipara River	Rodney District
222600	Hobsonville	Waitakere City	172000	Orewa	Rodney District
222700	Hobsonville	Waitakere City	210701	Parakai	Rodney District
303300	Karekare	Waitakere City	172807	Red Beach	Rodney District
282200	Otimai	Waitakere City	210302	South Head	Rodney District
237402	Swanson	Waitakere City	170700	Waiwera	Rodney District
237502	Swanson	Waitakere City			
301800	Waima	Waitakere City			
253900	Wakeling	Waitakere City			
223500	Whenuapai West	Waitakere City			

Table 4 MBs with Cleaned Data, and Corresponding Adjustments

North Shore City

MB No.	Problem Cycle(s)	Adjustment(s)
162300	1999	Interpolated between 1996 and 2002
181000	2002	Interpolated between 1999 and 2005
183904	1990	Drop
184600	1990	Drop
184703	1990	Drop
186102	1990	Drop
200000	1999	Interpolated between 1996 and 2002
351600	1999	Interpolated between 1996 and 2002

Rodney District

MB No.	Problem Cycle(s)	Adjustment(s)
139107	1992, 1995	Interpolated between 1989 and 1998
139700	2001	Interpolated between 1998 and 2004
145300	2001	Interpolated between 1998 and 2004
145900	2001	Interpolated between 1998 and 2004
175104	1989	Drop
208202	1989, 1992	Drop
213000	1998	Interpolated between 1995 and 2001
214300	1998	Interpolated between 1995 and 2001
217000	1995	Interpolated between 1992 and 1998
218800	1989 -1995	Drop
226501	2001	Interpolated between 1998 and 2004

Waitakere City

MB No.	Problem Cycle(s)	Adjustment(s)
181600	1989	Drop
221600	2004	Drop
223700	1995	Interpolate between 1992 and 1998
224106	1992, 1995	Interpolate between 1989 and 1998
224125	1989, 1992	Drop
229702	1989, 1992	Drop
230301	1992	Interpolate between 1989 and 1995
230500	1989, 1992	Drop
230702	1989	Drop
237203	1992	Drop
237300	1989, 1992	Drop
238200	1989	Drop
238400	1989	Drop
242501	1998	Interpolate between 1995 and 2001
242700	1998	Interpolate between 1995 and 2001
251100	1989, 1992	Drop
252000	1992	Interpolate between 1989 and 1995
266000	All	Blank all the time
278003	1989	Drop
282008	1998	Interpolate between 1995 and 2001
289200	1998	Interpolate between 1995 and 2001
290800	1995	Interpolate between 1992 and 1998

Papakura District

MB No.	Problem Cycle(s)	Adjustment(s)
807400	1997	Interpolated between 1994 and 2000

Auckland City

MB No.	Problem Cycle(s)	Adjustment(s)
383600	1990-2002	Drop
391602	1990 & 2005	Drop
397600	1990-1994	Drop
413000	1990-2002	Drop
413300	1999	Interpolate between 1994 and 2002
417700	1990-1994	Drop
426100	1990-2005	Blank all the time
429200	1990-2005	Blank all the time
429500	1990	Drop
432000	1990-1994	Drop
433100	1990-2002	Drop
436700	1990-1994	Drop
437900	1990-2002	Drop
438102	1990-1999	Drop
438202	1990-1994	Drop
438500	1990-1994	Drop
440400	1990-1999	Drop
441200	1990-1994	Drop
442100	1990-2005	Blank all the time
443600	1990-2002	Drop
451900	1990-1994	Drop
454900	2002	Interpolate between 1999 and 2005
457600	1994	Interpolate between 1991 and 1999
463901	1990-2005	Blank all the time
466700	1994	Interpolate between 1991 and 1999
468300	1994	Interpolate between 1991 and 1999
482400	1994	Interpolate between 1991 and 1999
485500	1999 & 2002	Interpolate between 1994 and 2005
489500	1990-2002	Drop
494902	1990-1994	Drop
497000	1990-2002	Drop
497900	1999	Interpolate between 1994 and 2002
498100	1994	Interpolate between 1991 and 1999
499800	1994	Interpolate between 1991 and 1999
503300	1990-2005	Blank all the time
511400	1994	Interpolate between 1991 and 1999
512200	1990 & 1994	Drop 1990; Interpolate 1994 between 1991 and 1999
514400	1990 & 1994	Drop 1990; Interpolate 1994 between 1991 and 1999
514600	1994	Interpolate between 1991 and 1999
520000	2005	Drop
530000	2005	Drop
530900	2005	Drop
534200	2002	Interpolate between 1999 and 2005
536200	1990 & 1991	Drop
543000	1990-2002	Drop
544000	2005	Drop
548200	2005	Drop
553700	2002	Interpolate between 1999 and 2005
561200	1999 & 2005	Drop 2005; Interpolate 1999 between 1994 and 2002
563902	1990-2002	Drop
571700	1990-1994	Drop
577000	2005	Drop
579100	1999	Interpolate between 1994 and 2002
581700	2002	Interpolate between 1999 and 2005
589204	1990 & 2005	Drop
589205	1990-1999	Drop
598800	1990-2002	Drop
600800	1990	Drop
601000	1990	Drop

MB No.	Problem Cycle(s)	Adjustment(s)
601600	1990-2002	Drop
601800	1990	Drop
602401	2002	Interpolate between 1999 and 2005
607500	1990	Drop
607800	1990	Drop
612200	1990	Drop
616300	2005	Drop
616600	1994	Interpolate between 1991 and 1999
616900	1990-2002	Drop
622500	1990-2002	Drop
624000	1994	Interpolate between 1991 and 1999
625500	1990 & 2005	Drop
629300	1990	Drop
631100	1990	Drop
637500	1990-1999	Drop
637801	1990	Drop
640002	1999 & 2002	Interpolate between 1994 and 2005
642500	2002	Interpolate between 1999 and 2005
644101	1990-2005	Blank all the time
785200	1999	Interpolate between 1994 and 2002
787200	2005	Drop
788300	2005	Drop
789100	2002	Interpolate between 1999 and 2005

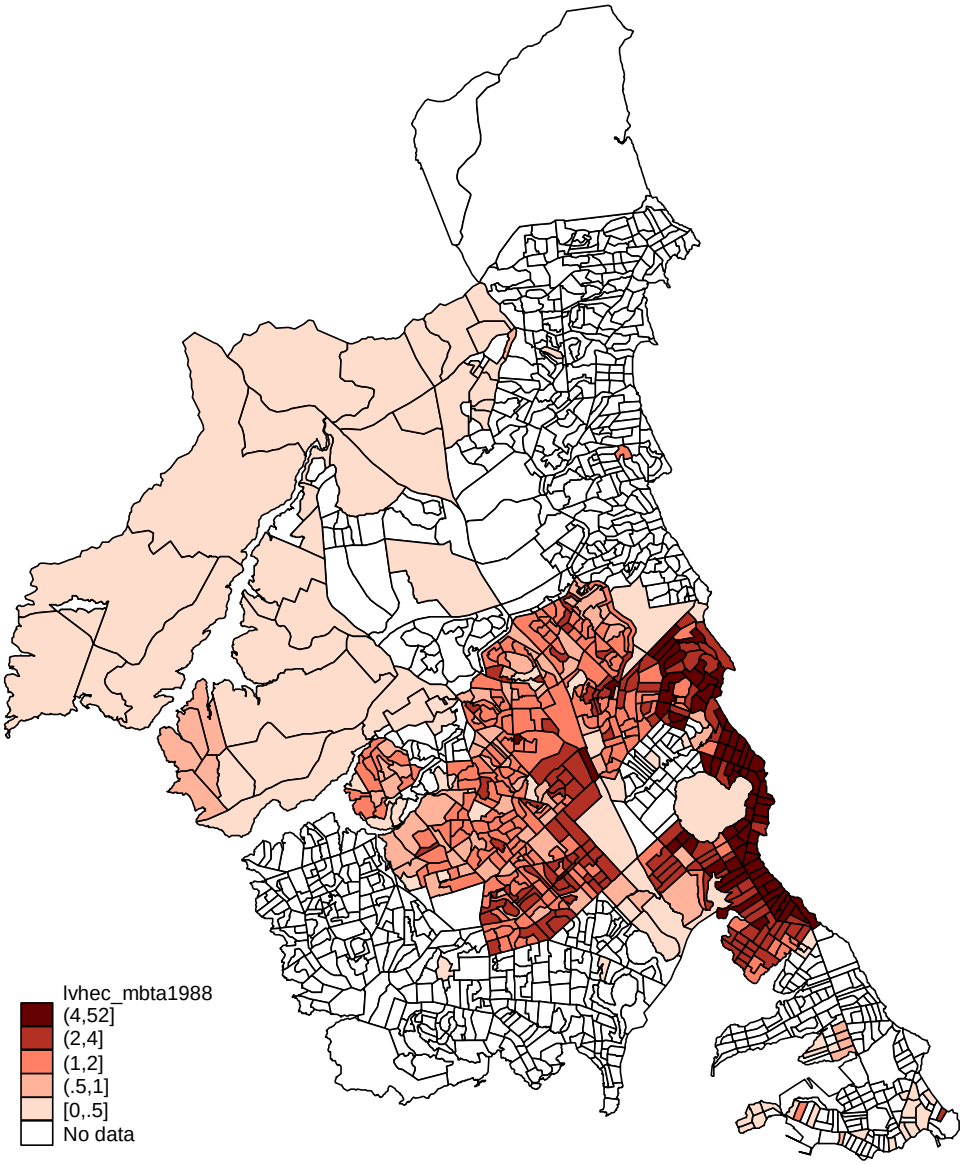
Manukau City

MB No.	Problem Cycle(s)	Adjustment(s)
648400	1990	Interpolate between 1987 and 1993
678900	2002	Interpolate between 1999 and 2005
711136	1990 & 1996	Drop 1990; Interpolate 1996 between 1993 and 1999
711141	1990 & 1993	Drop
711146	1987 to 1993	Drop
711149	1987 & 1990	Drop
711300	2002	Interpolate between 1999 and 2005
711408	1987 & 1990	Drop
711703	1987	Drop
712020	1987 to 1993	Drop
712024	1987 to 1996	Drop
712201	2002	Interpolate between 1999 and 2005
720800	2002 & 2005	Drop
730800	1990 to 1996	Drop
731600	1987 & 1990	Drop
749800	2002	Interpolate between 1999 and 2005
749900	1999	Interpolate between 1996 and 2002
751600	1993	Interpolate between 1990 and 1996
774431	1987	Drop
780404	1987	Drop
780700	1996	Interpolate between 1993 and 1999

Franklin District

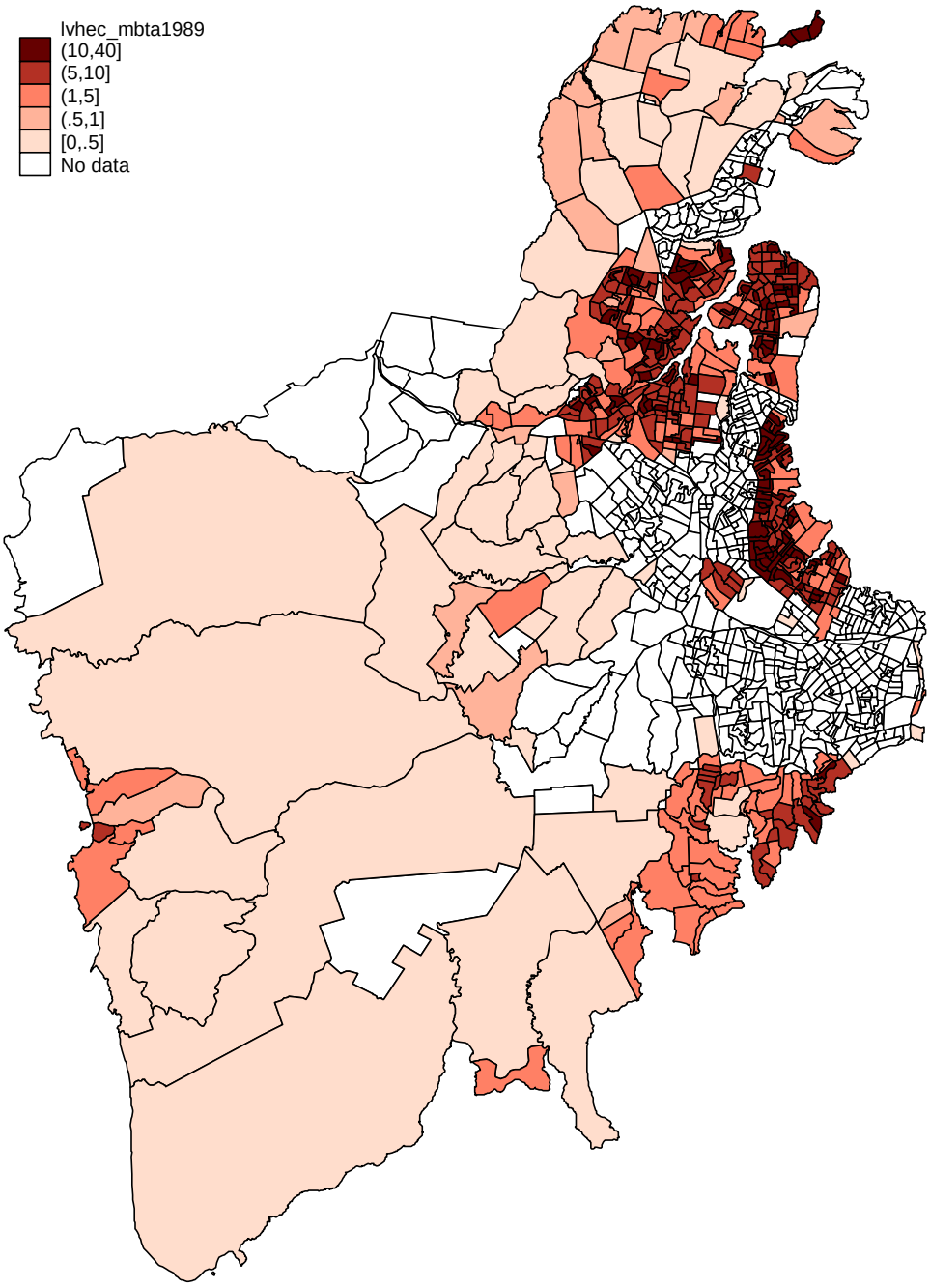
MB No.	Problem Cycle(s)	Adjustment(s)
815900	1995	Interpolate between 1992 and 1998
833900	1998	Interpolate between 1995 and 2001
841000	1998	Interpolate between 1995 and 2001
843300	1998	Interpolate between 1995 and 2001
844600	1998	Interpolate between 1995 and 2001
844700	1998	Interpolate between 1995 and 2001
846200	1998	Interpolate between 1995 and 2001
846300	1998	Interpolate between 1995 and 2001

Figure 1 Relative land price in North Shore City in 1988[17]



[17] lvhec_mbta=lvhec_mb/lvhec_ta, where lvhec_mb=lv_mb/areaSNZ_mb, and lvhec_ta=lv_ta/areaSNZ_ta. Because 1988 QV valuation only covered about half of the MBs, lvhec_ta in 1988 only counted the area from those MBs included in 1988 valuation data. The same is true for the Waitakere City in 1989 and 1992.

Figure 2 Relative land price in Waitakere City in the first 2 cycle years



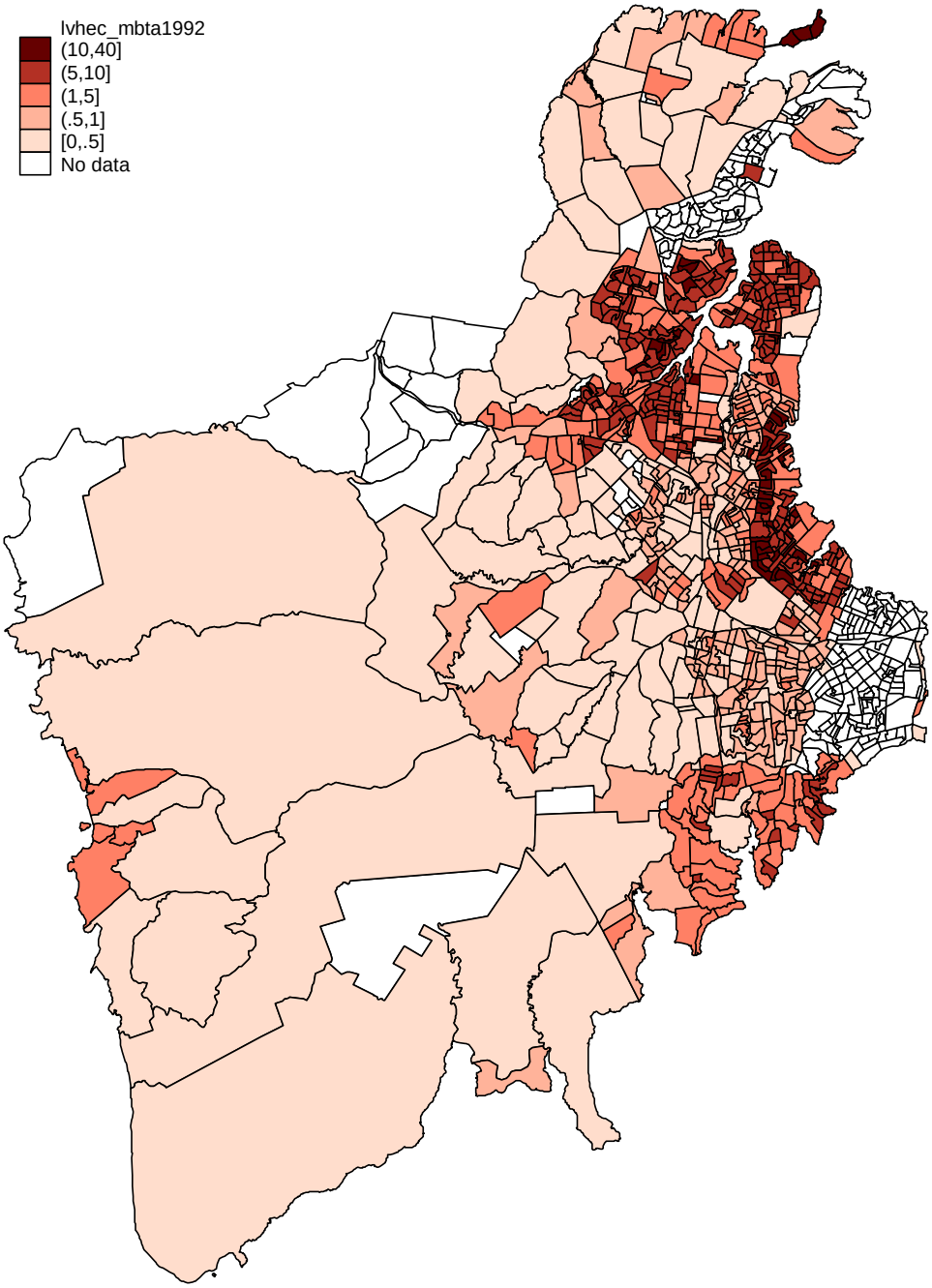
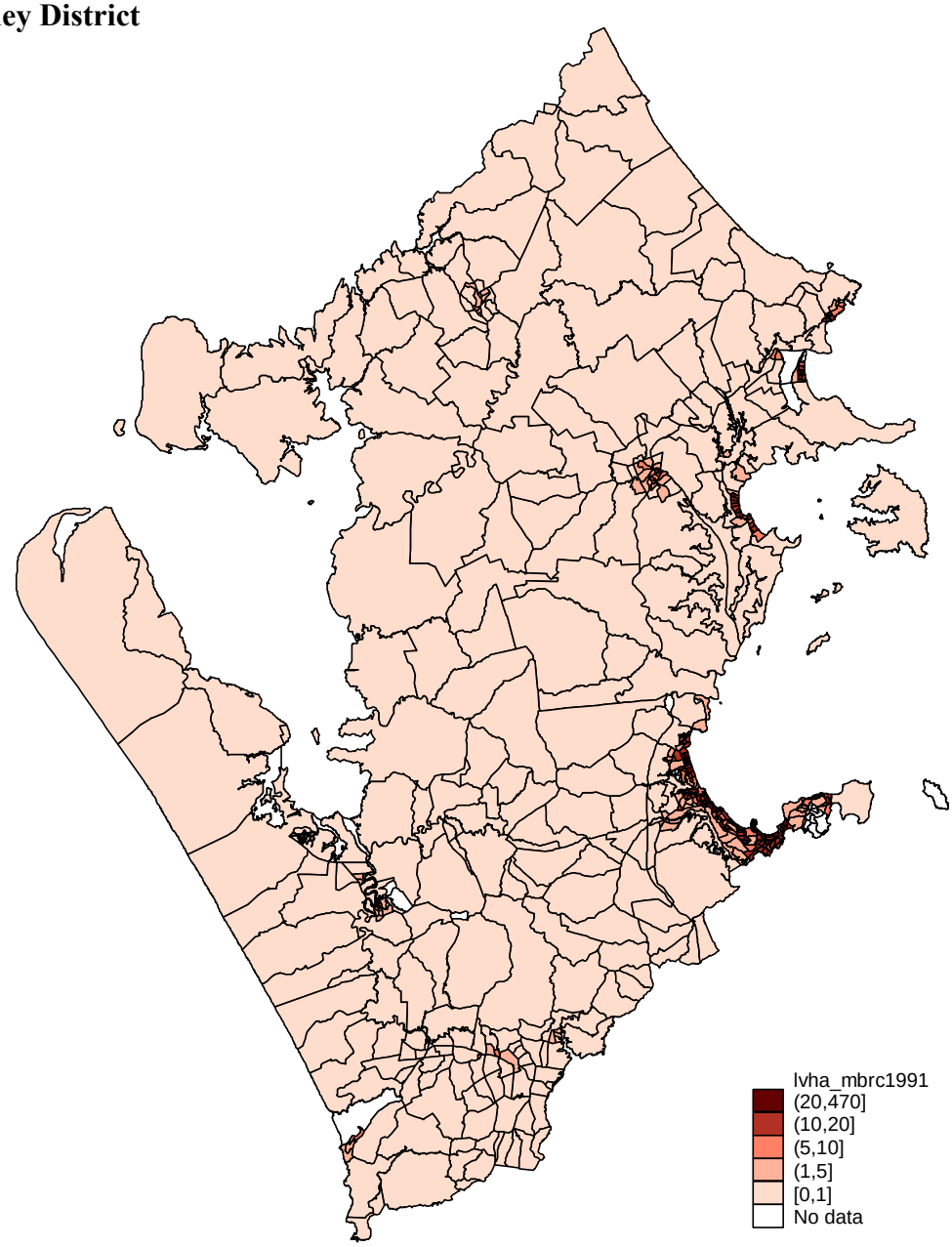

lvhec_mbta1992
(10,40]
(5,10]
(1,5]
(.5,1]
[0,.5]
No data

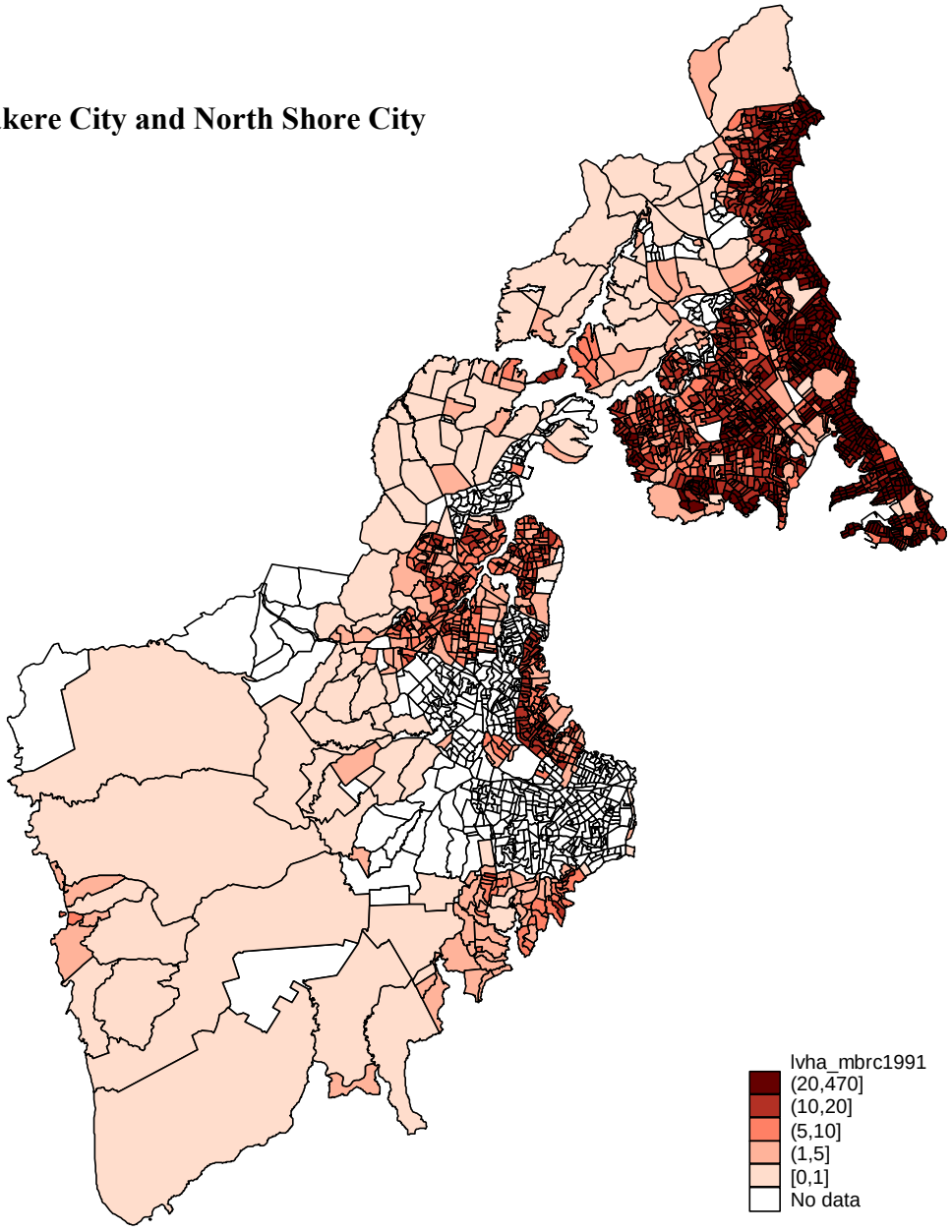
Figure 3 Relative Land Price by MB and year in Greater Auckland

1991

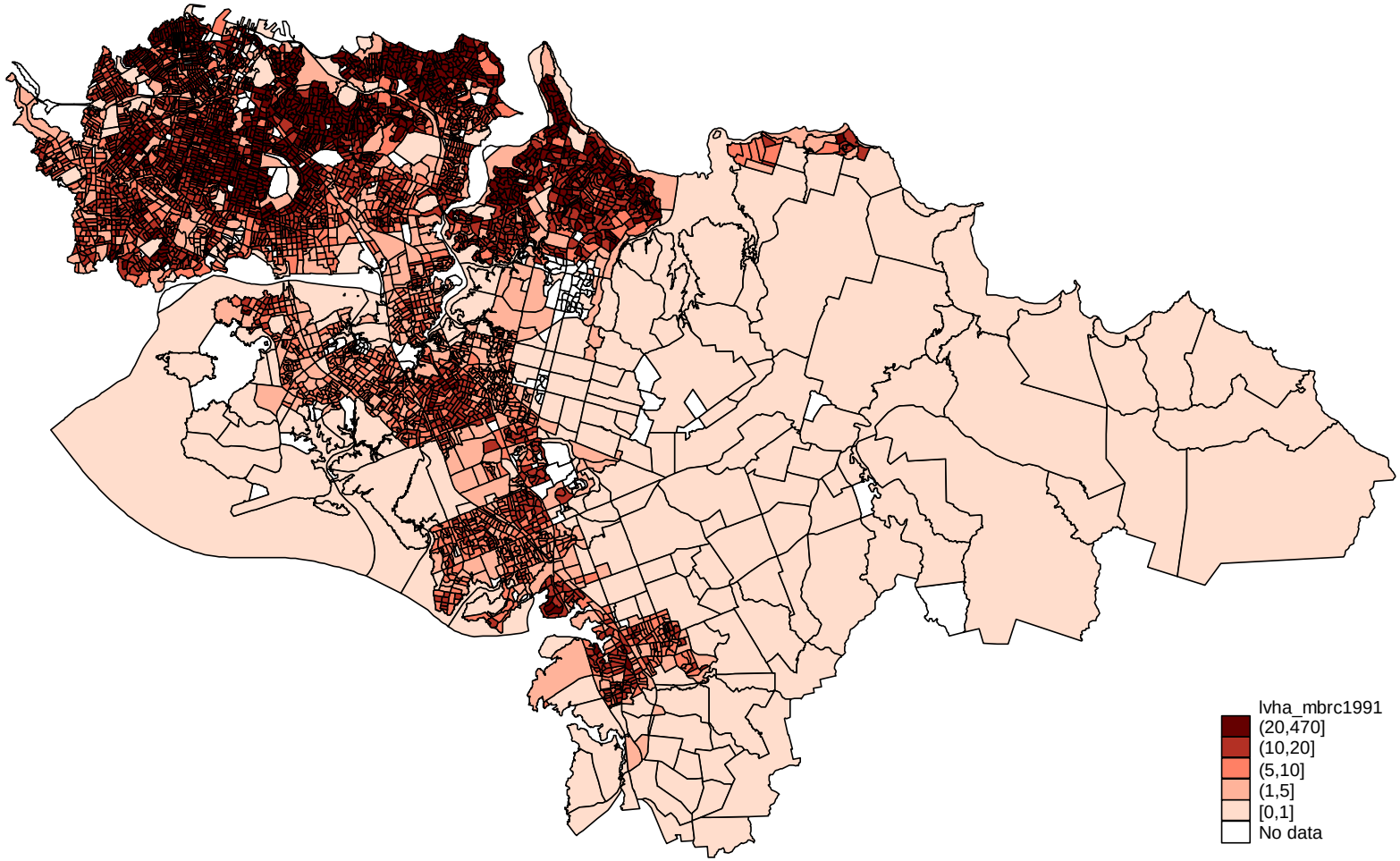
Rodney District



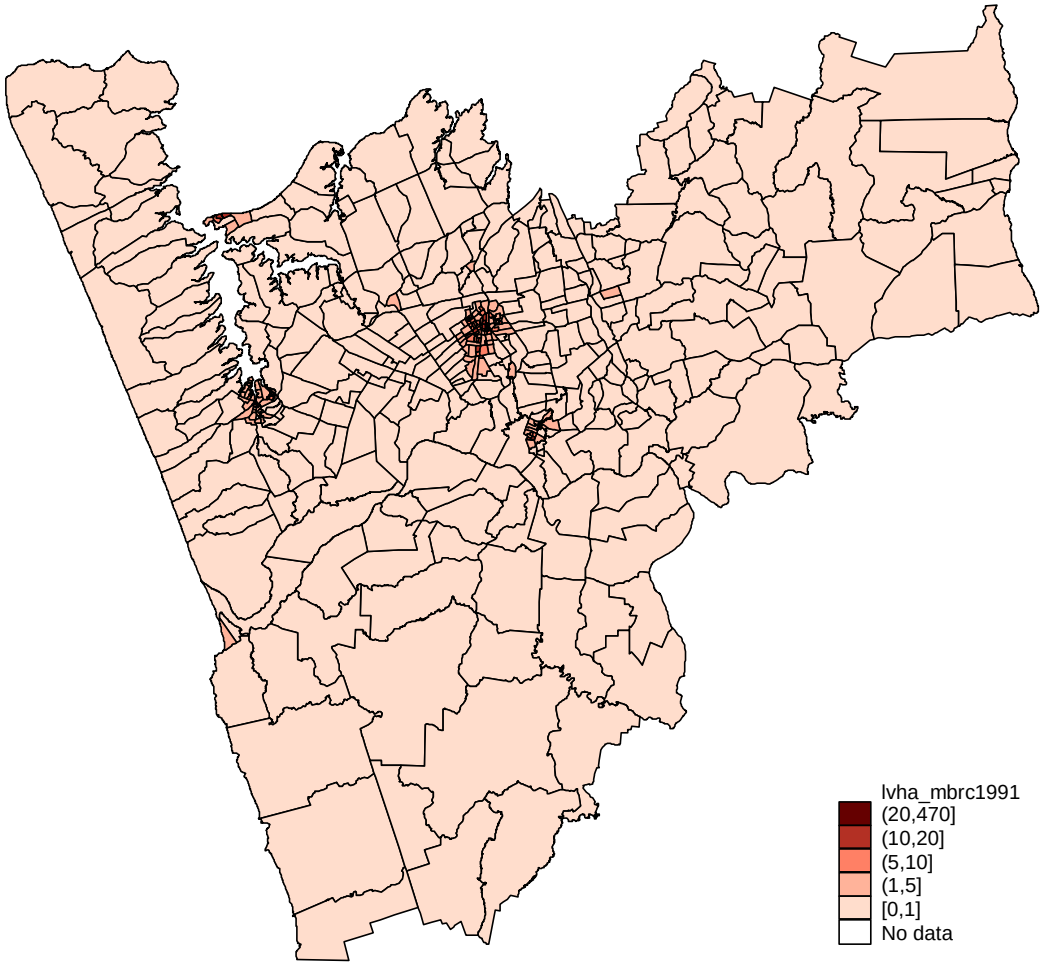
Waitakere City and North Shore City



Auckland City, Manukau City and Papakura District

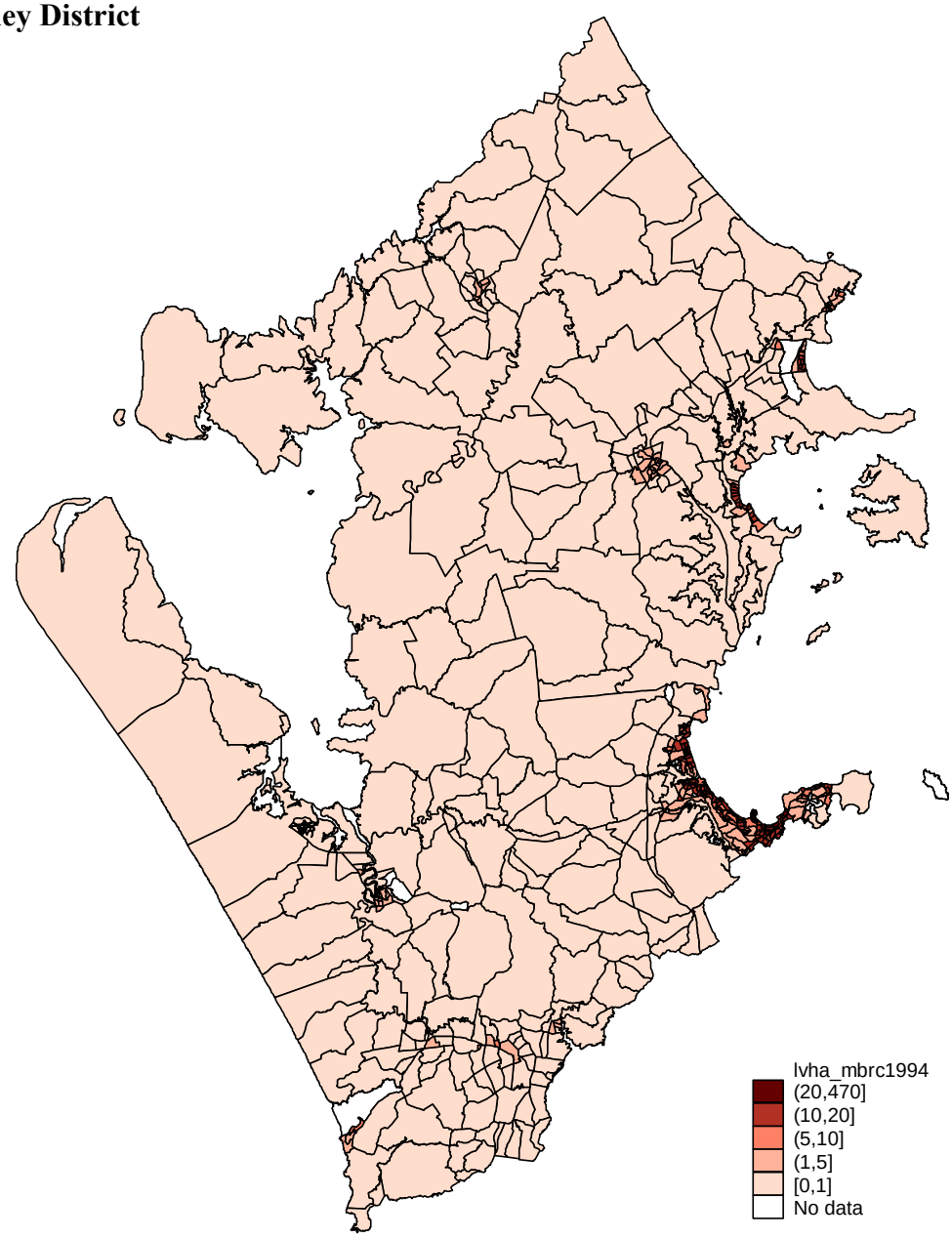


Franklin District

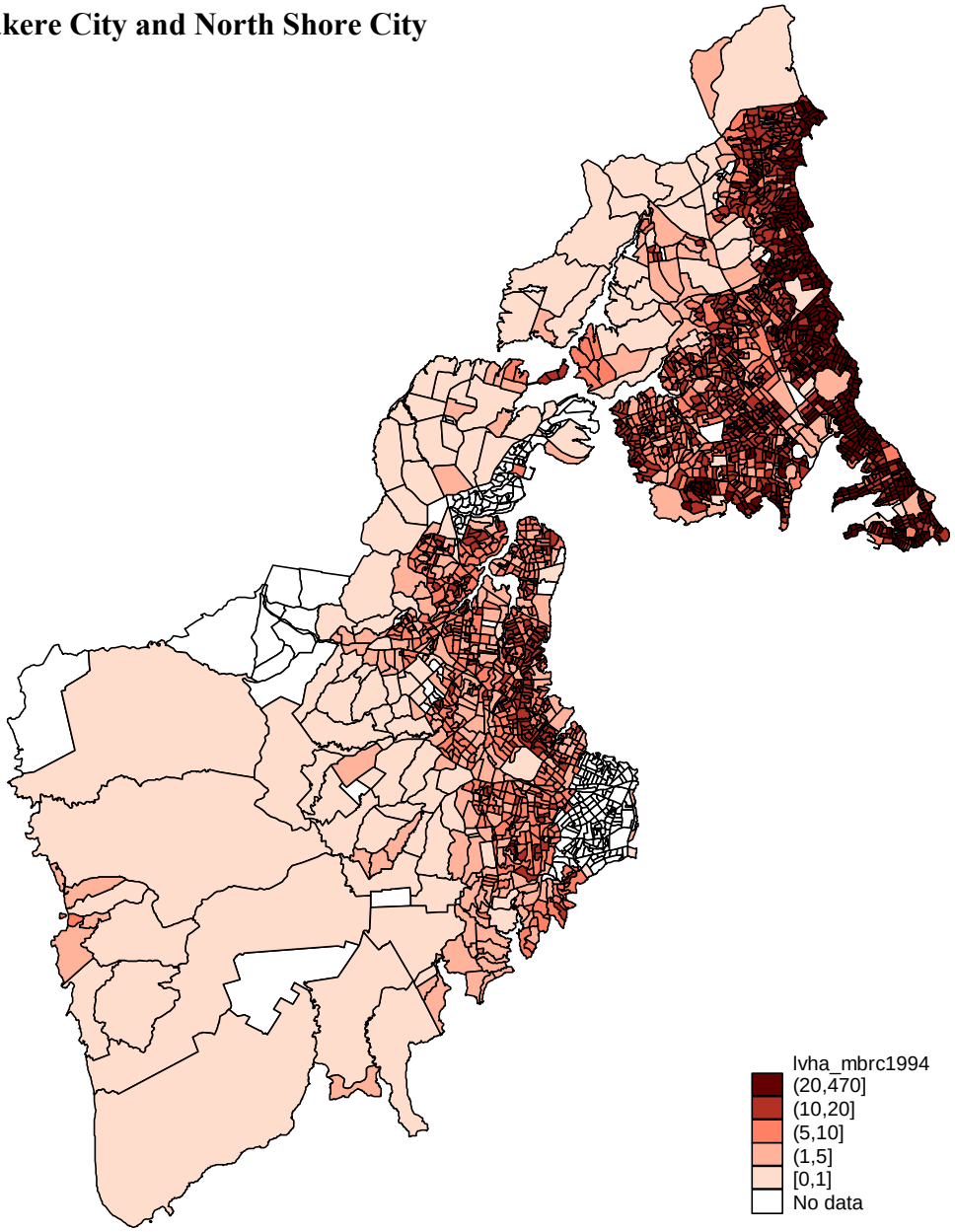


1994

Rodney District



Waitakere City and North Shore City



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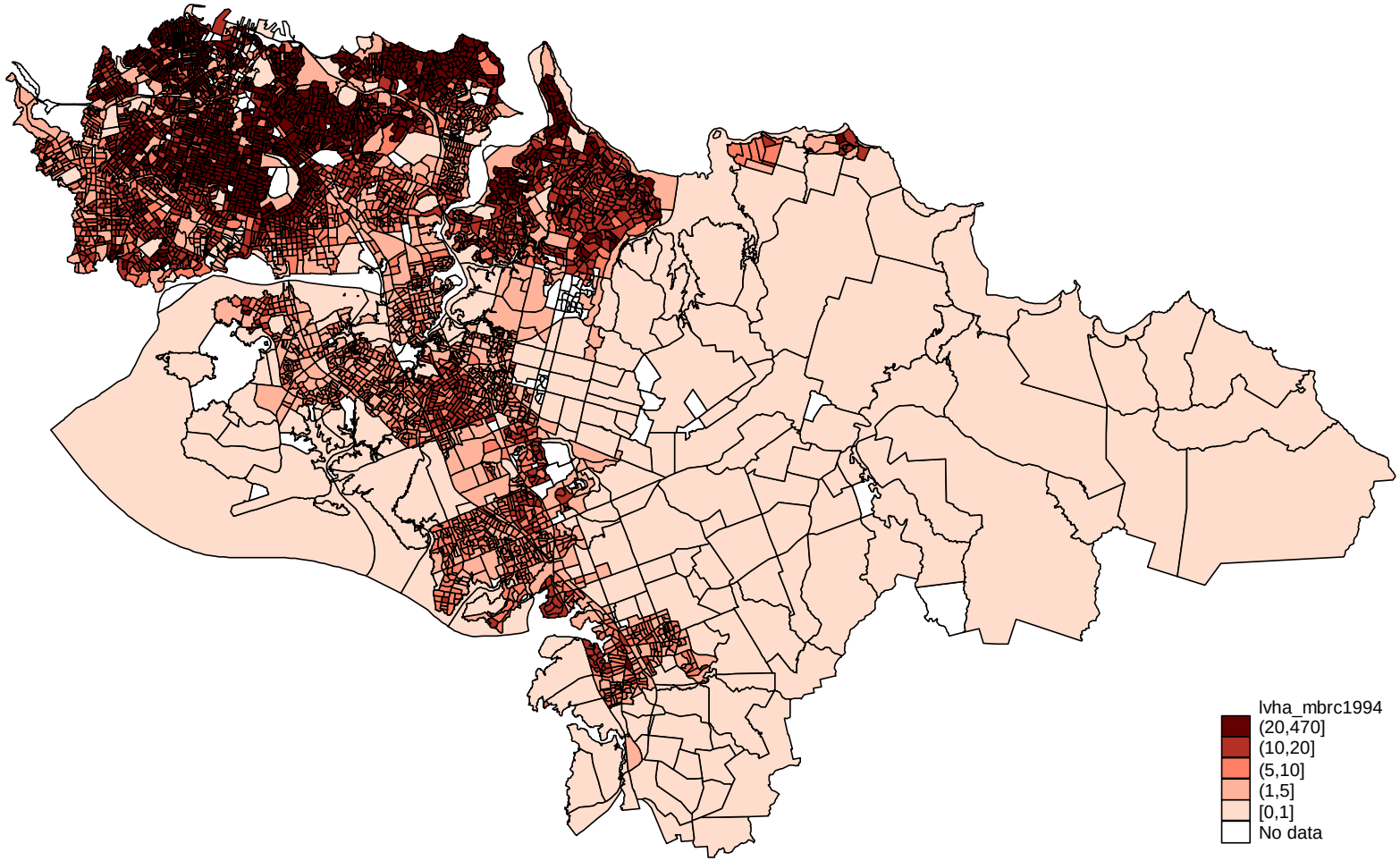
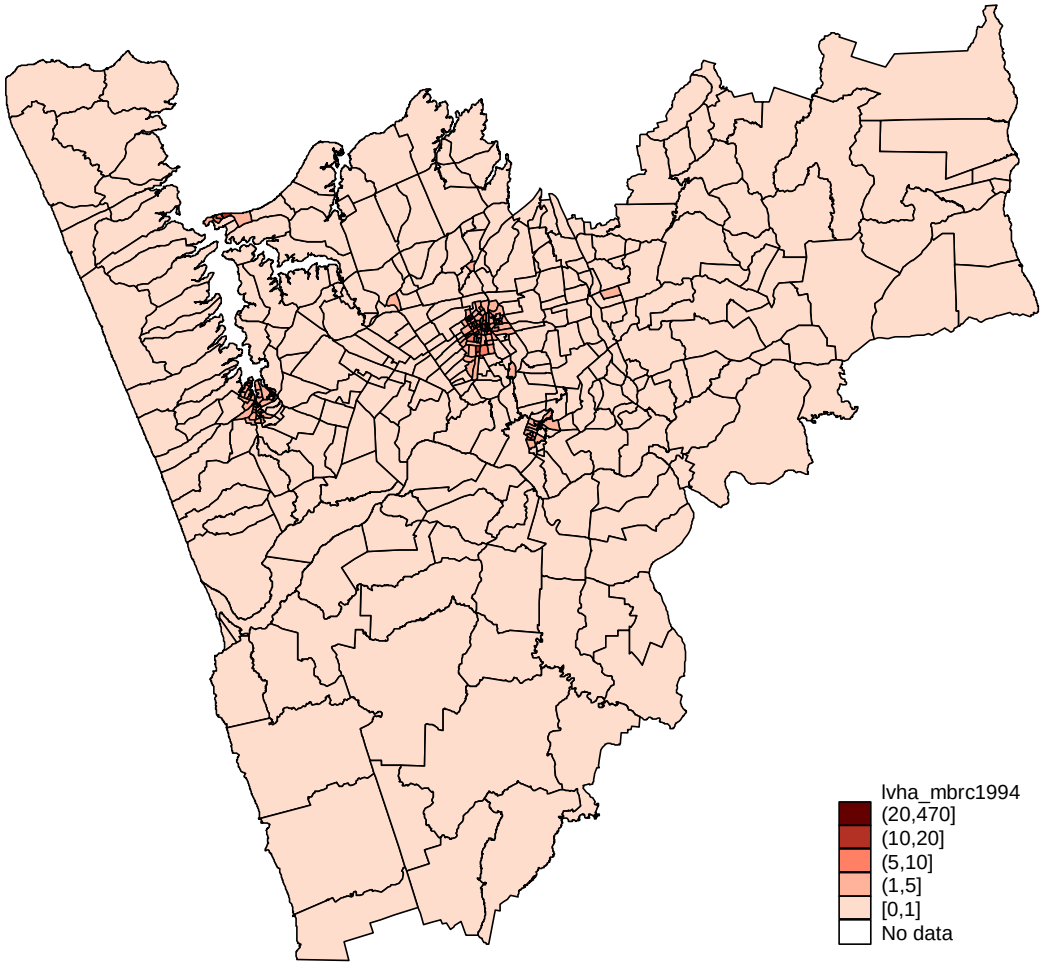
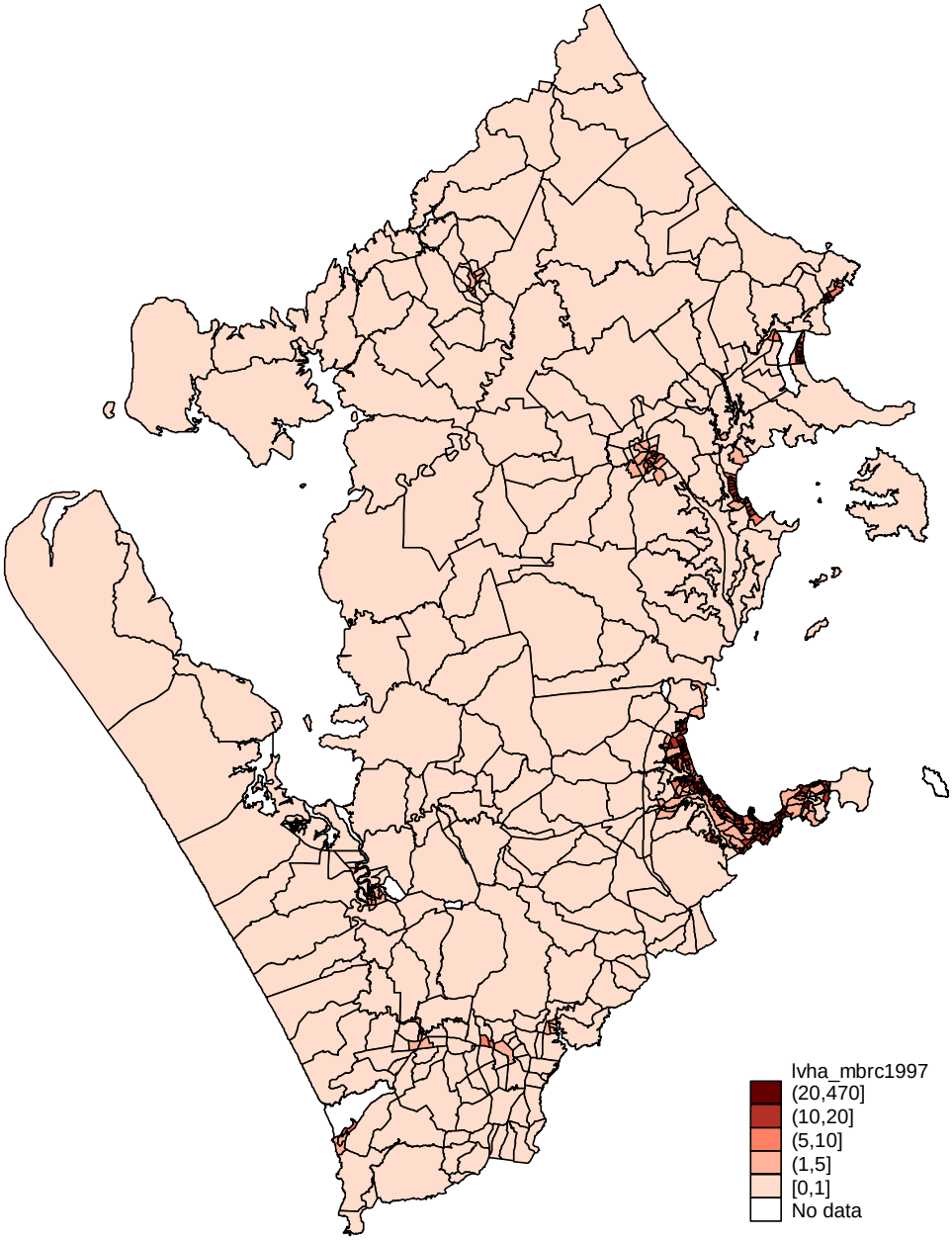


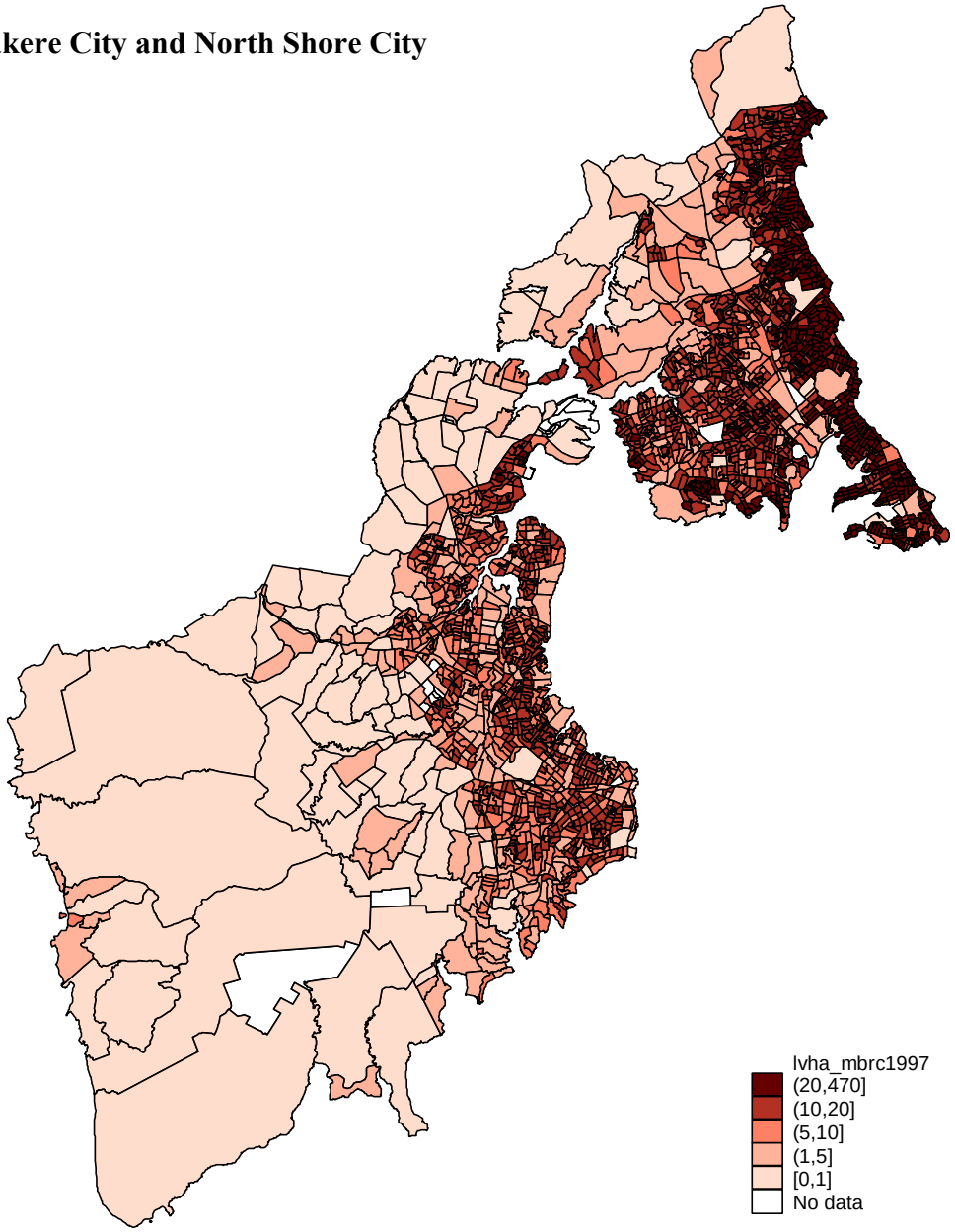
Franklin District



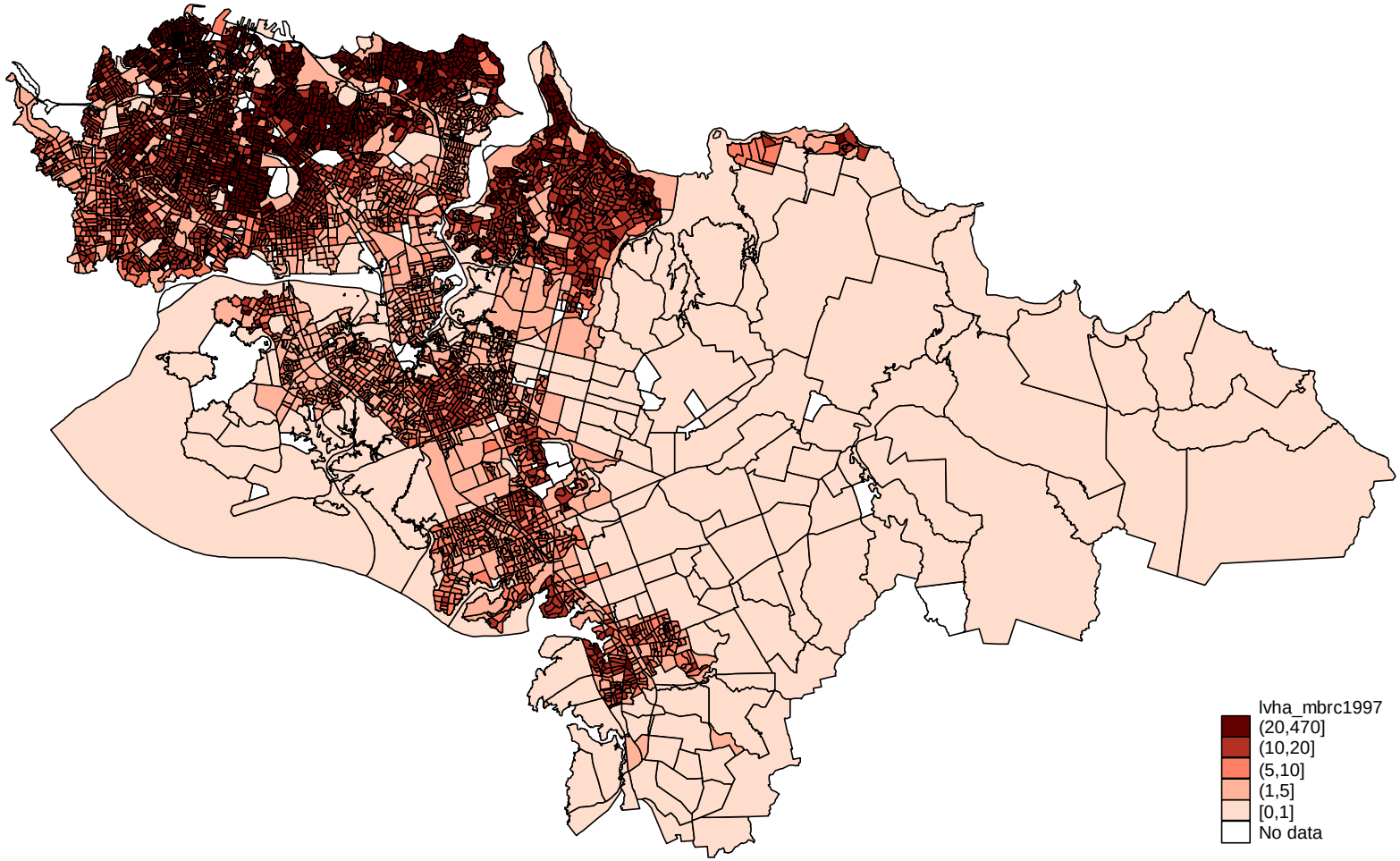
1997
Rodney District



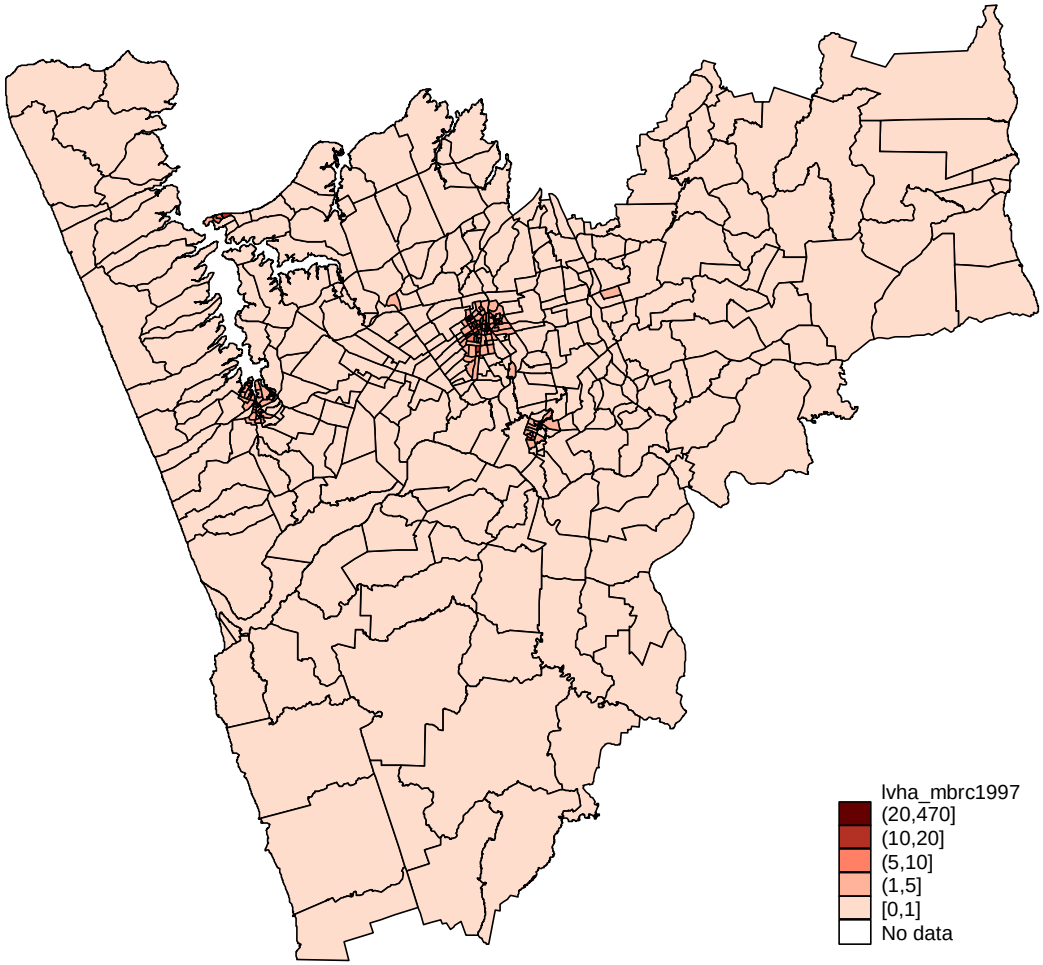
Waitakere City and North Shore City



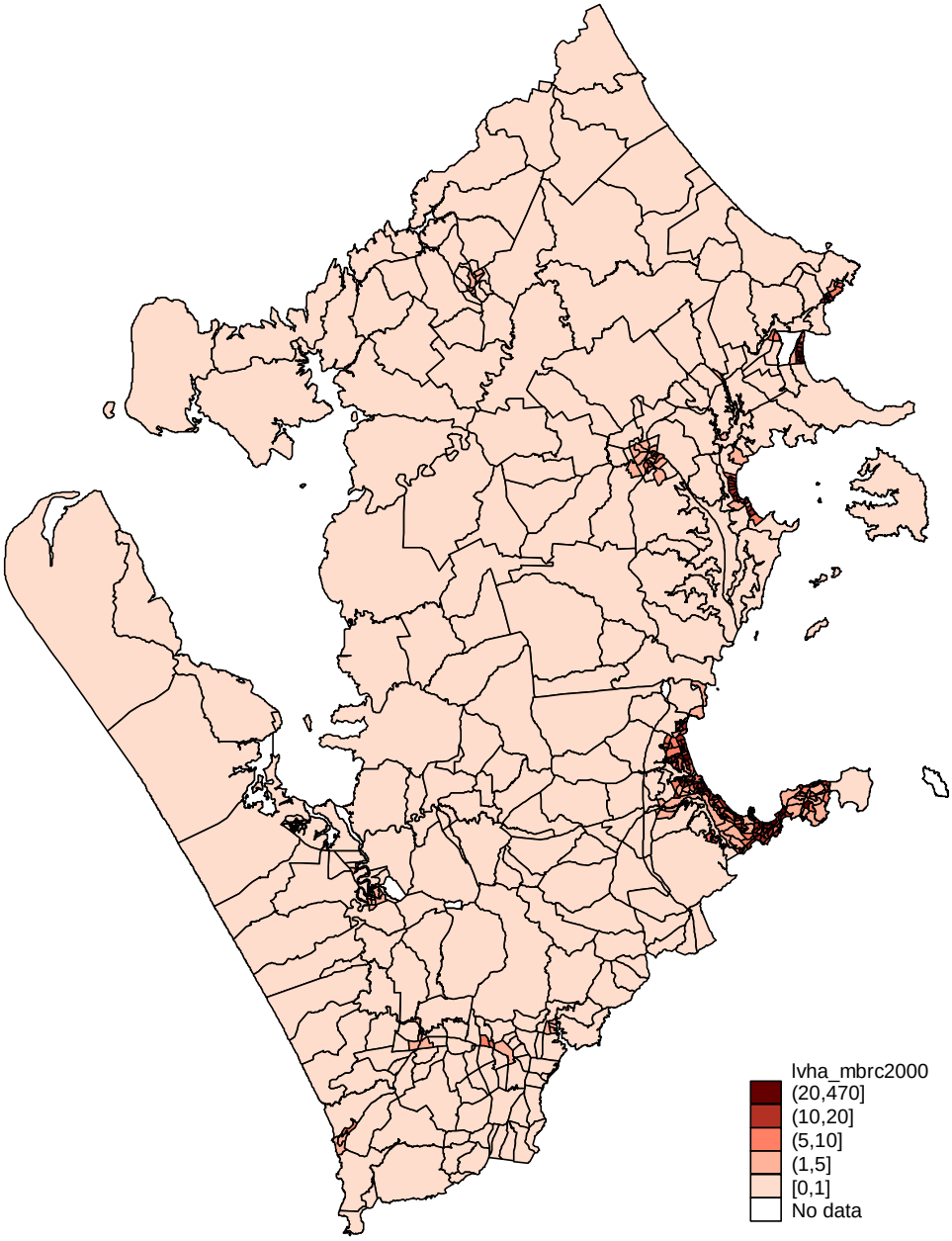
Auckland City, Manukau City and Papakura District



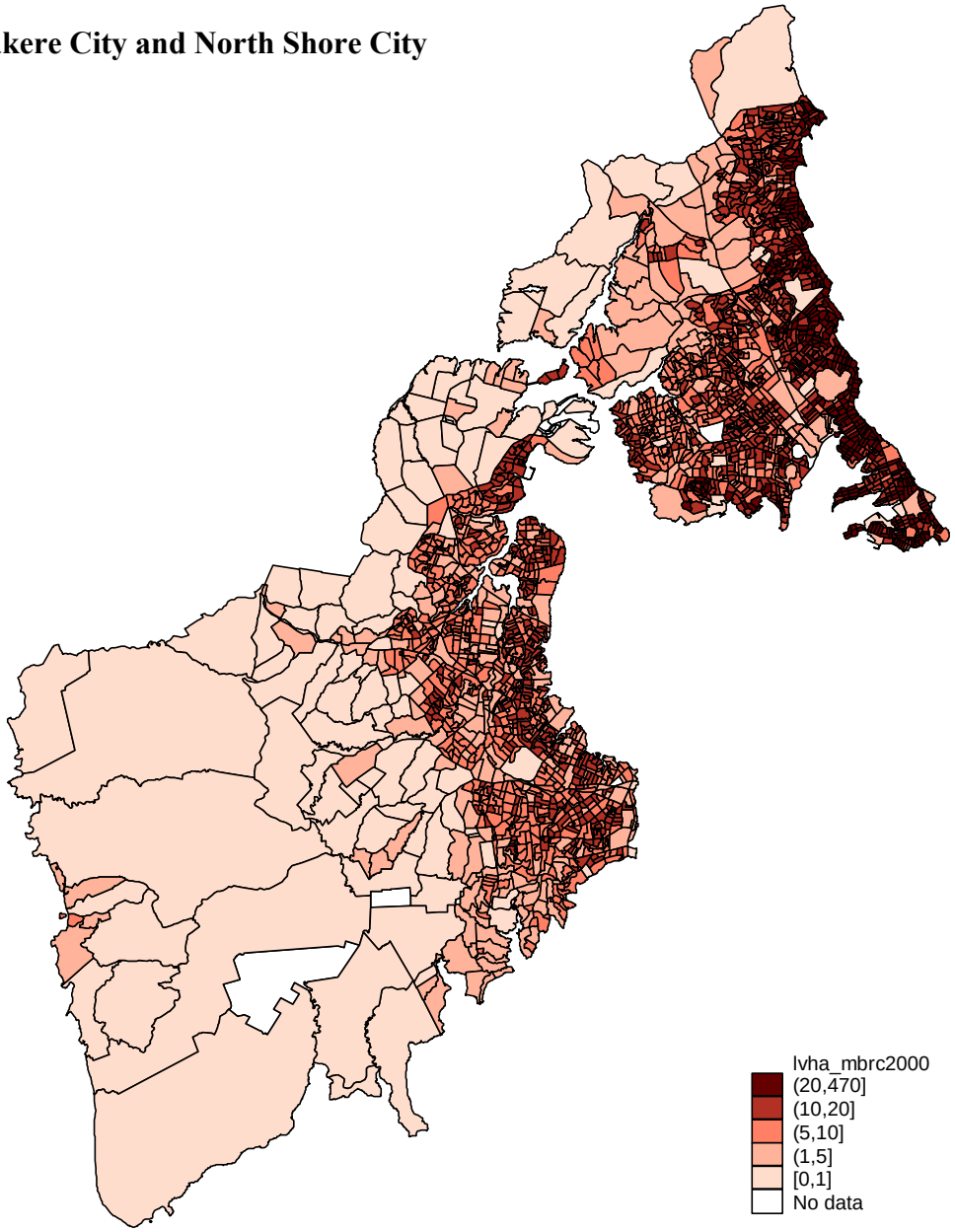
Franklin District



2000
Rodney District



Waitakere City and North Shore City



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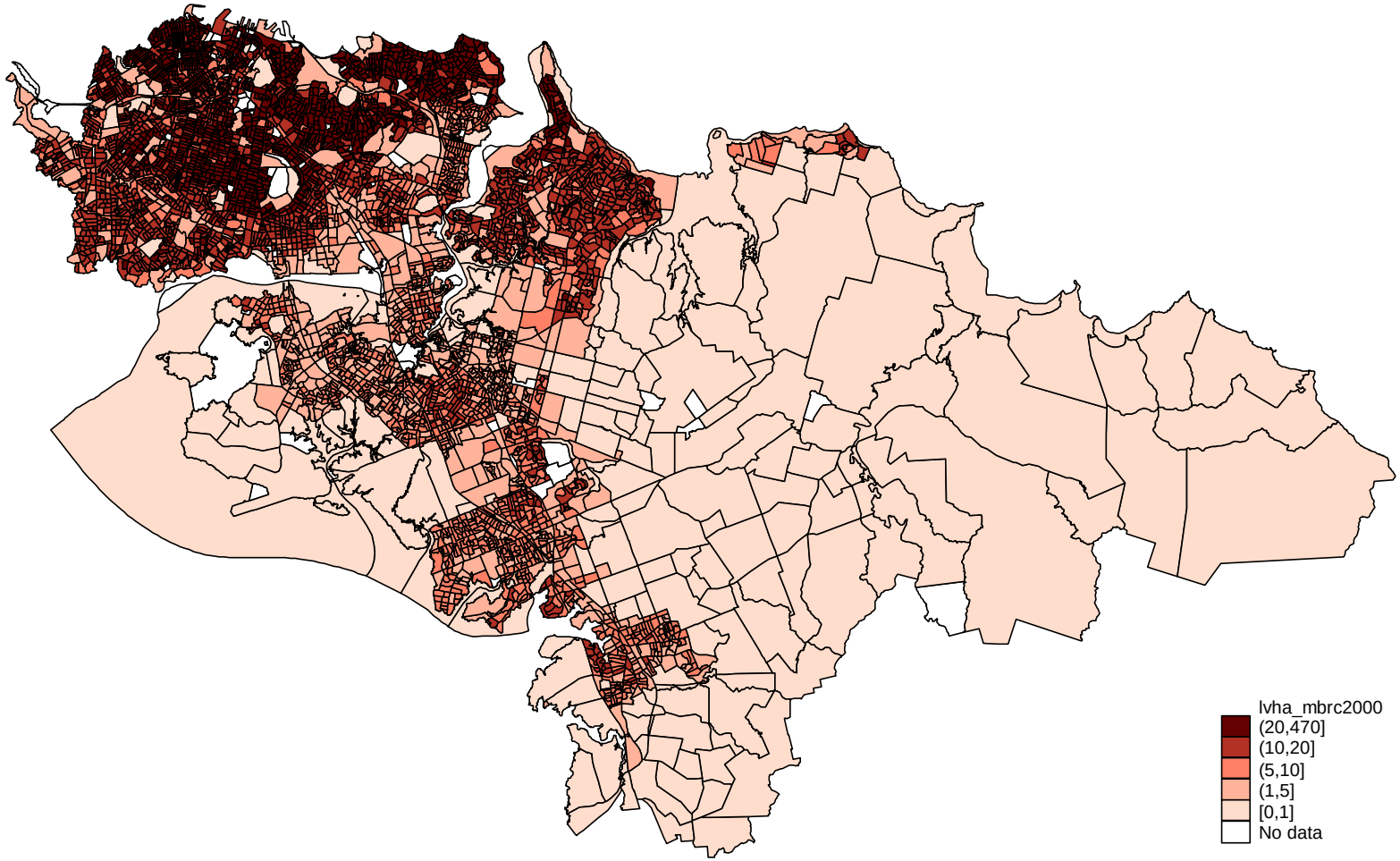
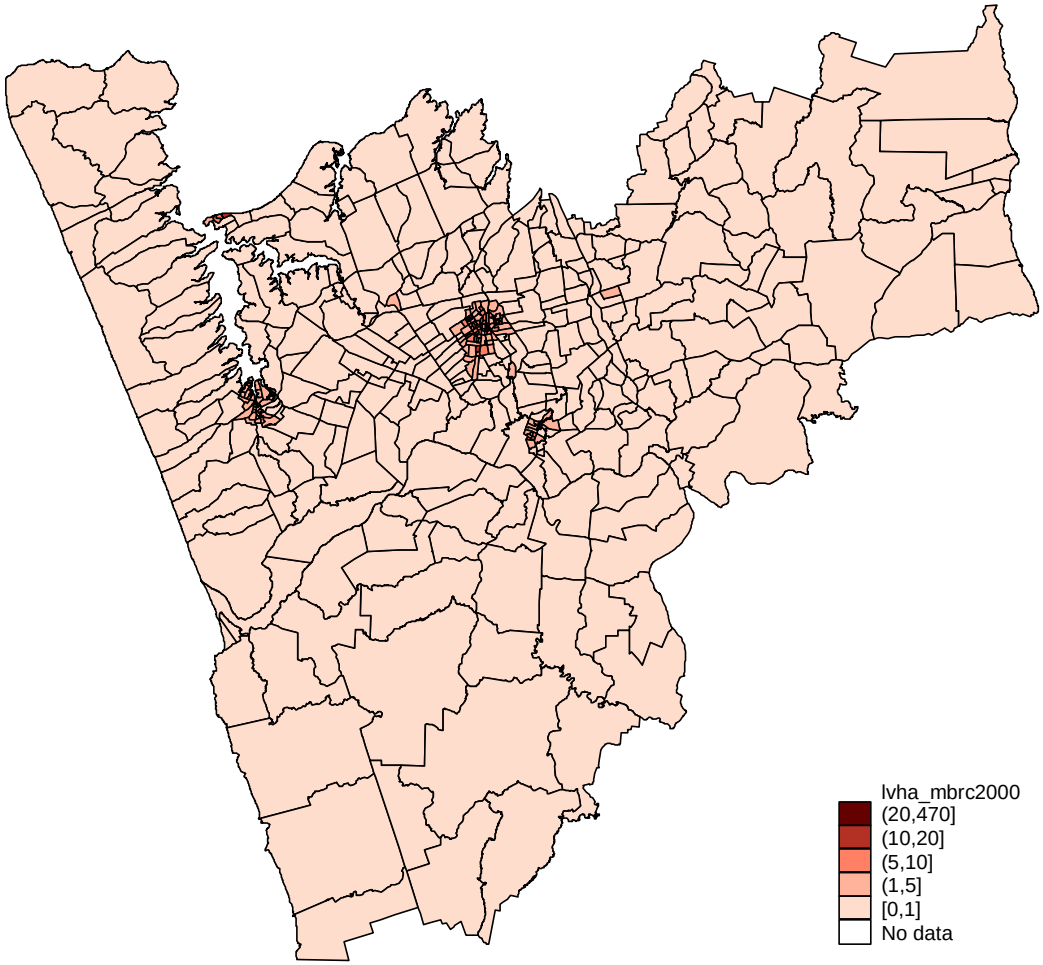
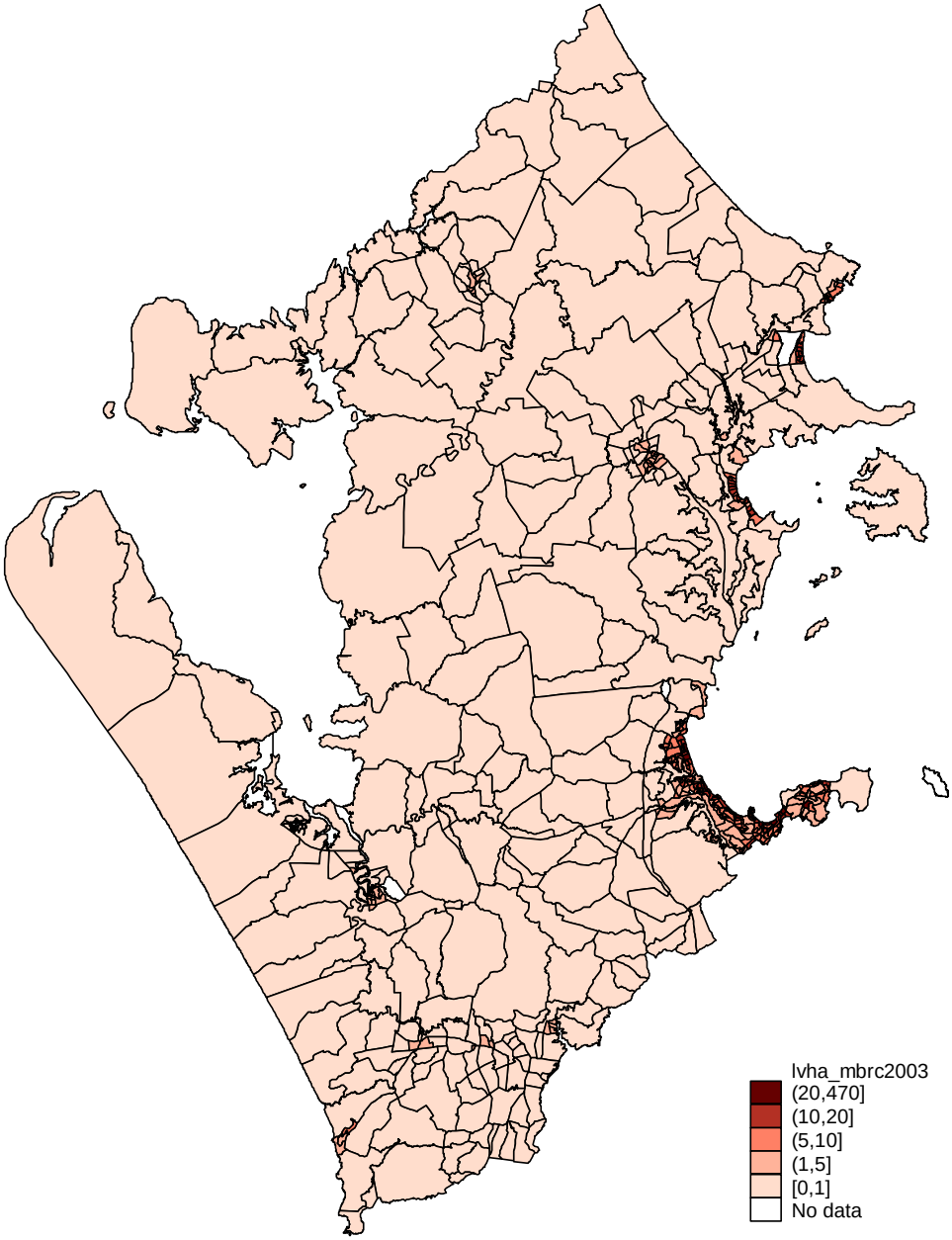


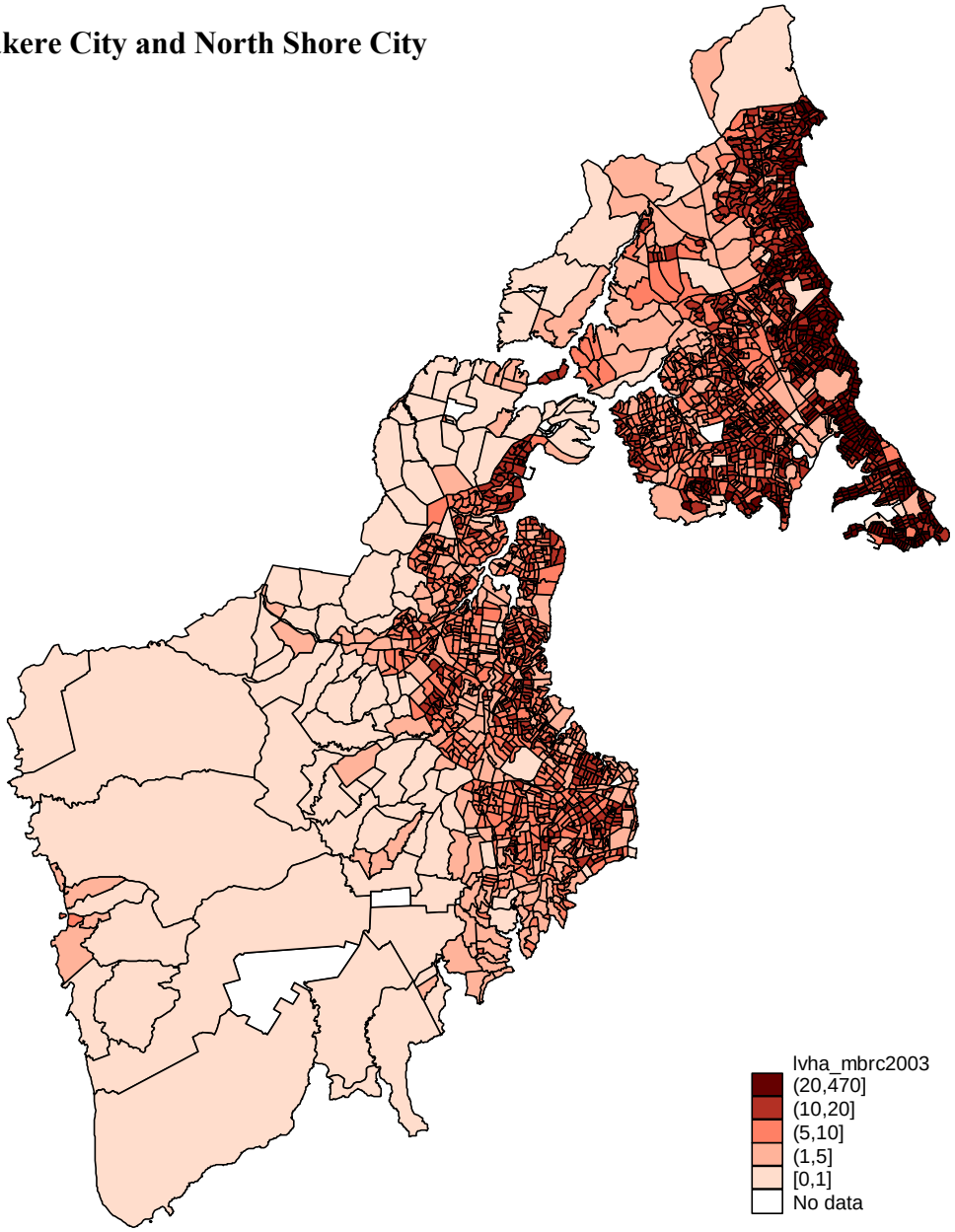
Franklin District



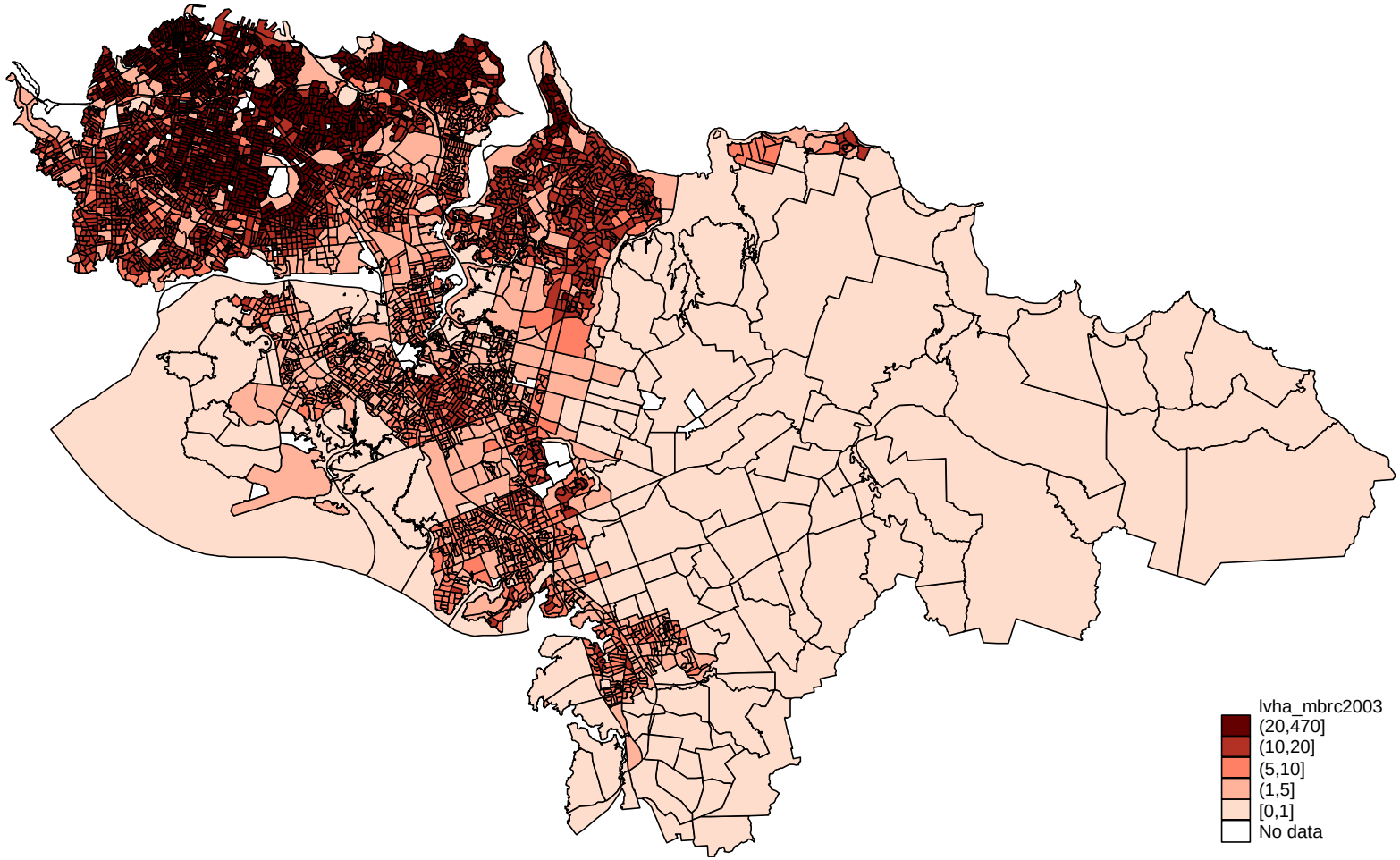
2003
Rodney District



Waitakere City and North Shore City



Auckland City, Manukau City and Papakura District



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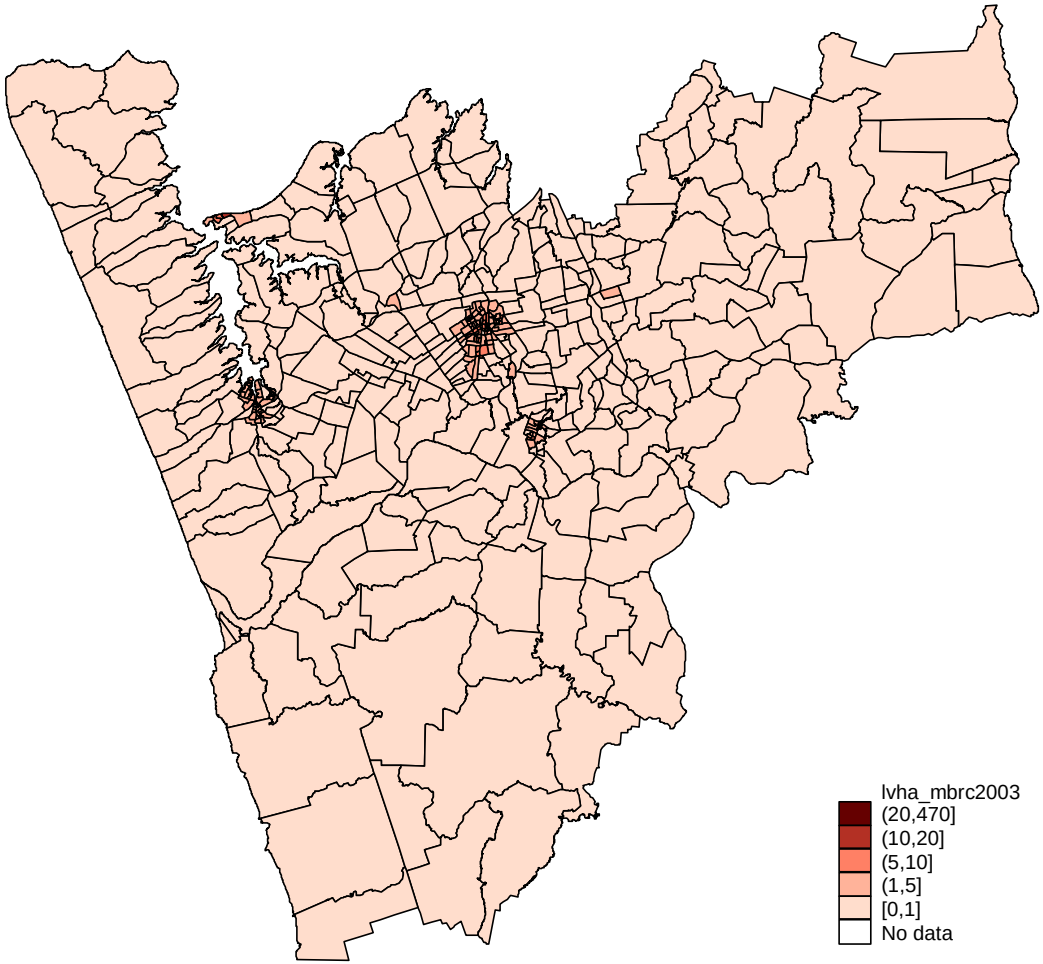

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