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# A Queensland Cartogram for Mapping by Postcode

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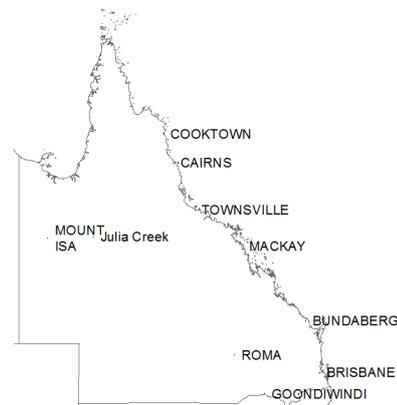
**W**arning: it is almost never a good idea to create maps using postcodes. In fact, I would say that it's always poor practice, unless you are mapping information used in conjunction with postal delivery - the purpose for which postcodes were created. Nonetheless, postcode maps will continue to be made where organisations choose to release their data with only this spatial reference. Therefore, a cartogram has been created to improve postcode based mapping when a Queensland state-wide view is required.

## Background

I am often asked by colleagues and clients to help map data of a 'sensitive' nature, such as disease incidence, hospital admissions, or other data where 'privacy' issues 'prevent' the release of more specific address location information. Postcode mapping is no longer required to preserve privacy, but more on that later. For now, we'll assume that your only spatial reference is a postcode and you want to make maps across the state of Queensland.

## Geographical Shape of Queensland

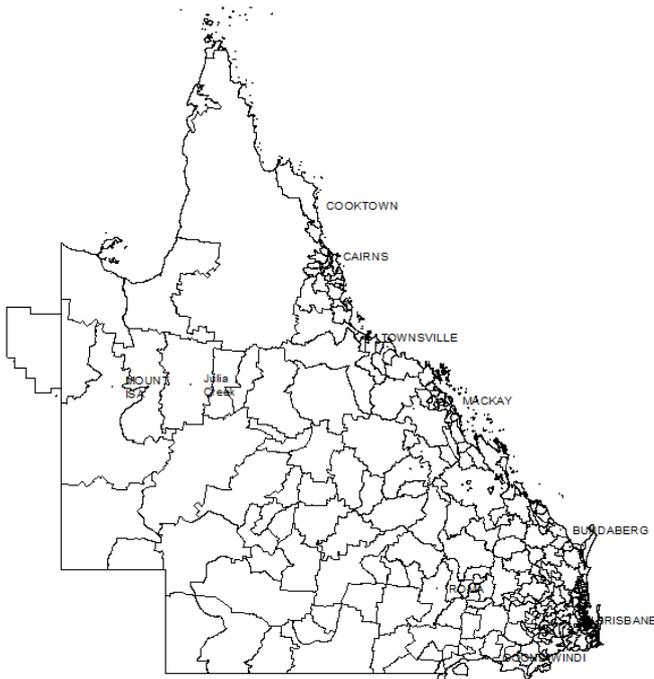
Queensland has a rather odd right-angle 'triangular' shape, pointy at the top, with a 'wing' sticking out of its left side and a rather rounded south-east corner (Figure 1). It is worth noting that most of the Queensland population is along the east coast, especially in the south-east corner, because this explains much of the postcode geography.



**Figure 1:** *The Australian State of Queensland has an odd quasi-triangular geographic shape, with most of its population along the east coast, especially the south-east corner.*

## Queensland Postcodes

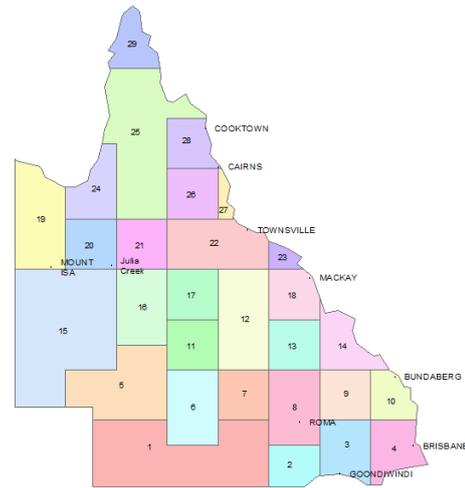
The postcodes in Queensland vary inversely in their geographical size with the size of the population. Therefore, rural postcodes have a much larger area than urban postcodes. The end result when mapped on a state-wide basis is that it is difficult to 'see' any of the urban postcodes nor any data they might contain (Figure 2). It is also notable that the number of postcodes, their shape and size vary over time, which is an unnecessary variable in multi-year mapping.



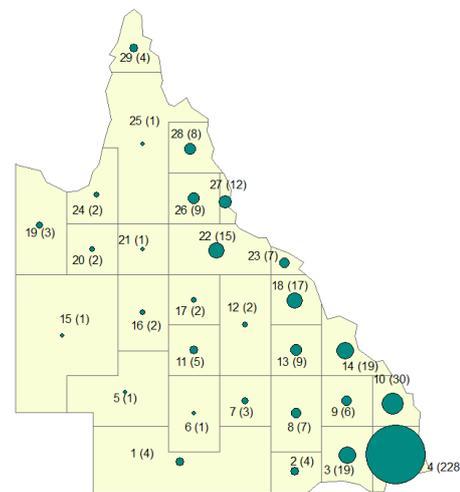
**Figure 2:** Queensland postcode geography is such that the density of postcodes in larger urban areas means that at the state level, much of the population is not visible. Note also that in 2011 one postcode crosses the state border into the Northern Territory.

## Queensland Postcode Cartogram

The Queensland postcode cartogram presented here (Figure 3), aggregates the postcodes to larger and more regular geographical areas to allow for a more robust geographical visualisation. To achieve this 'more regular' geography the cartogram is designed with uneven spread in the number of postcodes (Figure 4). Note that while cartograms often distort the geographical shape of areas to show proportionality, this cartogram retains the distinct original geographical shape, instead distorting the distribution of postcodes.



**Figure 3:** The Queensland geographic cartogram has 29 more-or-less 'regularly' defined and labelled regions.



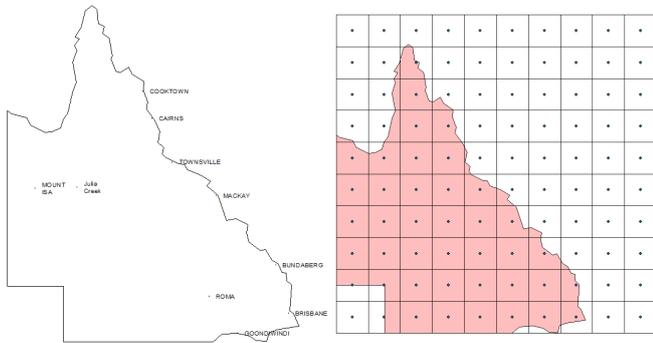
**Figure 4:** Distribution of Queensland postcodes across the state follows the population density pattern. Note that the (number) following the area ID is the count of postcodes.

## Method used to create the cartogram

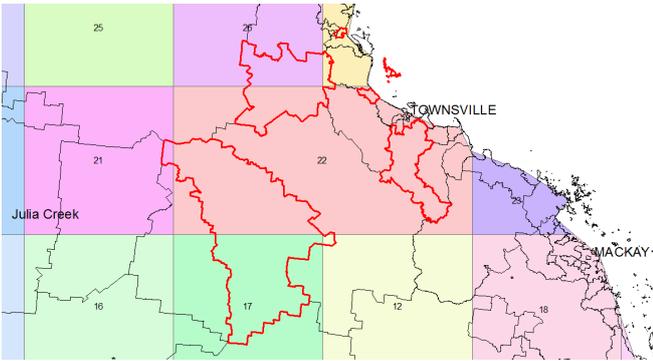
The first component of the cartogram is a simplified shape (Figure 5a), which was created using a free online tool called Map Shaper ([www.mapshaper.org](http://www.mapshaper.org)), although there are numerous tools available to facilitate the 'thinning' of lines to create simpler shapes.

The second most important feature of the cartogram was the creation of a 'fishnet' to provide the underlying pattern of the cartogram areas (Figure 6). This grid was laid across the state so that it aligned with the west and southern most borders of Queensland (Figure 5b).

This fishnet grid was then modified in order to not split postcodes across the new cartogram areas. Of course regular grids will never perfectly capture



(a) Create simple shape. (b) Create fishnet.



(c) Postcode 4816 (red outline) is a good example of why you shouldn't be mapping data using postcodes, not only is it cover a huge area, it is composed of several non-contiguous parts. In this case, the generalisation was to map 'this' postcode to cartogram area 22.

Figure 5: Queensland cartogram development.

irregular postcode boundaries, and postcode 4816 is a classic case in point (Figure 5c).

### Using the cartogram

This cartogram is a simplified polygon map of the State of Queensland with 29 separate areas replacing the 431 postcode area from 2006 (and 424 postcodes from 2011). Note that postcode boundaries are regularly updated and therefore change over time. To use this cartogram:

1. Make sure your spreadsheet of data has a unique postcode for each row/record of data. Join this to an appropriate postcode feature class file (POA\_Carto\_Trans2006 or POA\_Carto\_Trans2011), which has the cartogram area ID field.
2. Summarise and Join this table to the cartogram feature class file.
3. Now you are able to create cartogram maps based on the Queensland postcodes.

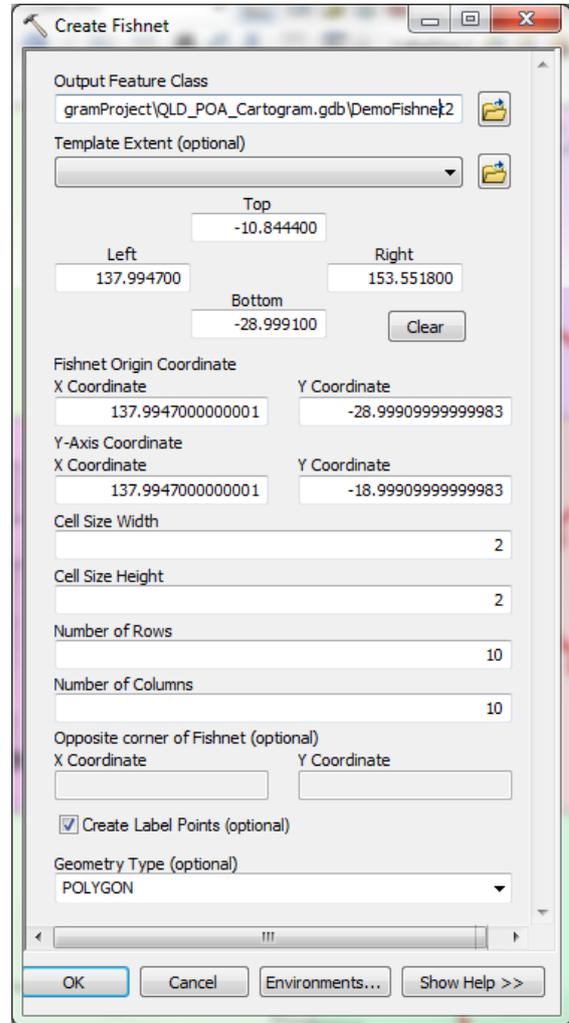


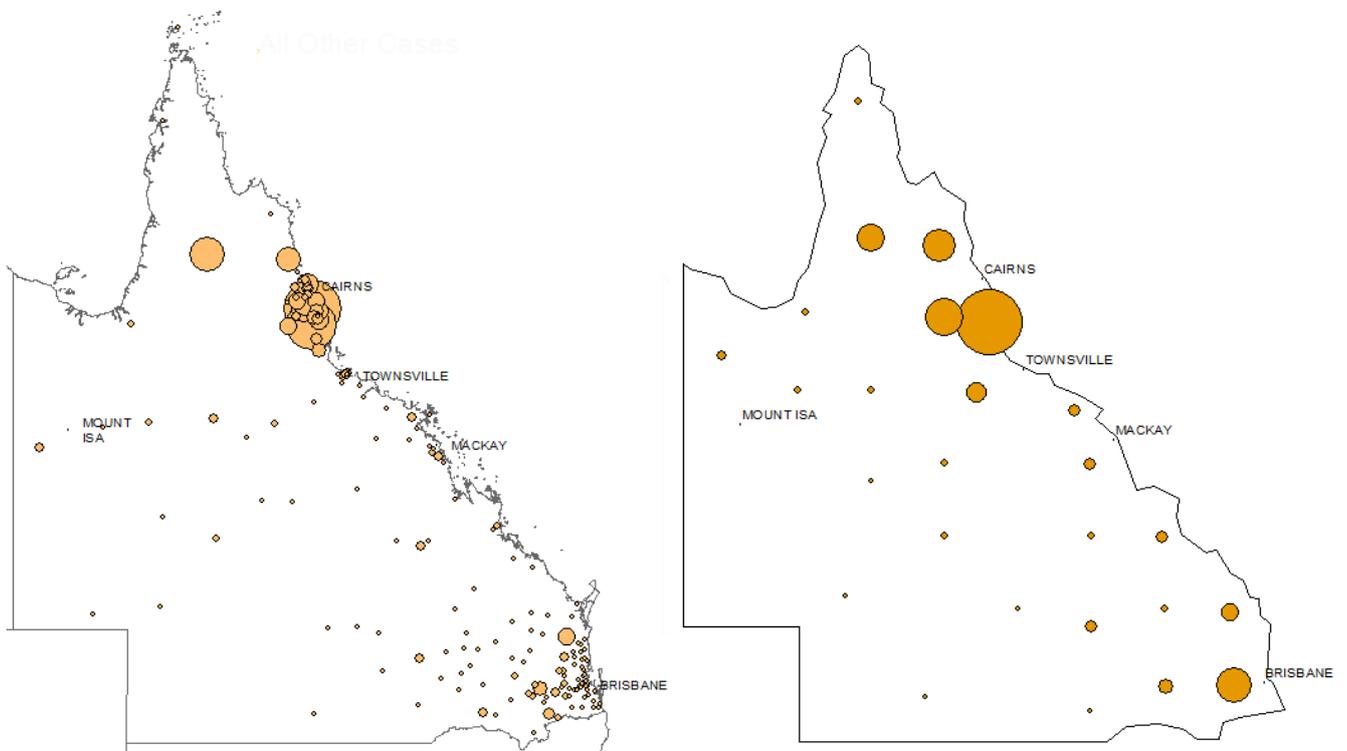
Figure 6: A 'Fishnet' grid can be created in ArcGIS Basic using the Create Fishnet tool under Data Management in the ArcToolBox.

### Health Sector Example

The same health sector data is mapped here by postcode (Figure 7a) and using the cartogram (Figure 7b). Note the differences between these two representations of the same information. Direct postcode mapping puts the proportional symbol (in this example) in the centre of the postcode area, which will be more positionally accurate than the cartogram.

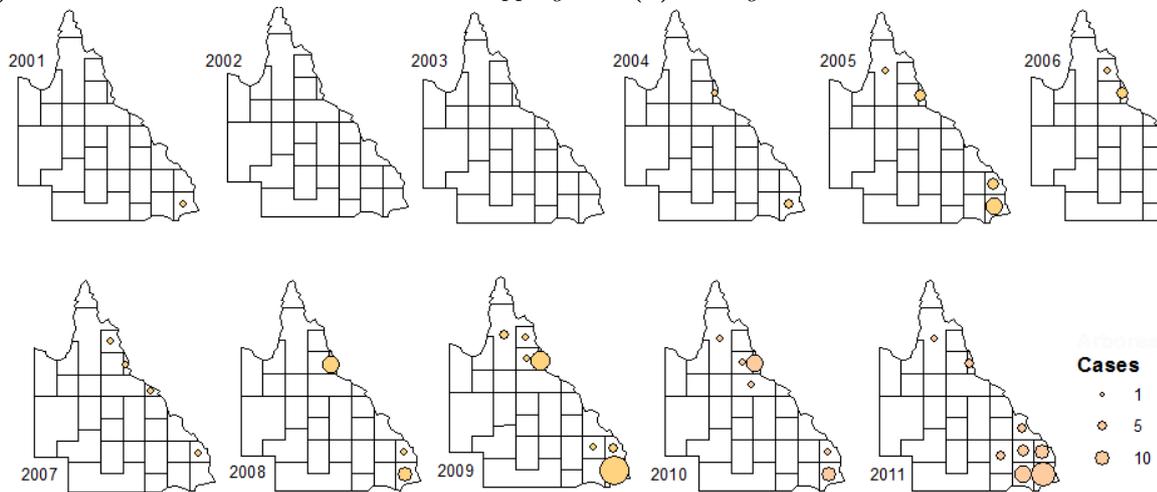
However, the point of the cartogram is not positional accuracy - it is to represent the overall distribution of disease incidence across the state. Although exactly the same data are displayed, the cartogram presents the state-wide picture more clearly.

The visual clarity of the cartogram over direct postcode mapping is even more evident when you want to show change over space and time (Figure 7c).



(a) Postcode-based disease incidence data mapping.

(b) Cartogram-based disease incidence data mapping.



(c) Cartogram-based health data mapping over 11 years.

**Figure 7:** Queensland cartogram applied to the incidence of a particular disease across the state as compared with direct mapping of postcodes.

## Beyond Postcode Mapping

If you are stuck with postcodes for now and need to make your Queensland-wide maps, then this Postcode Cartogram should help you do that more clearly. Furthermore, if you need to map a time-series of data, then this cartogram provides the really only practical way of mapping Queensland-wide postcode data.

However, if you are thinking longer-term, you need to move your mapping away from postcodes. There is no future in using postcode areas as your primary georeference. Instead:

1. Start with addresses and geocode them to specific X,Y points;
2. With X,Y point datasets you can aggregate to whatever area you wish; or better yet,
3. Create a continuous surface representing the density of observations, for example using the popular Google 'heat'-map approach.

There are now many methods of representing spatial data, even sensitive data, without having to use the problematic and very flawed postcode approach.

## Further Help

Please get in touch with Chris Skelly at GIS People to help with your spatial analytic and mapping needs. We specialise in helping organisations build their own spatial capability and capacity.



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