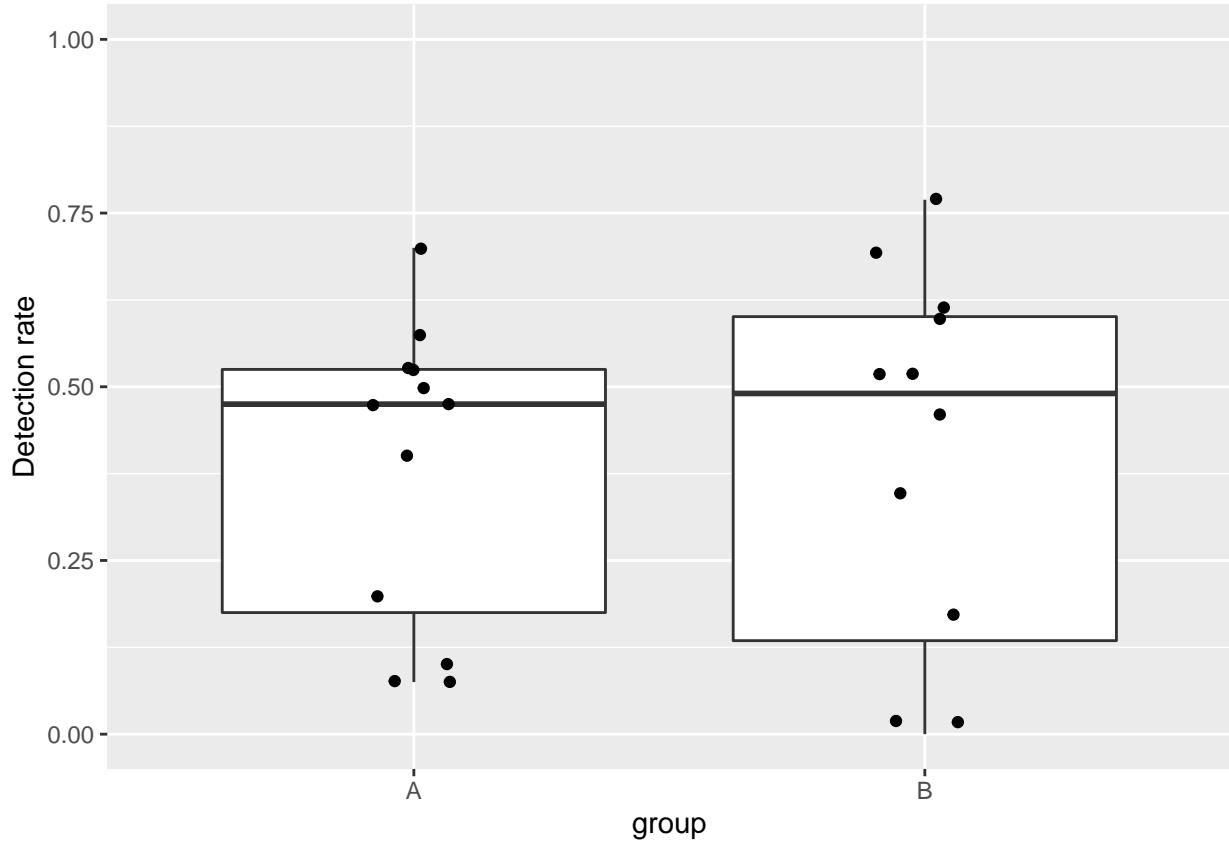


# Visual Inference Lineups

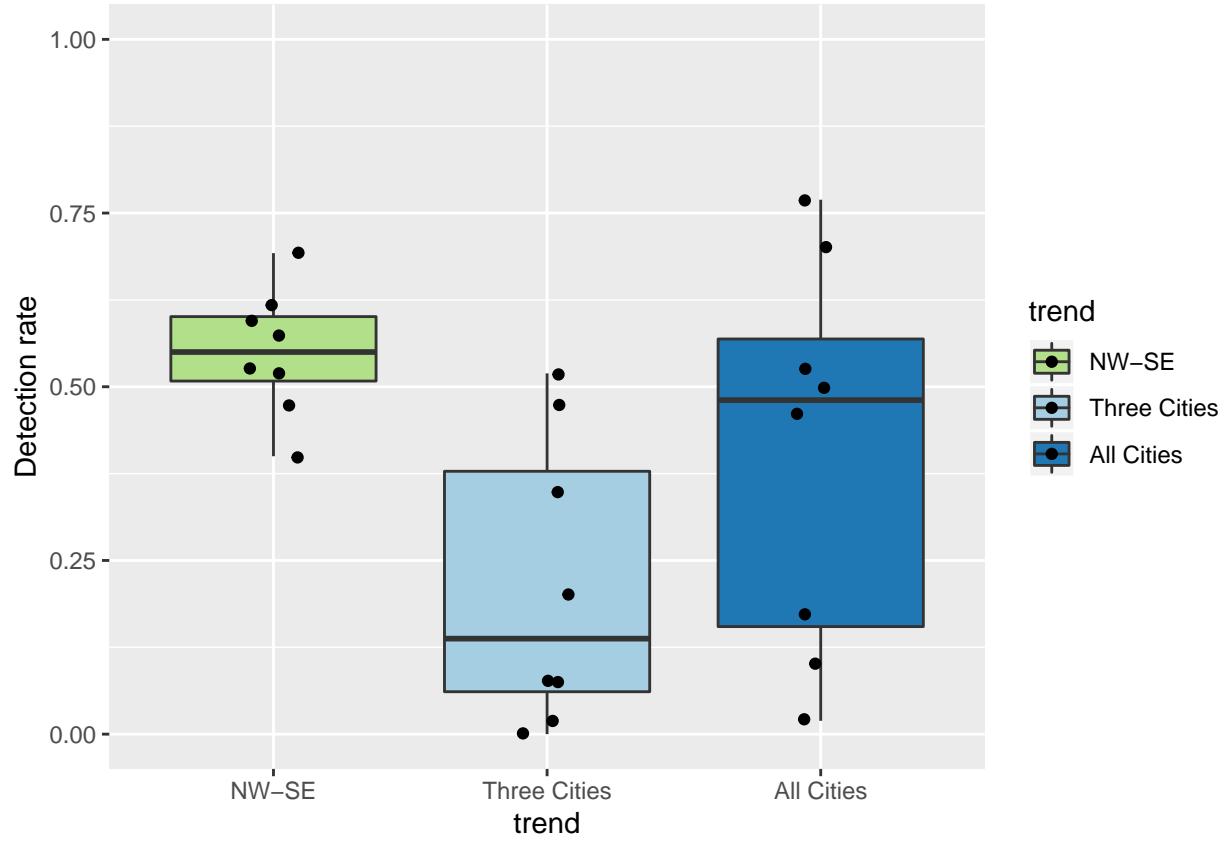
Stephanie Kobakian and Dianne Cook

## Overall Performance

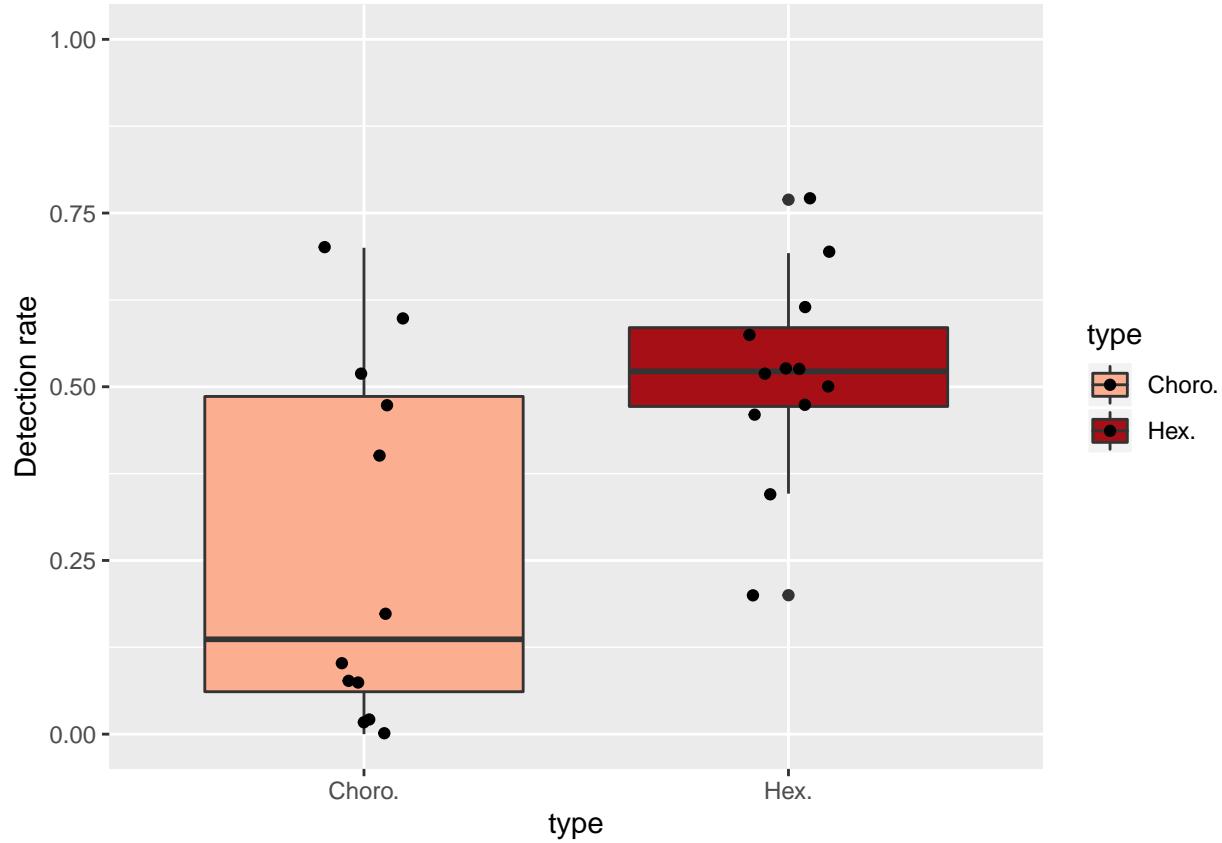
The detection rate is considered for each lineup. The detection rates for group A were less varied than the detection rates for the lineups seen by group B. Fig. ?? shows the distribution using a boxplot. This shows the median value for detection rate was extremely similar.



The overall detection rate is considered for each trend model in Fig. ???. The detection rates for the NW-SE trend model was less varied than the detection rates for the Three Cities and All Cities trends. Fig. ?? shows the distribution using a boxplot. This shows the distributions of the rates do not overlap for NW-SE and Three Cities trends, the Three cities range was larger, but the median was much higher for the NW-SE trend. The All Cities trend model distribution overlaps with the NW-SE and All Cities trends.



The boxplots in Fig. ?? contrast the distribution of the detection rates for each type of display. The detection rates across the lineups were less varied for the hexagon display. There was a large difference in the medians for the types of displays. Without considering the relationship for each lineup, the hexagon lineup display allowed the participants to achieve higher detection rates.



## Lineups

Each lineup had twelve map displays, this gave participants the choice of any plot, and the choice to not provide a response. This non-response is indicated by 0. The choices made by participants are displayed in Fig. ???. The height of each orange lollipop indicates the proportion of participants that selected the map display of real data, they represent the correct choices. The green lollipops show the proportion of participants that selected the incorrect displays in each lineup.

The proportion of choices are also presented separately for each trend model in Table. 1, Table. 2, and Table. 3. The correct map display in lineups with a North West to South East trend was chosen correctly with much greater frequency. In the lineups of All Cities displays, participants were misled by the choropleth display, but not the hexagon display for all except (2). All of Three Cities displays, except (4), were detected in the hexagon display. All except one lineup had at least one participant select the correct map in the lineup as shown in Fig. ??.

## Lineups

### North West - South East

The same data set is visualised in both displays, the difference is the land area of each SA3 is coloured in the choropleth and the hexagon representing the SA3 is coloured in the Hexagon Tile Map.

Lineups were created using the Australian Statistical Areas at Level 3.

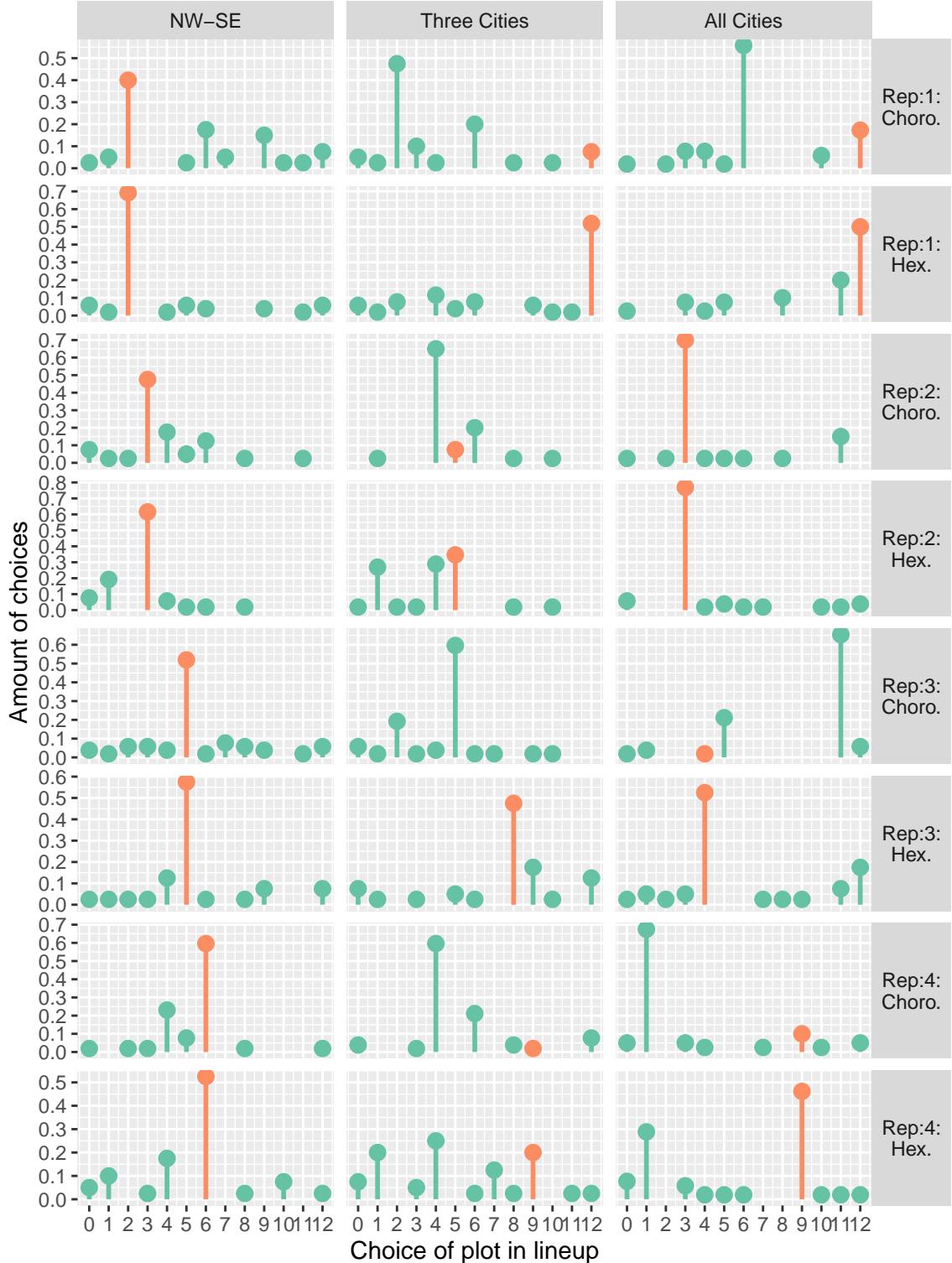


Figure 1: Each facet is associated with one lineup, the height of the points show the proportion of the participants that made each choice when considering each lineup. The points coloured orange show the map which contained a trend model, these are the correct choices. The numbers differentiate the replicates of each trend model and type of map display. Participants were able to select 0 to indicate they did not want to choose a map.

Table 1: The proportion of participants who selected each of the twelve map choices in each lineup for NW-SE displays.

| Rep | Type   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|-----|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1   | Choro. | 0.02 | 0.05 | 0.4  | 0    | 0    | 0.02 | 0.18 | 0.05 | 0    | 0.15 | 0.02 | 0.02 | 0.08 |
|     | Hex.   | 0.06 | 0.02 | 0.69 | 0    | 0.02 | 0.06 | 0.04 | 0    | 0    | 0.04 | 0    | 0.02 | 0.06 |
| 2   | Choro. | 0.08 | 0.02 | 0.02 | 0.48 | 0.18 | 0.05 | 0.12 | 0    | 0.02 | 0    | 0    | 0.02 | 0    |
|     | Hex.   | 0.08 | 0.19 | 0    | 0.62 | 0.06 | 0.02 | 0.02 | 0    | 0.02 | 0    | 0    | 0    | 0    |
| 3   | Choro. | 0.04 | 0.02 | 0.06 | 0.06 | 0.04 | 0.52 | 0.02 | 0.08 | 0.06 | 0.04 | 0    | 0.02 | 0.06 |
|     | Hex.   | 0.02 | 0.02 | 0.02 | 0.02 | 0.12 | 0.57 | 0.02 | 0    | 0.02 | 0.08 | 0    | 0    | 0.08 |
| 4   | Choro. | 0.02 | 0    | 0.02 | 0.02 | 0.23 | 0.08 | 0.6  | 0    | 0.02 | 0    | 0    | 0    | 0.02 |
|     | Hex.   | 0.05 | 0.1  | 0    | 0.02 | 0.18 | 0    | 0.52 | 0    | 0.02 | 0    | 0.08 | 0    | 0.02 |

Table 2: The proportion of participants who selected each of the twelve map choices in each lineup for Three Cities displays.

| Rep | Type   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|-----|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1   | Choro. | 0.05 | 0.02 | 0.48 | 0.1  | 0.02 | 0    | 0.2  | 0    | 0.02 | 0    | 0.02 | 0    | 0.08 |
|     | Hex.   | 0.06 | 0.02 | 0.08 | 0    | 0.12 | 0.04 | 0.08 | 0    | 0    | 0.06 | 0.02 | 0.02 | 0.52 |
| 2   | Choro. | 0    | 0.02 | 0    | 0    | 0.65 | 0.08 | 0.2  | 0    | 0.02 | 0    | 0.02 | 0    | 0    |
|     | Hex.   | 0.02 | 0.27 | 0.02 | 0.02 | 0.29 | 0.35 | 0    | 0    | 0.02 | 0    | 0.02 | 0    | 0    |
| 3   | Choro. | 0.06 | 0.02 | 0.19 | 0.02 | 0.04 | 0.6  | 0.02 | 0.02 | 0    | 0.02 | 0.02 | 0    | 0    |
|     | Hex.   | 0.08 | 0.02 | 0    | 0.02 | 0    | 0.05 | 0.02 | 0    | 0.48 | 0.18 | 0.02 | 0    | 0.12 |
| 4   | Choro. | 0.04 | 0    | 0    | 0.02 | 0.6  | 0    | 0.21 | 0    | 0.04 | 0.02 | 0    | 0    | 0.08 |
|     | Hex.   | 0.08 | 0.2  | 0    | 0.05 | 0.25 | 0    | 0.02 | 0.12 | 0.02 | 0.2  | 0    | 0.02 | 0.02 |

Table 3: The proportion of participants who selected each of the twelve map choices in each lineup for All Cities displays.

| Rep | Type   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|-----|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1   | Choro. | 0.02 | 0    | 0.02 | 0.08 | 0.08 | 0.02 | 0.56 | 0    | 0    | 0    | 0.06 | 0    | 0.17 |
|     | Hex.   | 0.02 | 0    | 0    | 0.08 | 0.02 | 0.08 | 0    | 0    | 0.1  | 0    | 0    | 0.2  | 0.5  |
| 2   | Choro. | 0.02 | 0    | 0.02 | 0.7  | 0.02 | 0.02 | 0.02 | 0    | 0.02 | 0    | 0    | 0.15 | 0    |
|     | Hex.   | 0.06 | 0    | 0    | 0.77 | 0.02 | 0.04 | 0.02 | 0.02 | 0    | 0    | 0.02 | 0.02 | 0.04 |
| 3   | Choro. | 0.02 | 0.04 | 0    | 0    | 0.02 | 0.21 | 0    | 0    | 0    | 0    | 0    | 0.65 | 0.06 |
|     | Hex.   | 0.02 | 0.05 | 0.02 | 0.05 | 0.52 | 0    | 0    | 0.02 | 0.02 | 0.02 | 0    | 0.08 | 0.18 |
| 4   | Choro. | 0.05 | 0.68 | 0    | 0.05 | 0.02 | 0    | 0    | 0.02 | 0    | 0.1  | 0.02 | 0    | 0.05 |
|     | Hex.   | 0.08 | 0.29 | 0    | 0.06 | 0.02 | 0.02 | 0.02 | 0    | 0    | 0.46 | 0.02 | 0.02 | 0.02 |

## All Cities

### Replicate 1

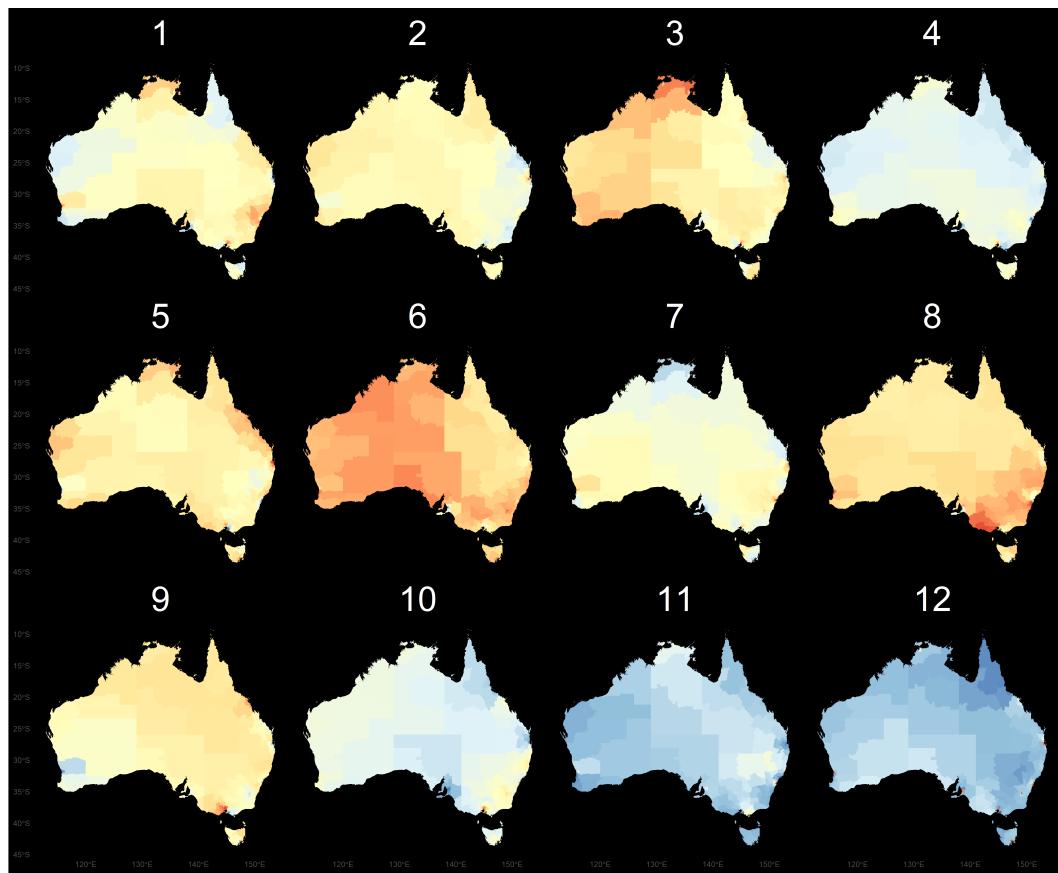


Figure 2: The lineup of choropleth map displays, location 12 contains a distribution that affects all capital cities.

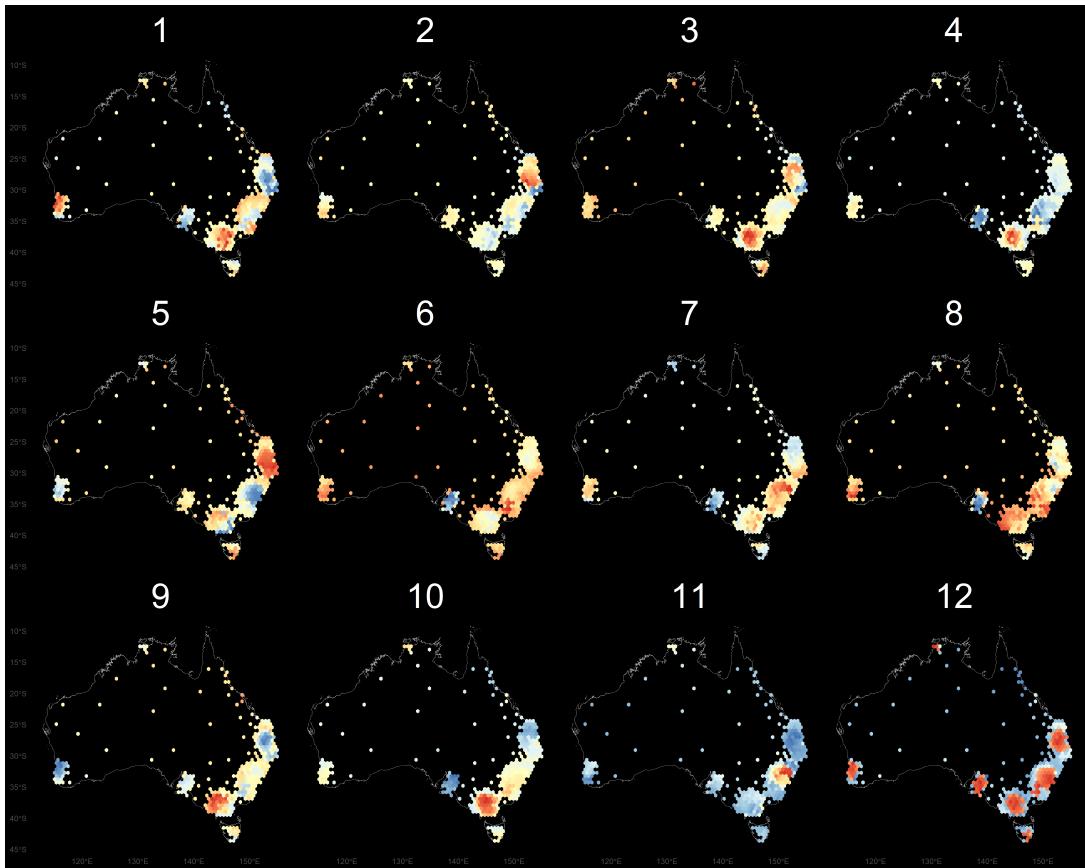


Figure 3: The lineup of hexagon tile map displays, location 12 contains a distribution that affects all capital cities.

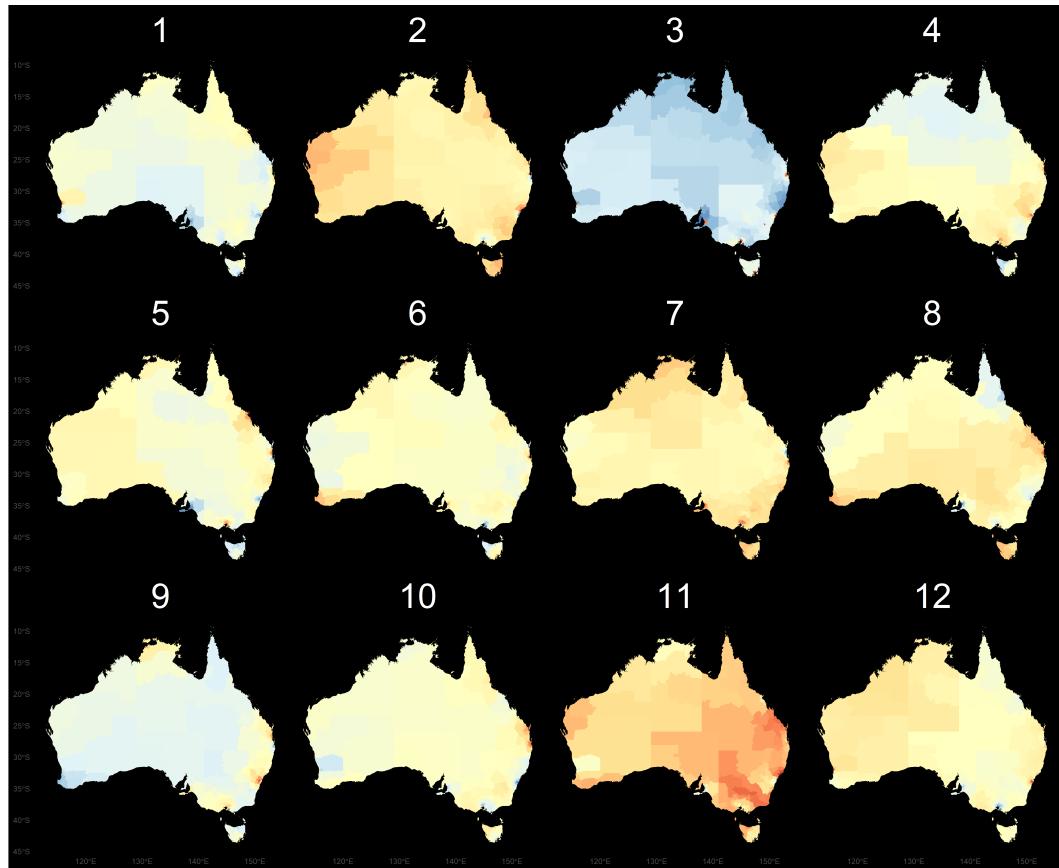


Figure 4: The lineup of choropleth map displays, location 3 contains a distribution that affects all capital cities.

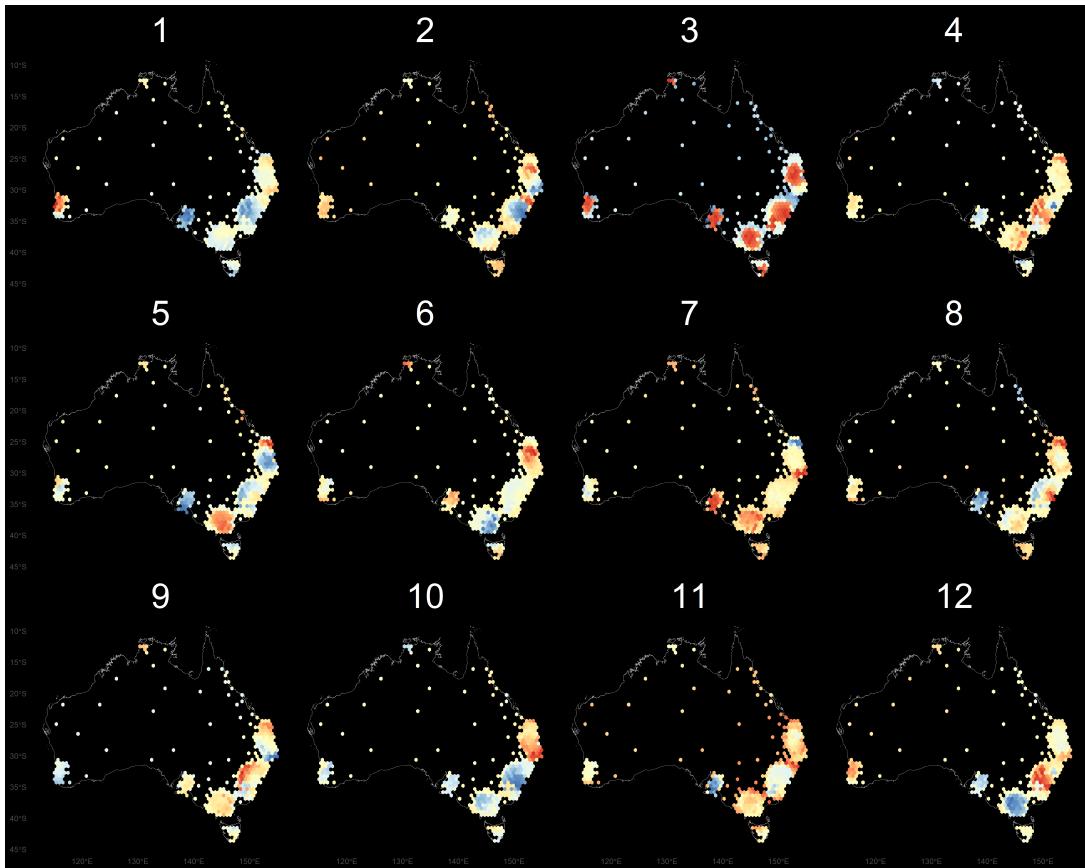


Figure 5: The lineup of hexagon tile map displays, location 3 contains a distribution that affects all capital cities.

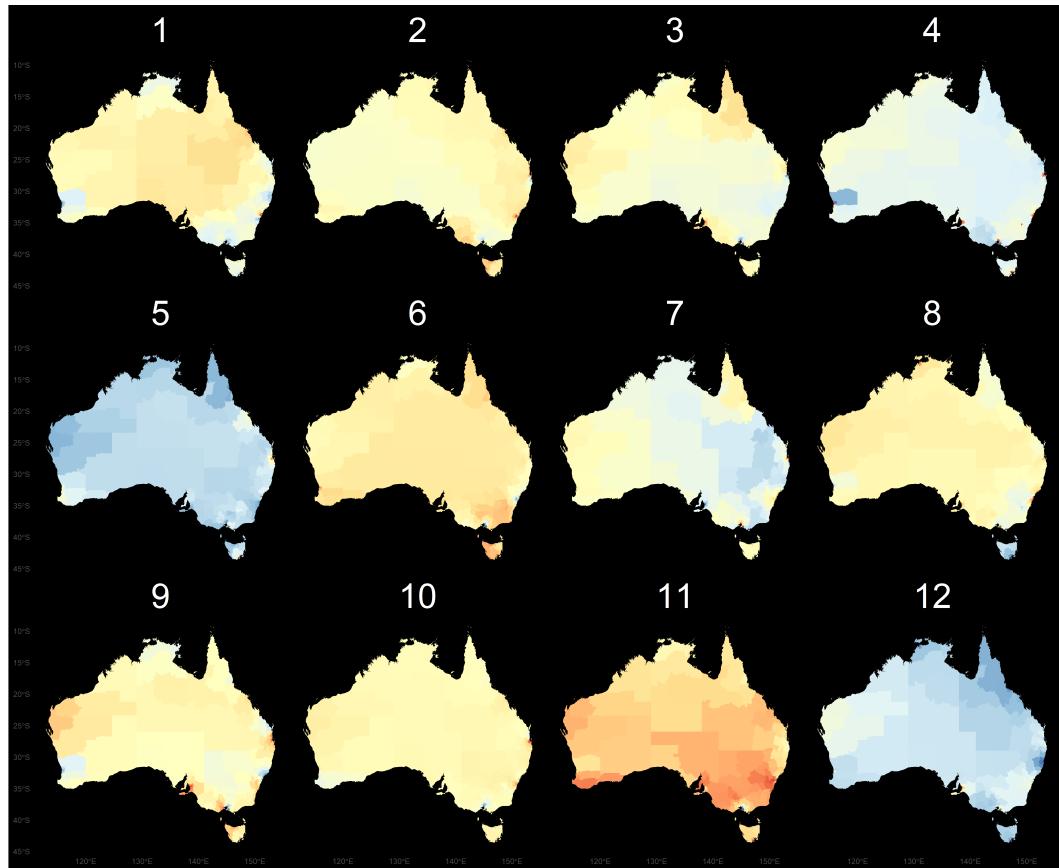


Figure 6: The lineup of choropleth map displays, location 4 contains a distribution that affects all capital cities.

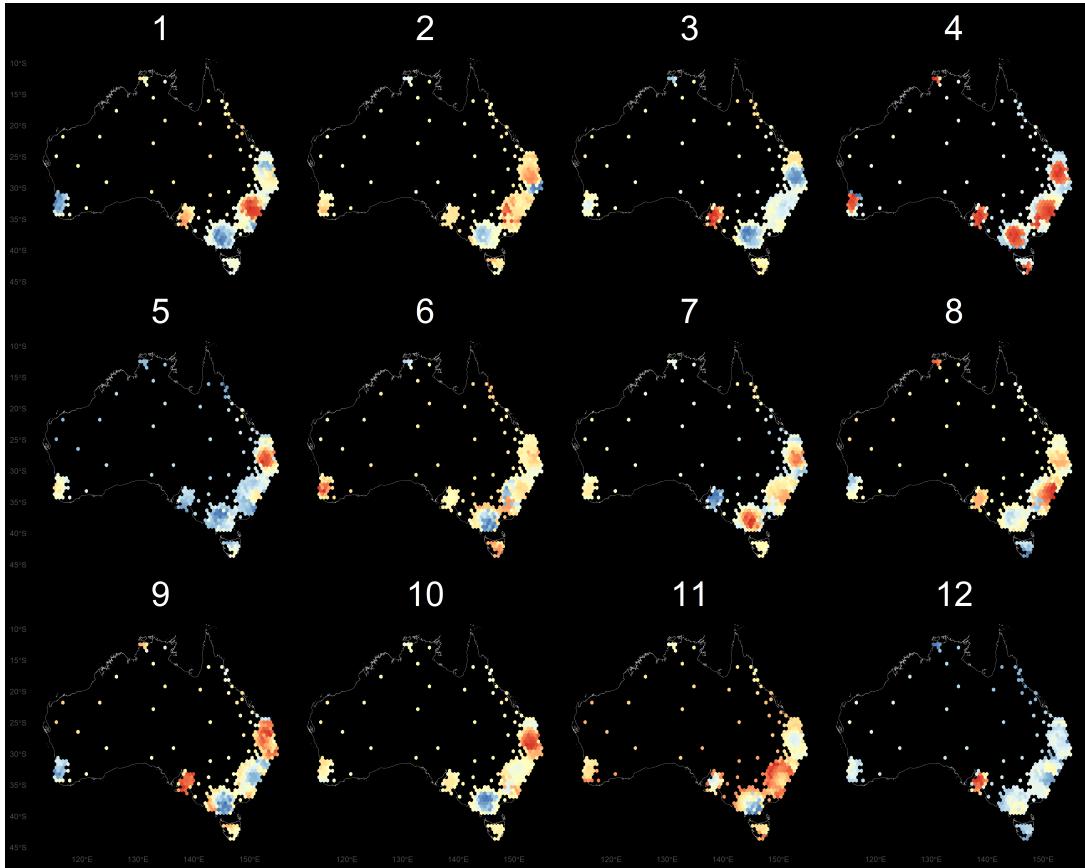


Figure 7: The lineup of hexagon tile map displays, location 4 contains a distribution that affects all capital cities.

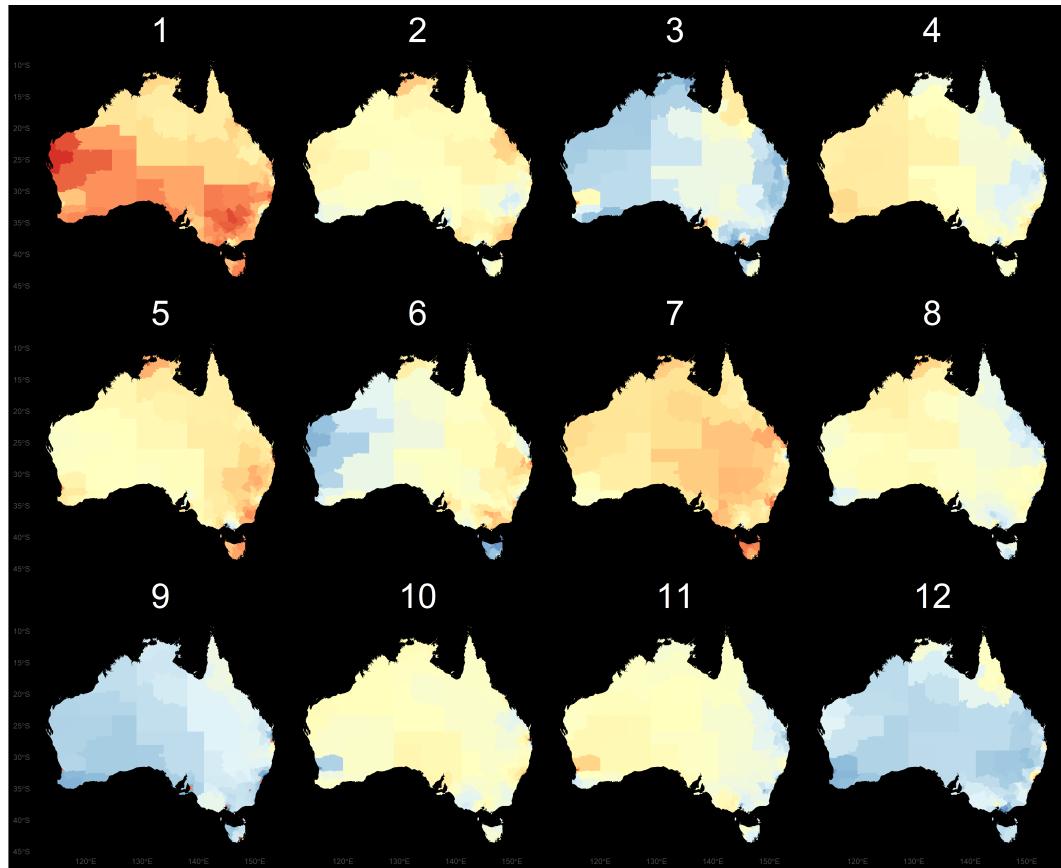


Figure 8: The lineup of choropleth map displays, location 9 contains a distribution that affects all capital cities.

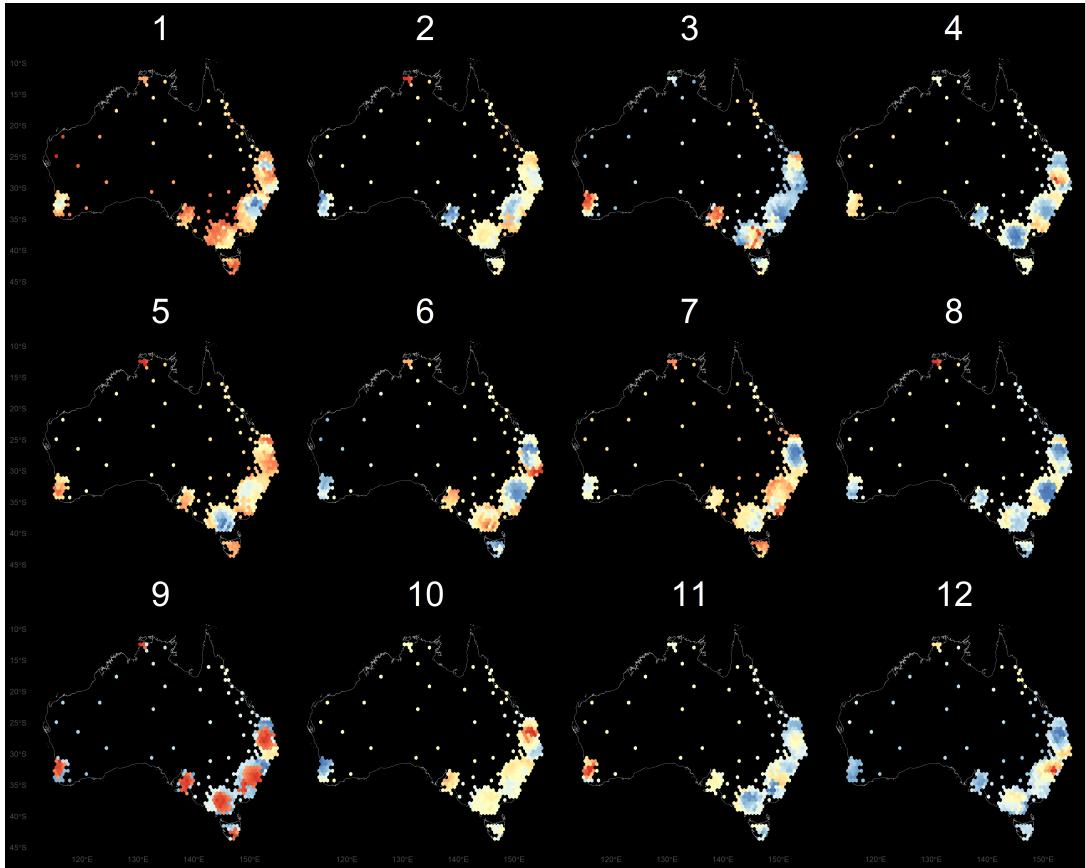


Figure 9: The lineup of hexagon tile map displays, location 9 contains a distribution that affects all capital cities.

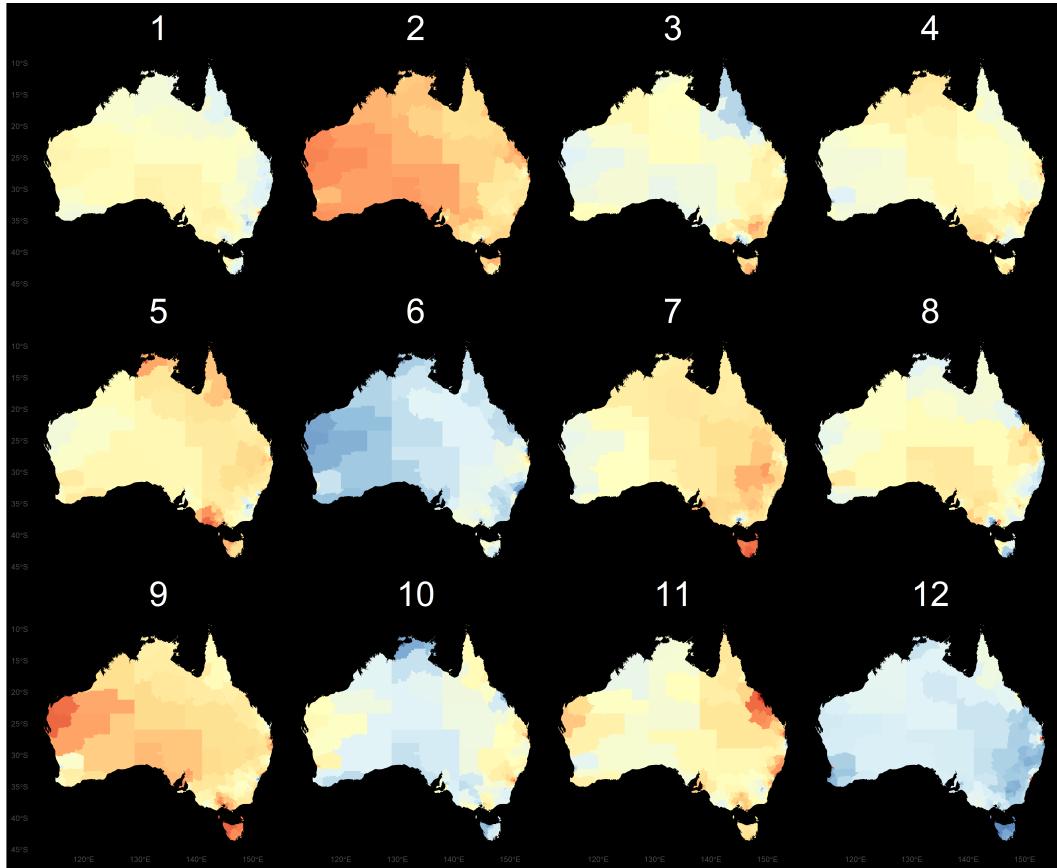


Figure 10: The lineup of choropleth map displays, location 12 contains a distribution that affects three of the Australian capital cities.

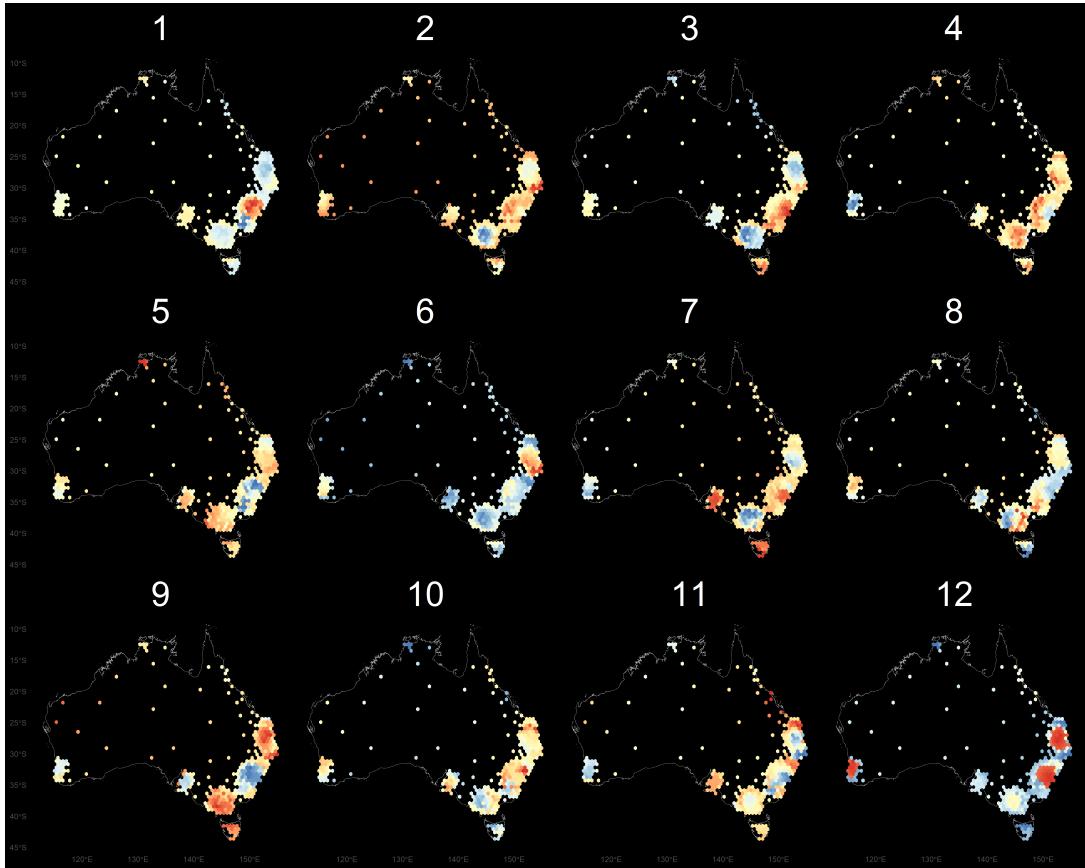


Figure 11: The lineup of hexagon tile map displays, location 12 contains a distribution that affects three of the Australian capital cities.

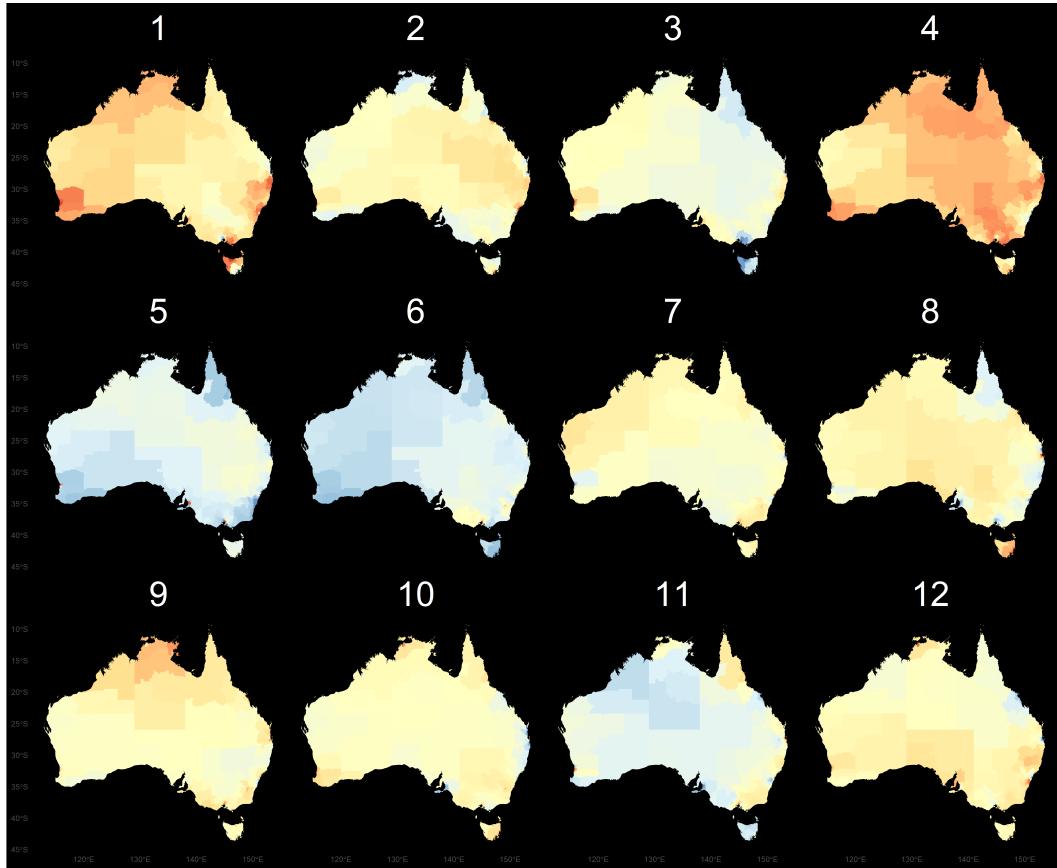


Figure 12: The lineup of choropleth map displays, location 3 contains a distribution that affects three of the Australian capital cities.

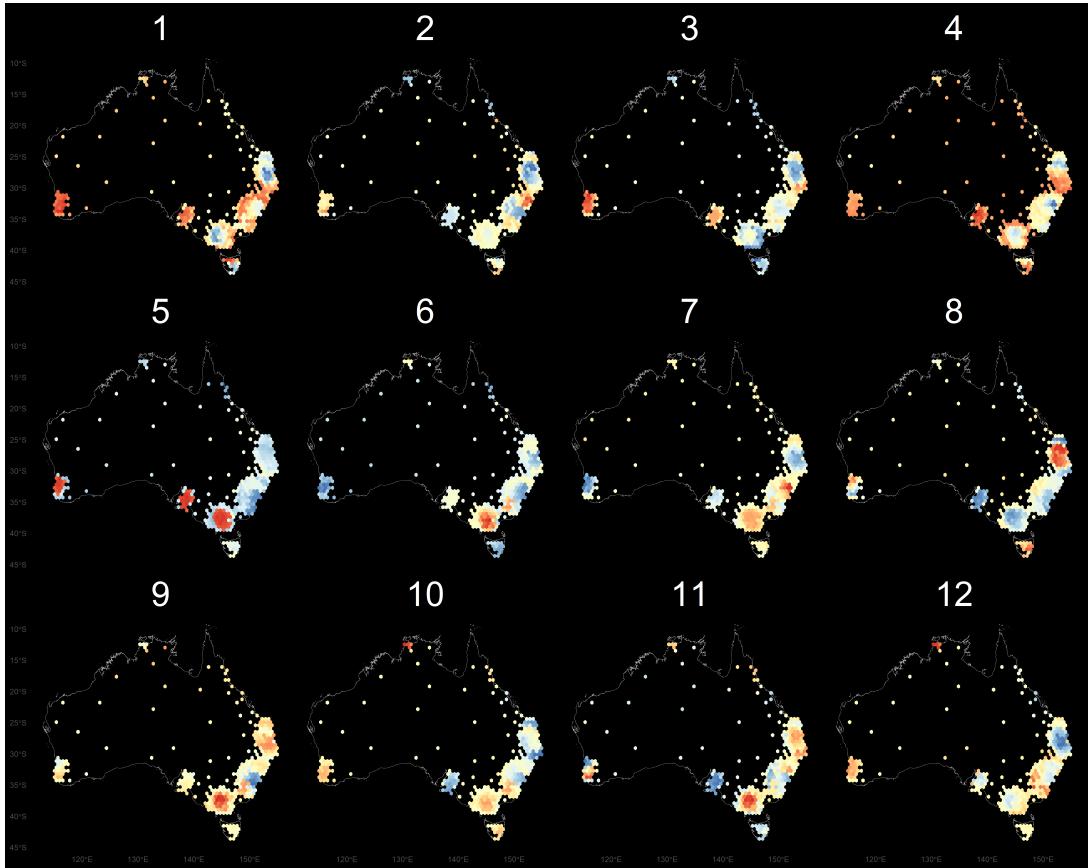


Figure 13: The lineup of hexagon tile map displays, location 3 contains a distribution that affects three of the Australian capital cities.

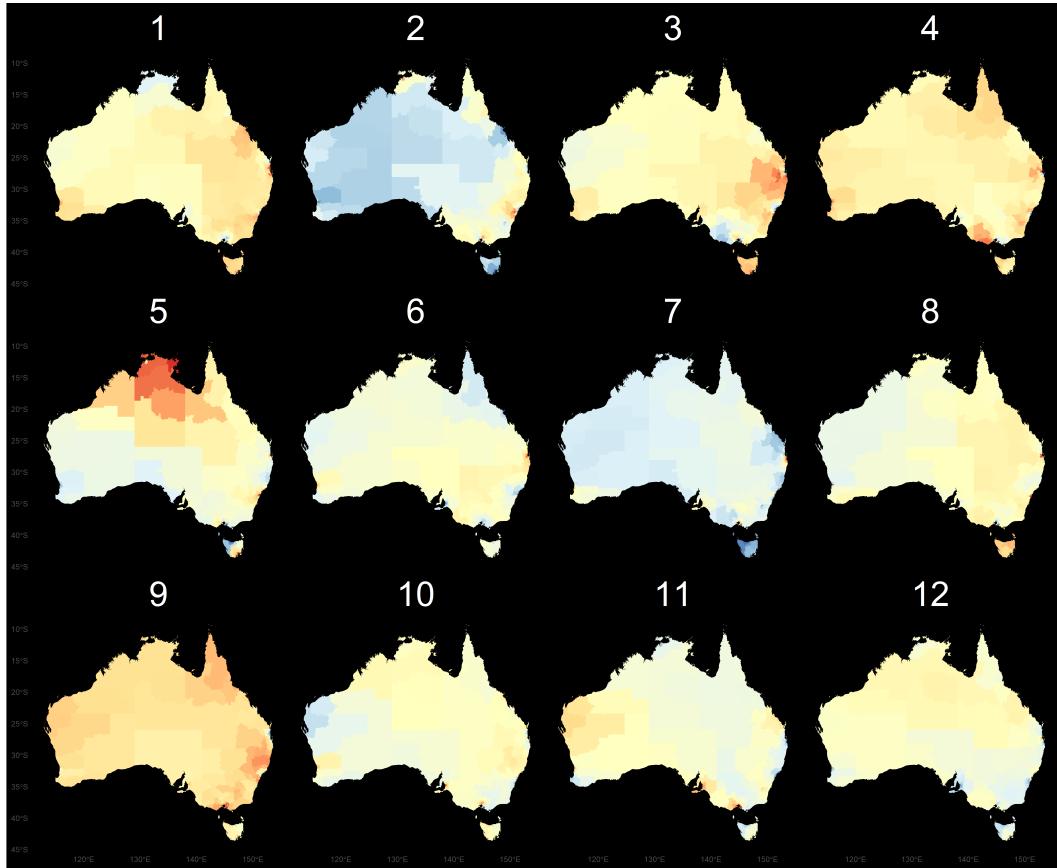


Figure 14: The lineup of choropleth map displays, location 4 contains a distribution that affects three of the Australian capital cities.

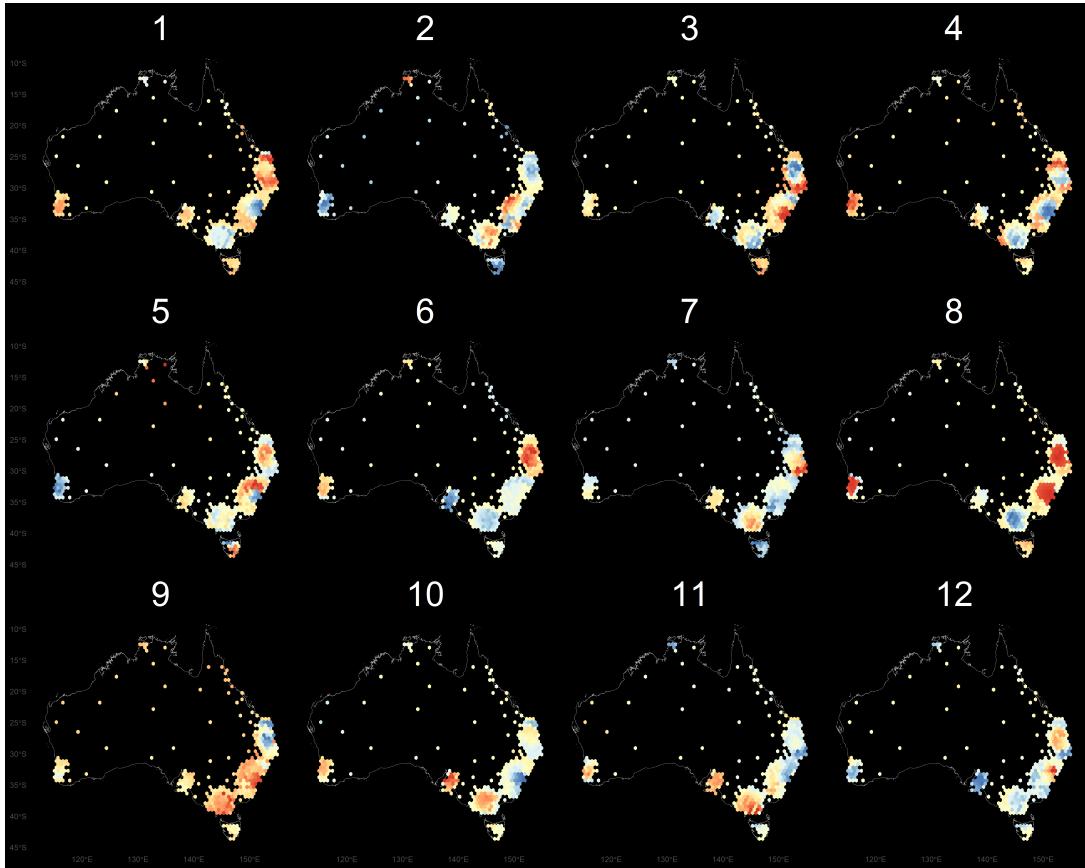


Figure 15: The lineup of hexagon tile map displays, location 4 contains a distribution that affects three of the Australian capital cities.

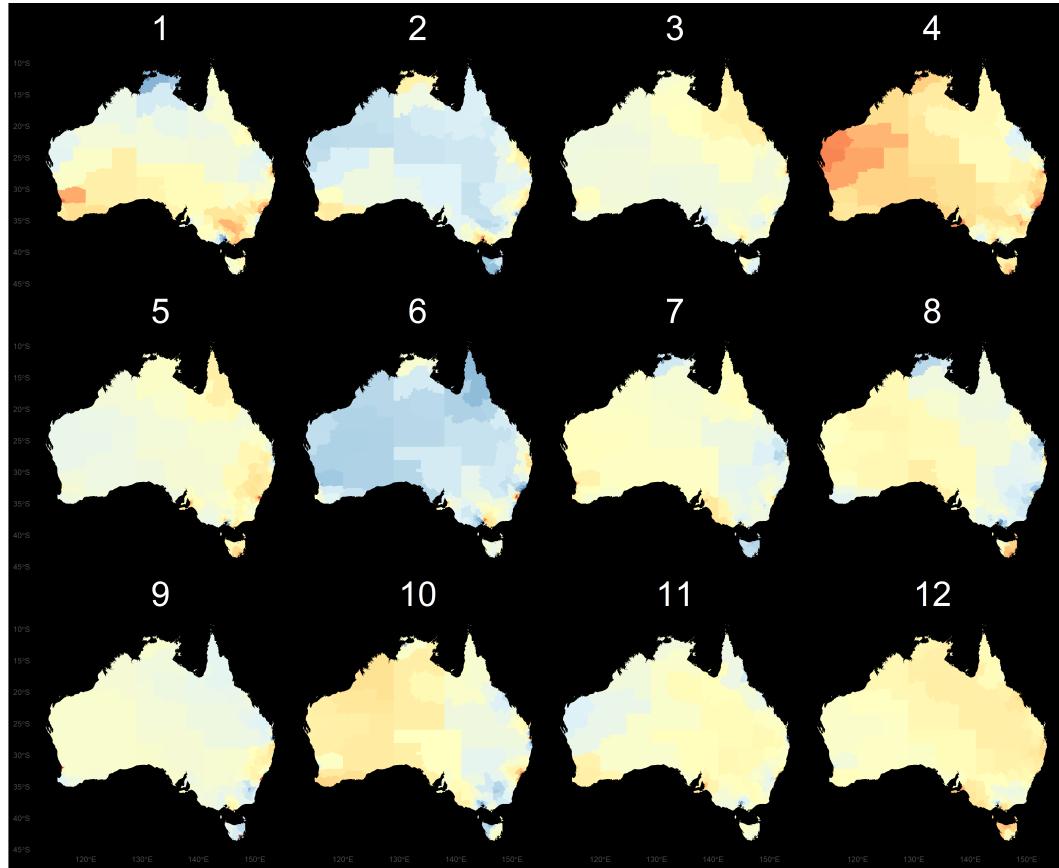


Figure 16: The lineup of choropleth map displays, location 9 contains a distribution that affects three of the Australian capital cities.

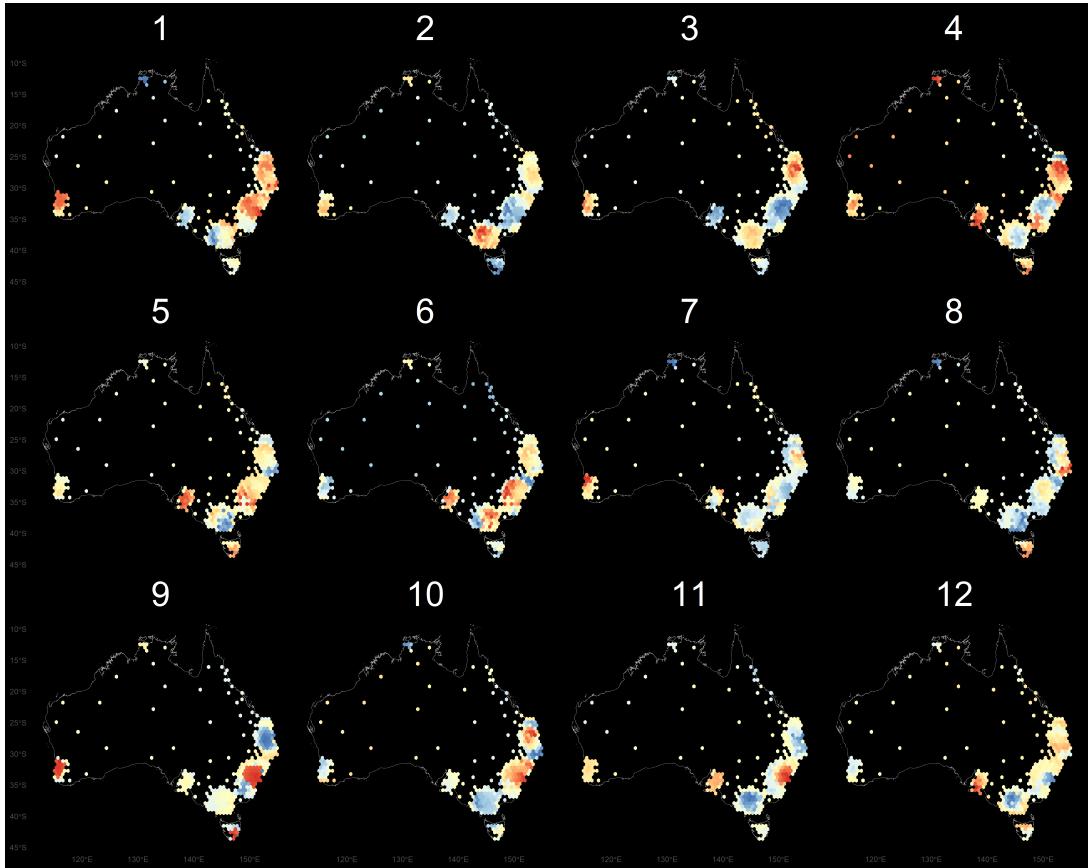


Figure 17: The lineup of hexagon tile map displays, location 9 contains a distribution that affects three of the Australian capital cities.

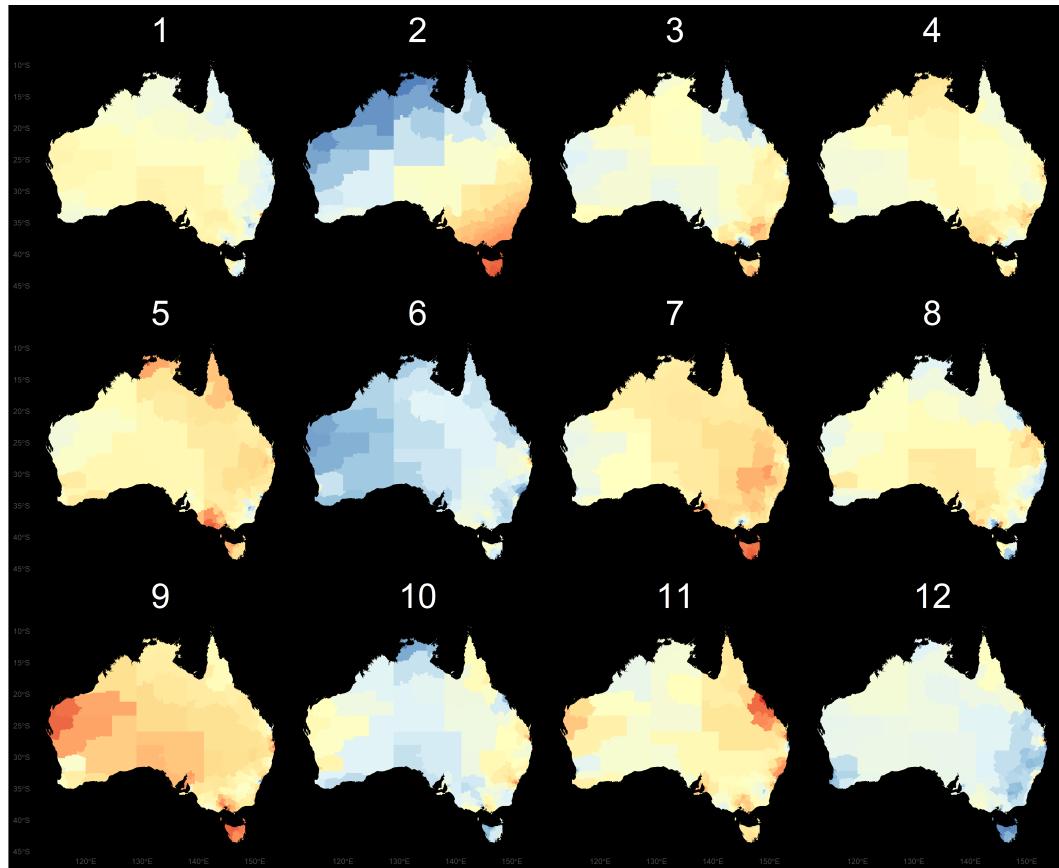


Figure 18: The lineup of choropleth map displays, location 12 contains a distribution that affects all capital nwse.

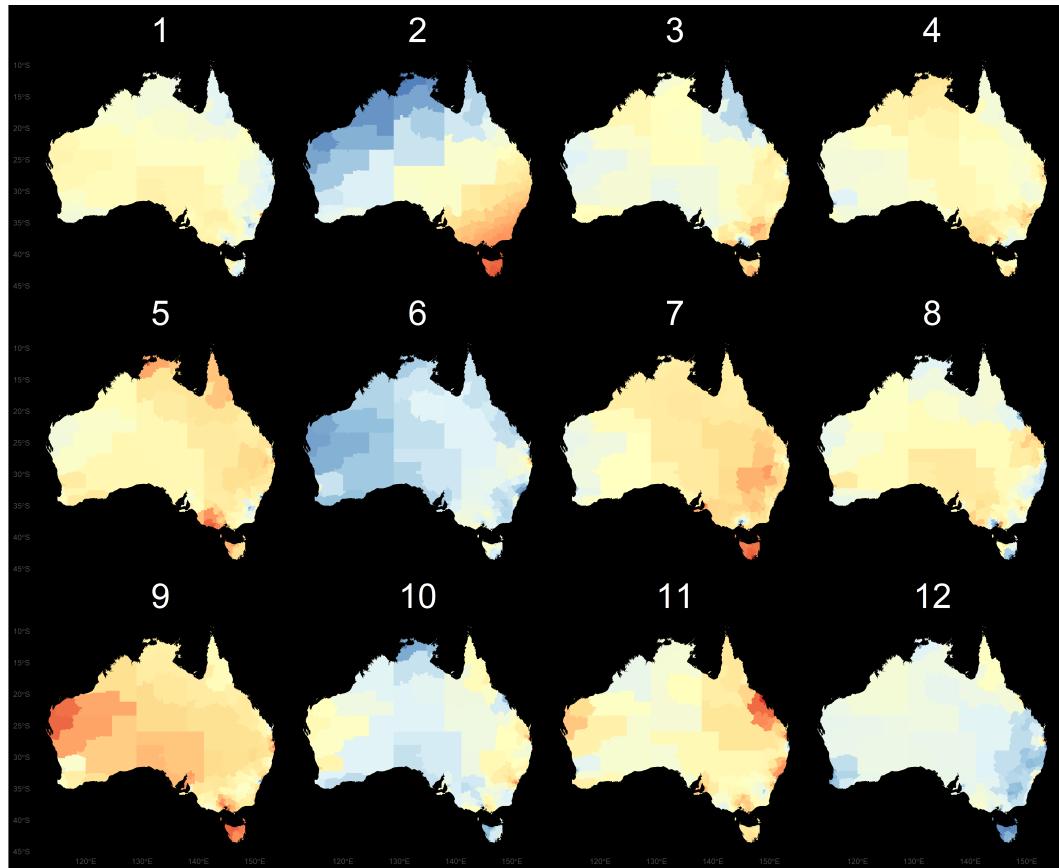


Figure 19: The lineup of hexagon tile map displays, location 12 contains a distribution that affects all capital nwse.

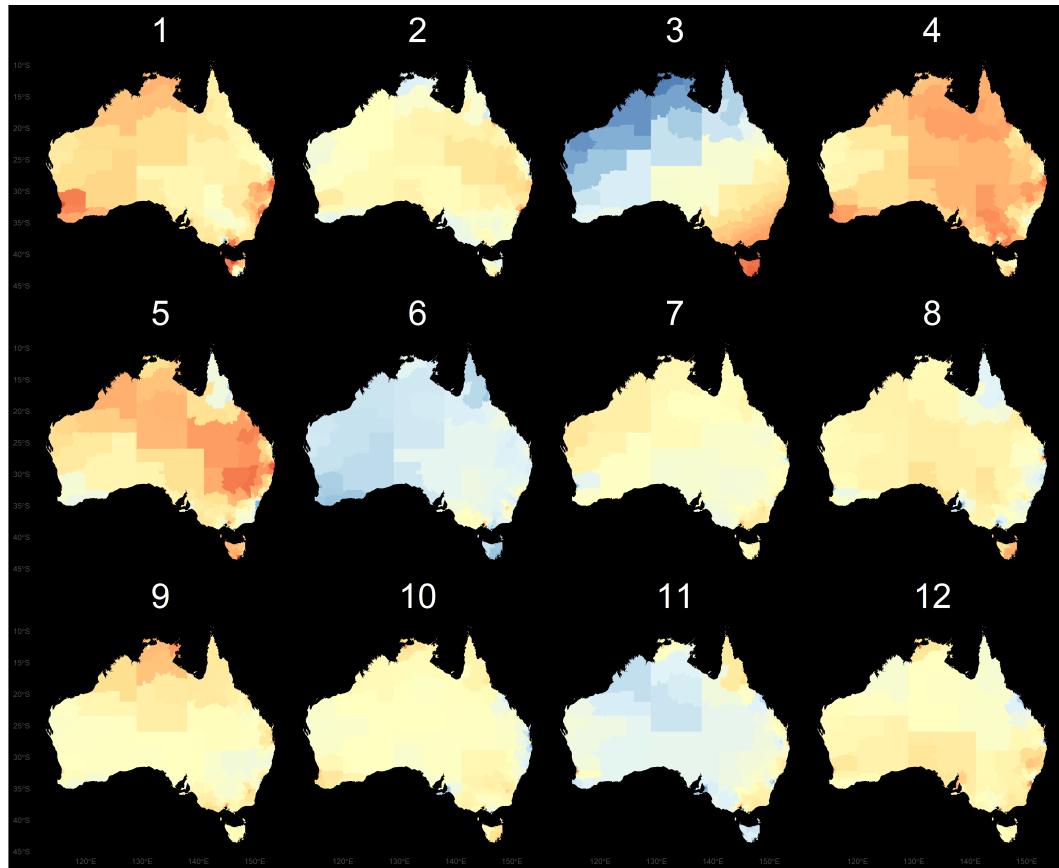


Figure 20: The lineup of choropleth map displays, location 3 contains a distribution that affects all capital nwse.

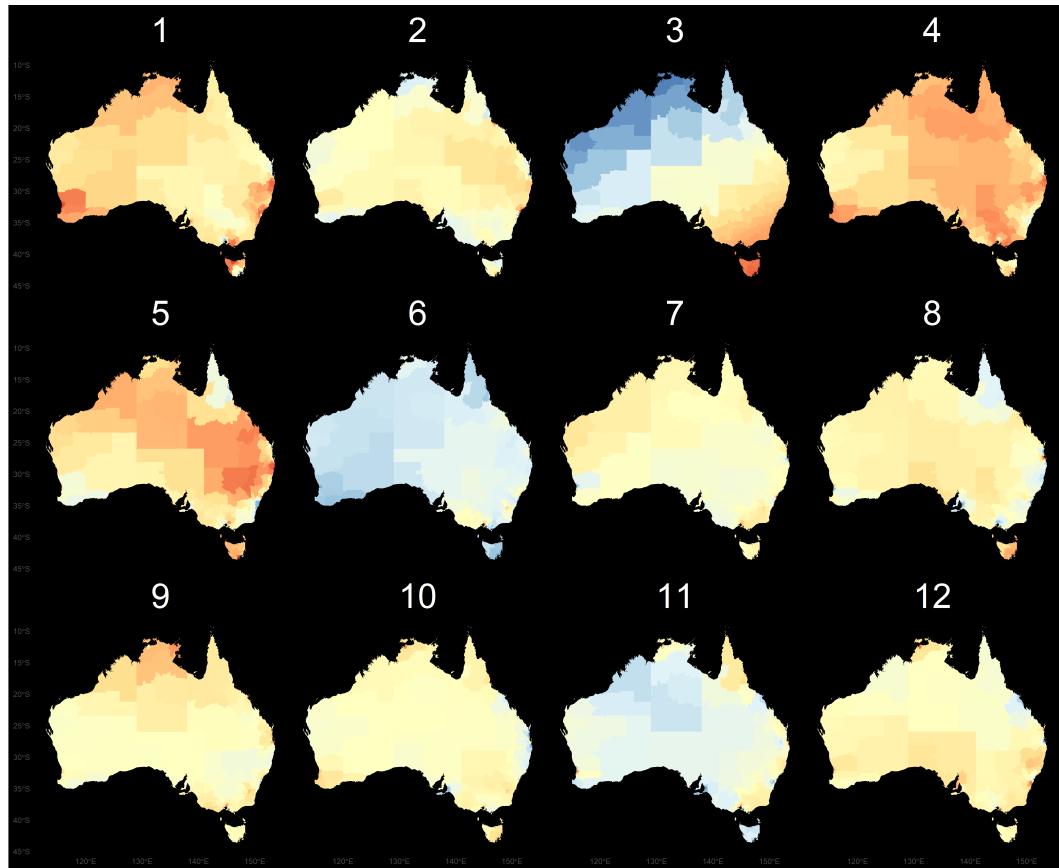


Figure 21: The lineup of hexagon tile map displays, location 3 contains a distribution that affects all capital nwse.

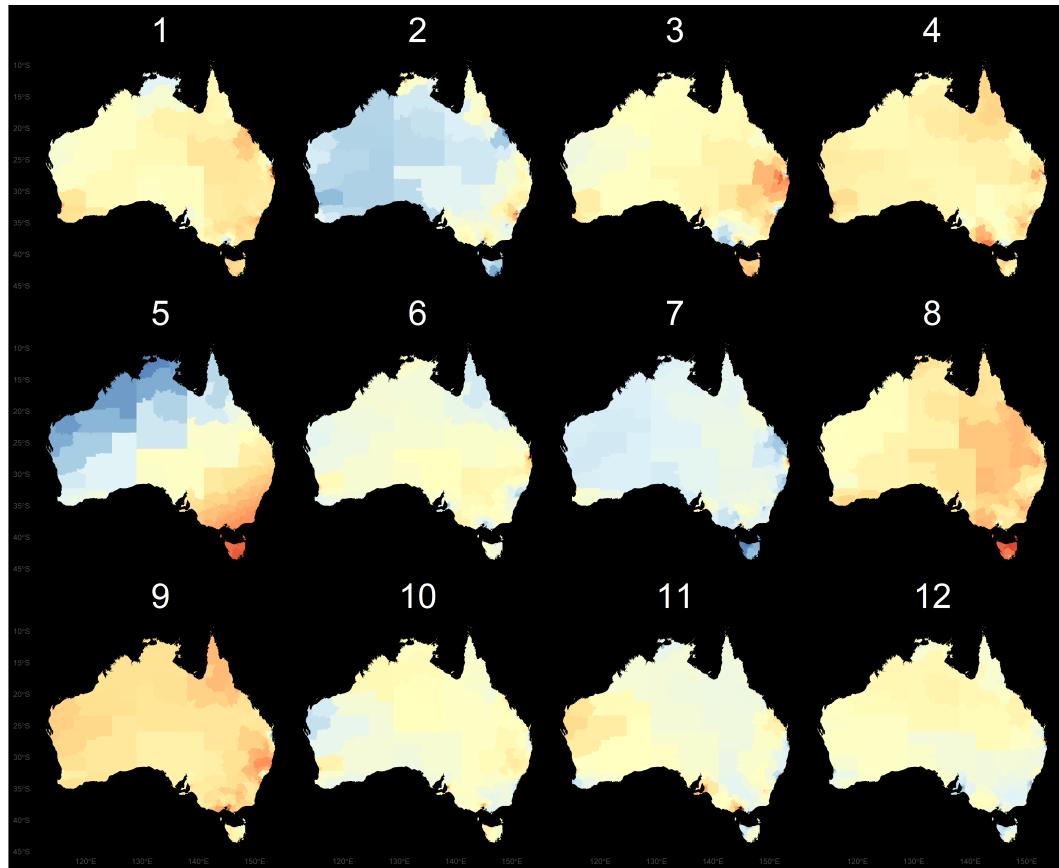


Figure 22: The lineup of choropleth map displays, location 4 contains a distribution that affects all capital nwse.

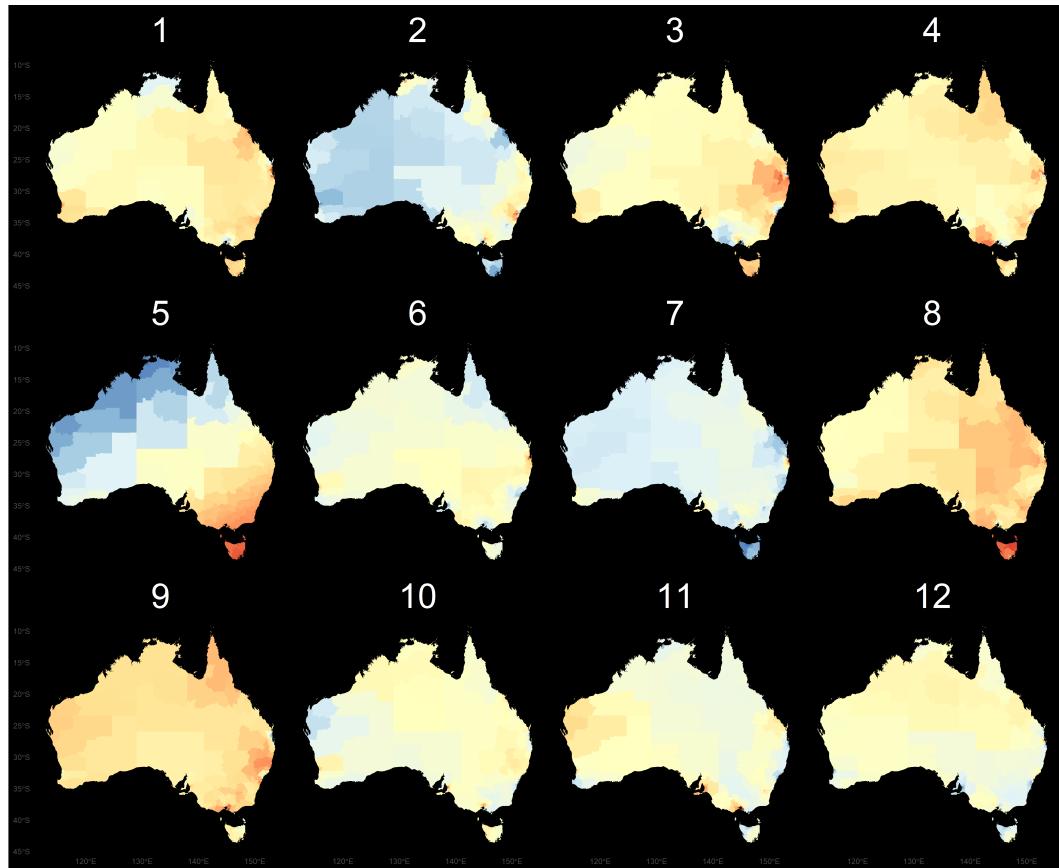


Figure 23: The lineup of hexagon tile map displays, location 4 contains a distribution that affects all capital nwse.

Replicate 2  
Replicate 3  
Replicate 4  
Three Cities

Replicate 1  
Replicate 2  
Replicate 3  
Replicate 4

#### North West to South East Geographic Trend

Replicate 1  
Replicate 2  
Replicate 3  
Replicate 4

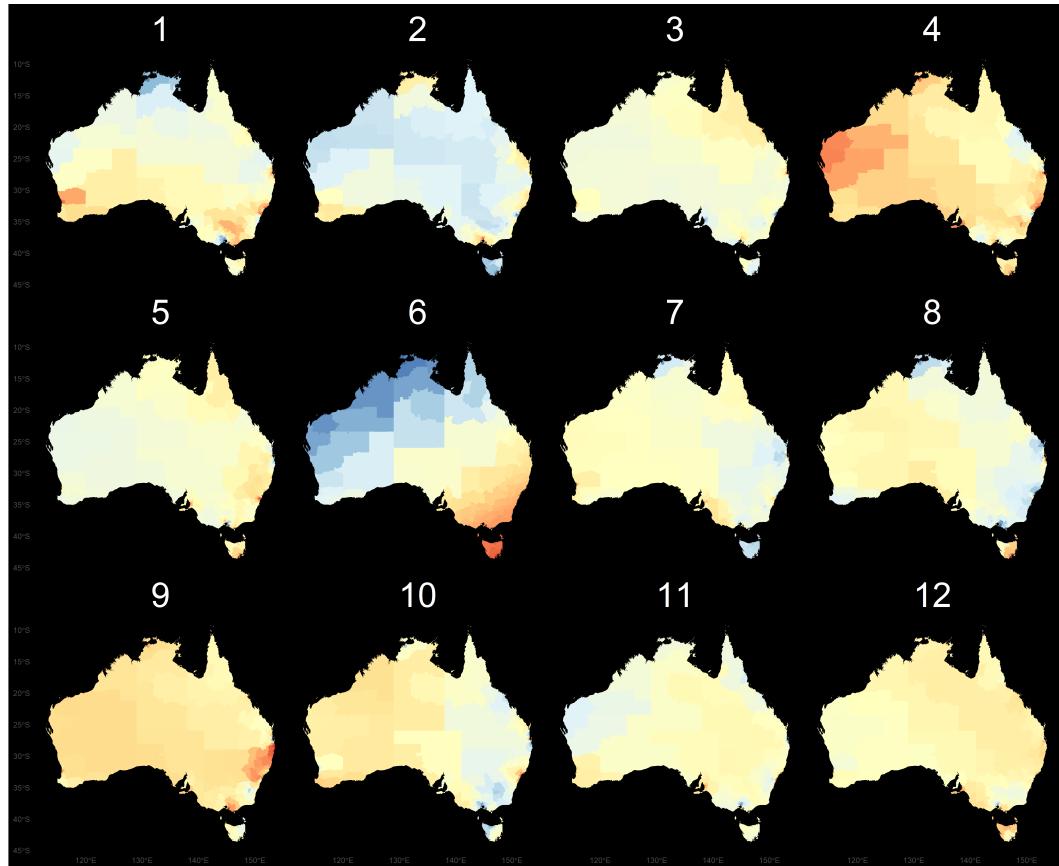


Figure 24: The lineup of choropleth map displays, location 9 contains a distribution that affects all capital nwse.

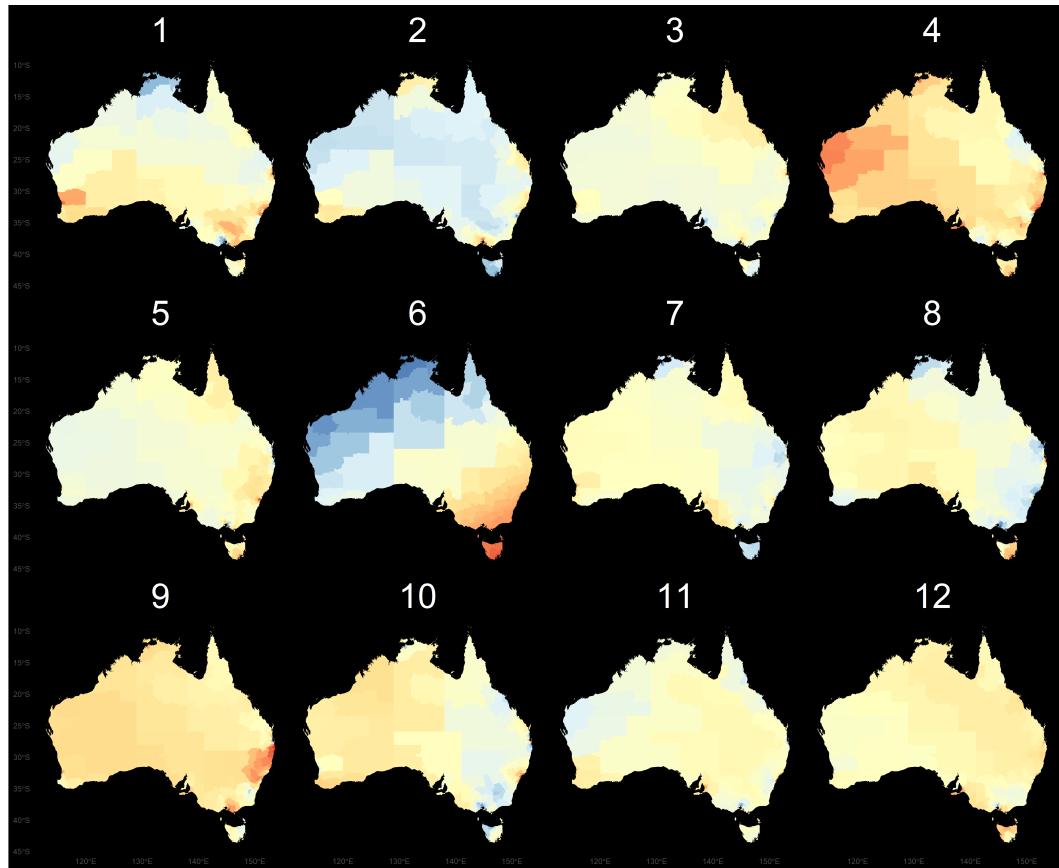


Figure 25: The lineup of hexagon tile map displays, location 9 contains a distribution that affects all capital nwse.