

# EnvSci 360 – Computer and Analytical Cartography Spring 2017

## - Lab 6 -

### Exercise 1: Dot Density Map of 2010 Population Density in the Metropolitan Boston Area

**Task:** Create a letter-size layout showing the year 2010 population density (POP2000) of the metro Boston area towns using the Dot Density method (in the layer's Properties > Symbology tab, show Quantities > Dot density).

Download the for this exercise at <http://faculty.www.umb.edu/michael.trust/data360/lab6ex1.zip>

- Decide how many people one dot equals.
- Choose a point size and color for the dot symbol.
- Display the towns' background as appropriate.
- Use masking so that the dots do not appear in areas in which people do not live, giving a more realistic appearance to the map. To do this you need to make a mask layer, which will be a UNION of Open Space and water body polygons (areas where there are no residents):
  - Add OPENSOURCE\_POLY\_METRO\_BOSTON.shp (permanently protected open space) and WATER\_BODIES\_METRO\_BOSTON.shp (major lakes, ponds and large rivers).
  - Since ArcMap can use only one layer for masking, you need to combine the open space and water layers into one layer: Use the UNION ArcToolbox tool to create a single layer that combines the open space and the water features. In the Union dialog, choose ONLY\_FID for JoinAttributes (you don't need all the columns in the output shapefile) and keep 'Gaps Allowed' checked. Name the output shapefile OS\_WATER\_UNION\_METRO\_BOSTON.shp.
  - Remove all layers from the data frame except the Towns and Union shapefiles. DO NOT turn on the Union layer (turn it off if it is displaying, although you may want to look at it just to see if the Union process completed successfully.).
  - Next, set masking as follows: In the towns layer Properties > Symbology tab, click the Properties button, check the box for 'Use Masking' and select OS\_WATER\_UNION\_METRO\_BOSTON as the Control Layer and click the 'Exclude dots from these areas' radio button.
- Use typefaces **other than** Arial, Calibri and Times New Roman for all text on the layout. You can download free, high-quality fonts from Google Fonts if you want to experiment using new typefaces.

Help for dot density mapping in ArcMap is at:

<http://desktop.arcgis.com/en/arcmap/latest/map/working-with-layers/using-dot-density-layers.htm>

#### Include on your layout:

- A small locator map showing where the metro Boston study area is in relation to the entire state
- A legend
- An appropriate title describing the purpose of this layout
- North arrow
- Scale bar and/or text
- Your name and date
- Source of data
- A neatline; use a fill color or a gradient if desired

Export the layout as a PDF named **Lab6\_Map1\_yourname.pdf** and email it to [michael.trust@umb.edu](mailto:michael.trust@umb.edu).

## Exercise 2: Multivariate Map - Pie Chart and Choropleth

**Task:** Create a 22" x 17" layout showing the continental United States symbolized with the following two variables:

- Year 2000 people per square mile (POP00\_SQMI) symbolized with a sequential color scheme using one hue (e.g. light green to dark green)
- Racial breakdown of WHITE, BLACK, ASIAN, and HISPANIC populations using a pie chart for each state.

Download the for this exercise at <http://faculty.www.umb.edu/michael.trust/data360/lab6ex2.zip>

### Notes:

- Set the coordinate system of the data frame to USA\_Contiguous\_Albers\_Equal\_Area\_Conic.
- Label the states with state name.
- Do your best to size the pie charts so they don't overwhelm the map and obscure the state polygons and labels. Use leader lines if necessary for the state labels and/or pie charts.
- Include a legend and other supporting elements.
- As in Exercise 1, use typefaces *other than* Arial, Calibri and Times New Roman.

Export the layout as a PDF named **Lab6\_Map2\_yourname.pdf** and email it to [michael.trust@umb.edu](mailto:michael.trust@umb.edu).