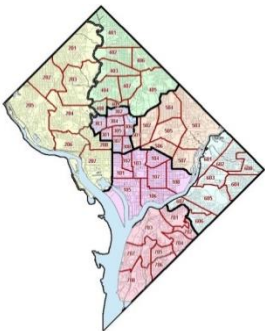# OFFICE OF RESEARCH AND ANALYTICAL SERVICES
EXECUTIVE OFFICE OF THE CHIEF OF POLICE
METROPOLITAN POLICE DEPARTMENT

HOW TO MAKE A KERNEL DENSITY MAP WITH ARCMAP 10.1 & 10.2

STEP BY STEP INSTRUCTION MANUAL

Creating a Kernel Density Map in ArcMap 10.1

1. Add data points to map
   a. *Note: in some cases, you may have to export and re-import data for density to work*
2. Zoom out your map so that all points are visible in the data frame
3. Use the "search" function on the right side panel and type in "density"
4. Select "Kernel Density (Spatial Analyst)"
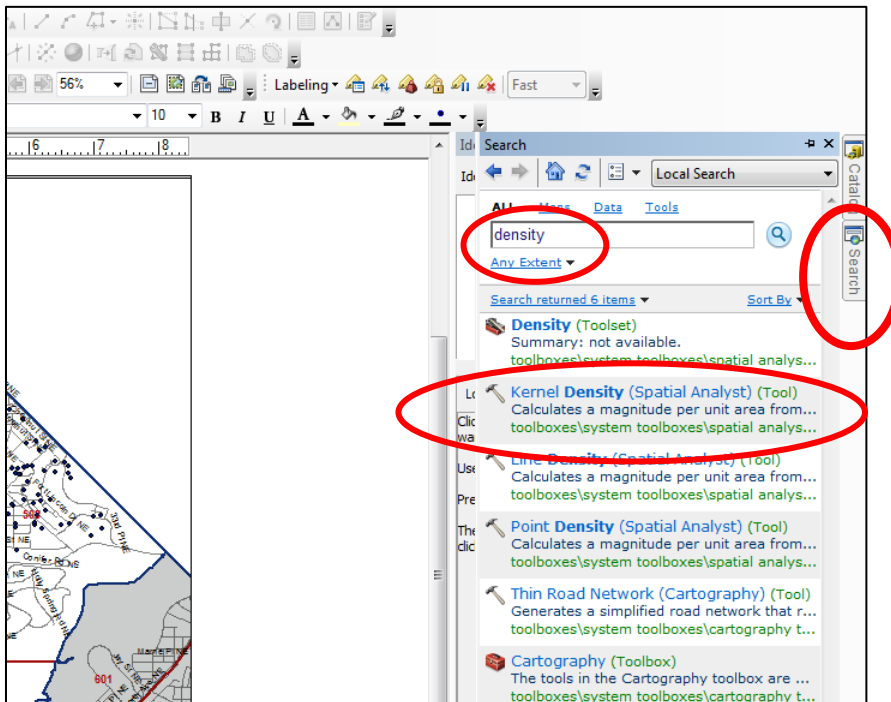
5. Select desired data under "input point or polyline features"
6. Set output, search radius, area units and then click "OK"
   a. *Baseline/guideline*:
      i. **Output cell = 25**
      ii. **Search radius = 500**
   iii. **Area units = square_meters**
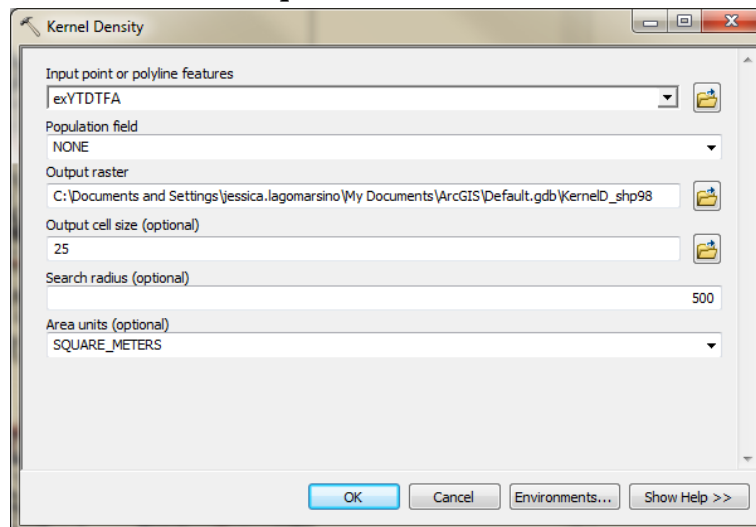
7. After hitting OK, the density may span a larger area than necessary
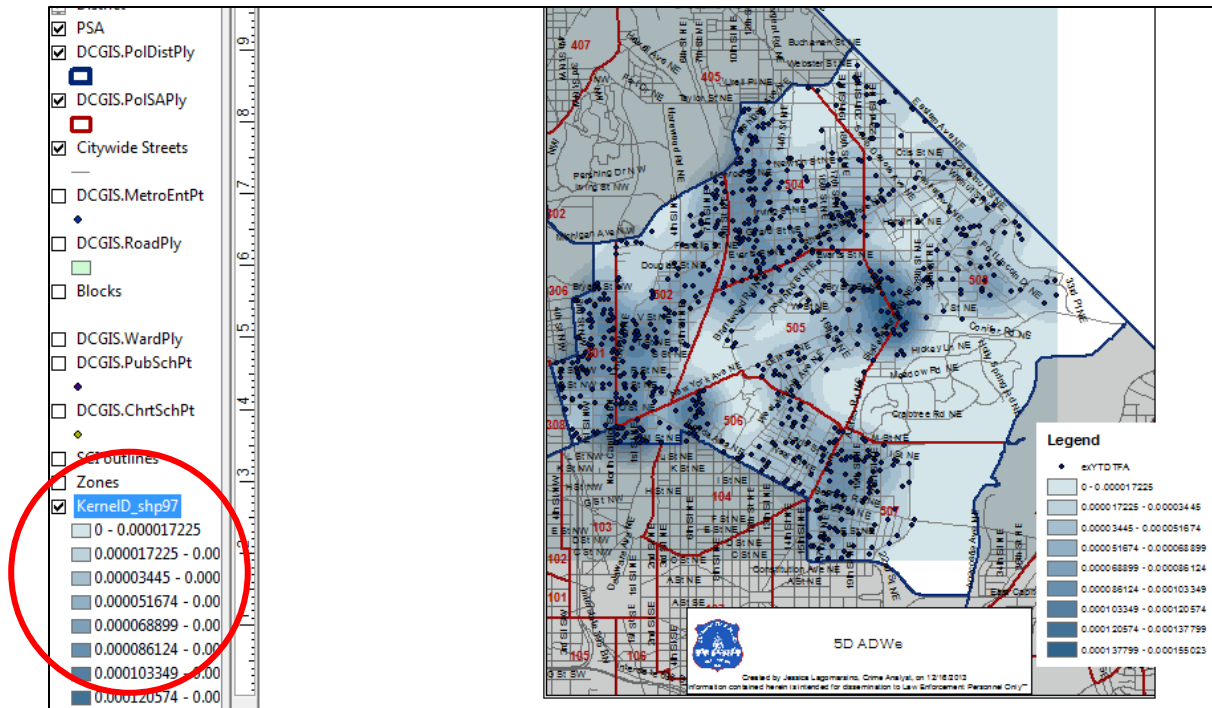
8. If this is the case, double click the "KernelD_shp" file in the table of contents and change the symbology so the top 1 or 2 fields are clear of color
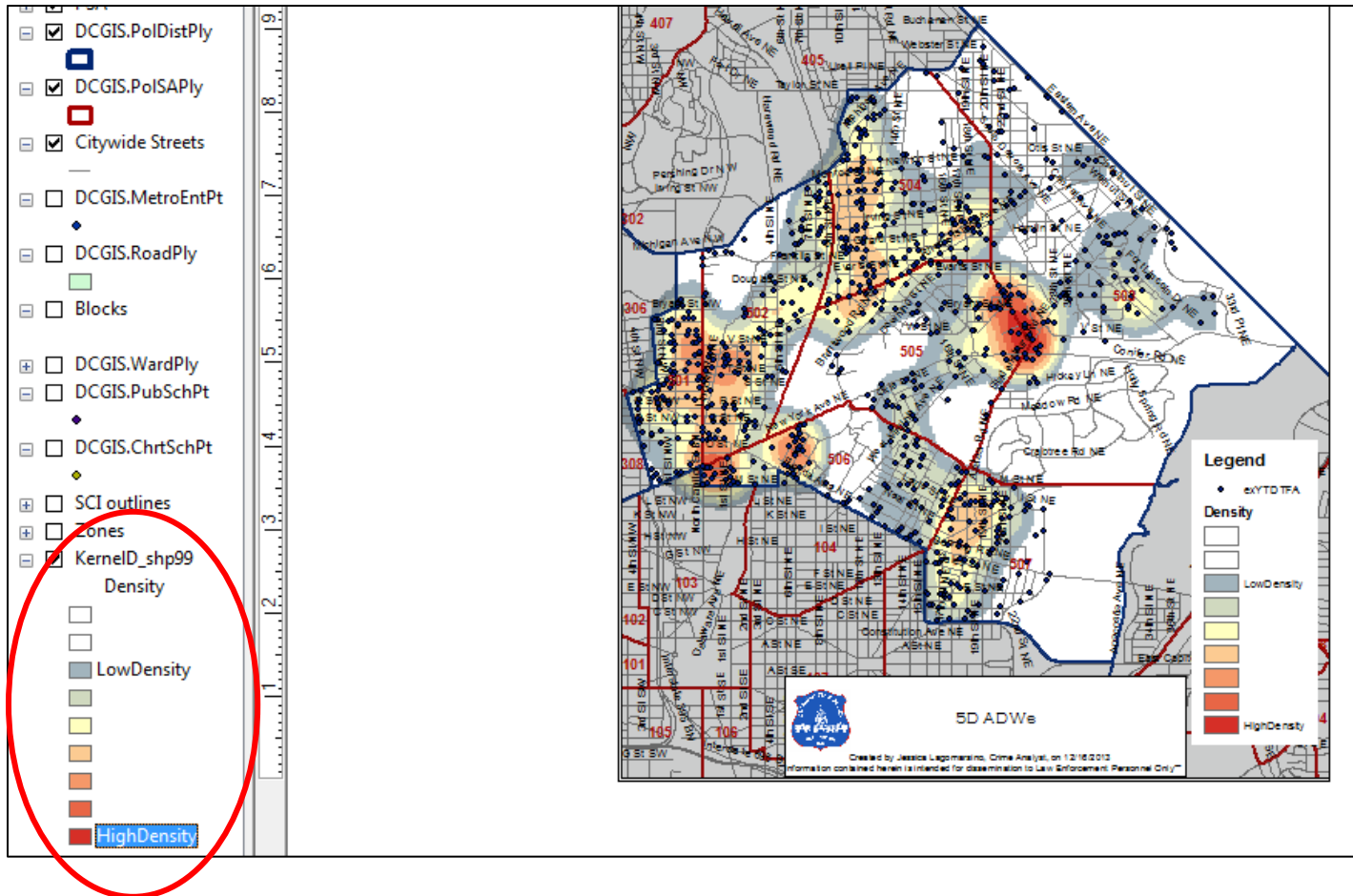   a. This can also be done by changing the number of classes (i.e from 9 to 6)
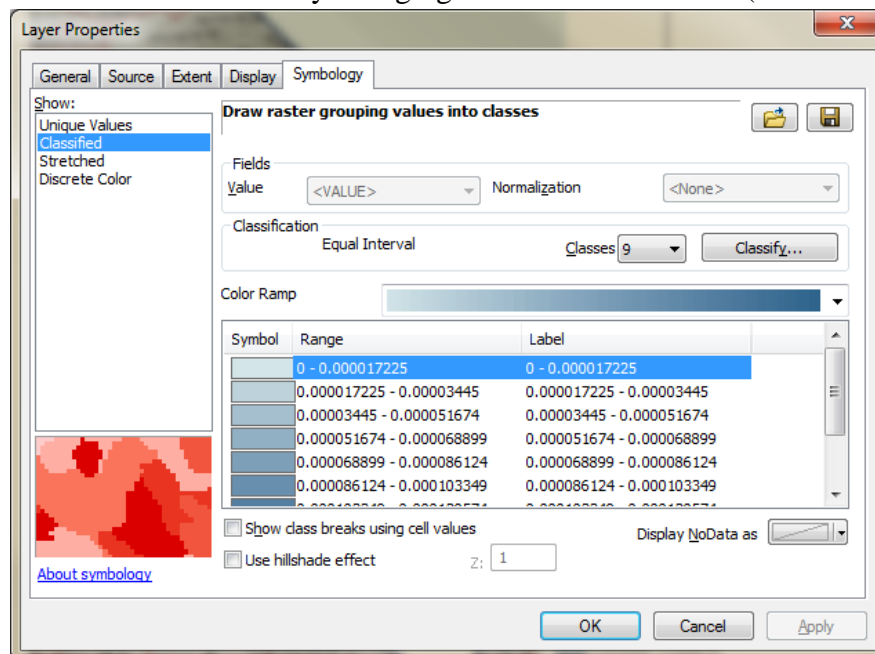
9. Colors can also be changed at this point by selecting the "color ramp"
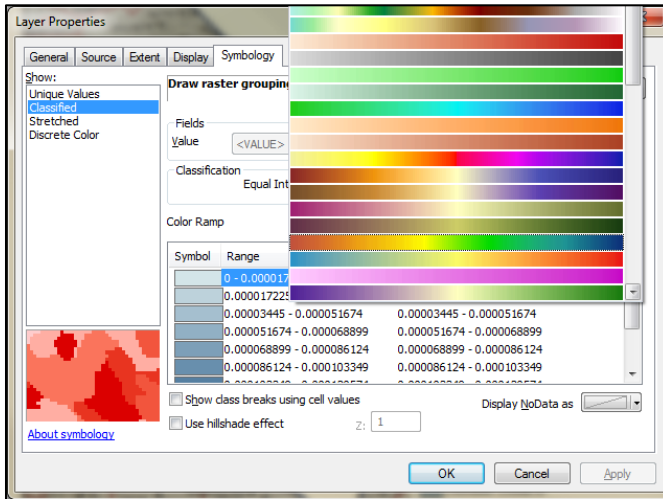
10. In order to make the density key more clear – double click "VALUE" in the table of contents and replace with "Density"
    a. Then click on the top and bottom density values and replace the numbers with "low density" and "high density"

Creating a Kernel Density Map in ArcMap 10.2

1. In Arcmap, open the background polygons of D.C. as well as the point layer you want to make the density map with.
2. Zoom out your map so that all points are visible in the data frame.
3. In the Search tab on the right side of the ArcMap window, search for "Kernel Density".
4. Click on the first option for Kernel Density (Spatial Analyst), pictured below.


5. If you receive a pop-up window saying that the tool is not licensed, then follow the next steps, if not, continue to step 9.
6. Click Ok in the pop-up window telling you that the tool is not licensed.
7. Go to the customize drop down menu at the top of the page and then click "Extensions…"
8. In extensions, check all of the boxes and then click "close". You should now be able to go back and open the Kernel Density tool.
9. A pop-up window will appear for the Kernel Density tool. Input the points that you want to be made into a density layer in the "Input point or polyline features" drop-down menu.
10. Leave Population field as "NONE".
11. Under "Output Raster" use the browse folder button to choose which folder you would like to store the data and then type what you would5 like all the output file into the "Name" box and then click "Save". See Picture Below.
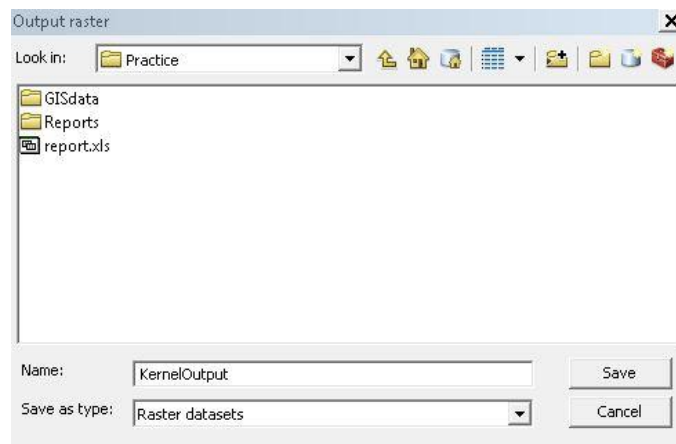

12. "Output cell Size" depends on the extent where you would like to make the density layer. For a Citywide extent, use 100 m and for more specific areas, such as PSA's use 77 meters.
13. "Search radius" also depends on the area you wish to cover. For citywide, use 1000, and for smaller areas, use 305.
14. Finally, Use the drop-down menu under "Area units" to choose SQUARE_METERS.
15. Next, click on the "Environments" button at the bottom of the Kernel Density Window.

16. Open "Processing Extent" and change the value in the drop-down menu to "Same as Display". And Click "OK". This will prevent sudden stops in the density layer where the points end.
17. Your final window should look like the image below. If everything is filled in correctly, press "OK".
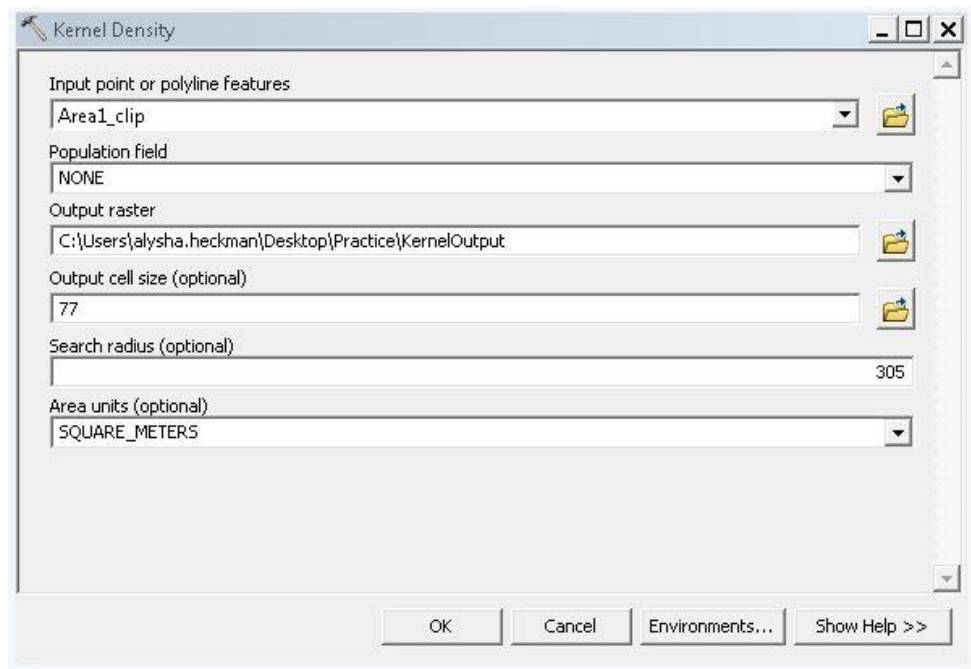
18. Click "Close" When the tool completes.
19. Symbolize your layer. To do this, use your Identify t 🛈 (   ) to click on a spot on the raster that is the smallest value (Around no points). See Example below.
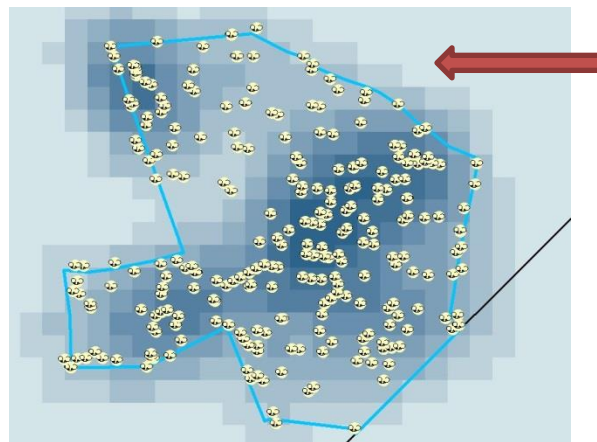
20. Once you have the value for that cell, double click on the Kernel Output layer and go to the symbology tab.

21. Click on the "Classify Button", and then the "Exclusion" button. In excluded values, type in "0-X" with X being the value you found with the identify tool. (i.e. 0-0.000061) and click "OK". Click "OK" again.
22. You can now change the color scheme of your layer by changing the value in the Color Ramp drop-down menu. When finished click "OK".
23. Remember, you can change the classification scheme of the kernel density layer, but always use the same scheme and breaks when comparing two density maps.