Determining Population Growth Using Map Layers

The amount of population growth can be determined for a particular area on the map (i.e. within a certain land use category, county, or urban growth area). The following steps provide a walk-through of how to download data, how to symbolize the layer in ArcMap, and how to calculate population growth by several selection methods.

Acquiring data

2.

First, download the shapefile of the dataset from the Washington State Open Data website at geo.wa.gov and add it to ArcMap.

1. Locate the population dataset you would like to use on geo.wa.gov. (All three population layer files contain the same data).

PS Housing New Units 2017 Dataset	-
This data set was developed as an information layer for the Washington State Department of Commerce. It is designed to be used as part of the Puget Sound Mapping Project to provide a generalized and standardized depiction of land uses and growth throughout the Puget Sound region. A tiled map version is available here for online viewing:	2
Custom License 🗮 3/30/2018 陆 Spatial Dataset 🔚 25,703 Rows	
Select Select from the from the drop down menu on the right hand side to begin downloading the shapefile of the dataset to your computer.	



3. Add shapefile to a new ArcMap document.

Symbolizing the Population Layer

- 1.) Right click on the layer and select **Properties** to open the Layer Properties Dialogue Box.
- 2.) Click the **Symbology** tab. Display Symbology Fields C

		Quantities
3.) Selec	t Quantities and Graduated Colors.	- Graduated colors

4.) Select the **Value** field and select the population dataset you want to use.



5.) You will get a message box stating the maximum sample size has been reached. Click OK.

General Source S how:	Selection	Display	Symbology	Fields	Definition Query	Labels	Joins & R	elates	Time	HTML Popu
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6.) Under **Classification** select the number of classes you would like to use (ex. 10).

Classificat	tion		
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Classes:	10	~	Classify

7) Select the	Classify	box to open the Classification Dialog Box
7.) Select the		box to open the Classification Dialog box.

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columns: 1	20	Show Mean	Break Values			
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-19.	00000 251.500000 522.0	00000 792.500000 1063.000	001 ОК			

8.) Select the **Sampling ...** box to open the Data Sampling Dialogue Box.

9.) Change the **Maximum Sample Size** from 10,000 to 1,000,000.

Maximum Sample Size: 1000000

Classification			Classification Statisti	cs
Method: Classes: Data Exclusion	Natural Brea	ks (Jenks) v	Count: Minimum: Maximum:	257 A -42.0000 1063.0000
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olumns: 1	100 ≑	Data Sampling	×	>
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- Click on the Data Sampling Dialogue Box. 10.)
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Click on the Classification	n Dialogue Box.	
Select a graduated Color Ramp:	to	o display the da
Under Label change the labels to rea	move the extra deci	Lat mal places42
Optionally, you can change the first cl to no color so it does not display. Double Symbol Selector Dialogue Box. Under	lassification section click the color box color: and	a of negative gr a under Symbol Dutine Color:

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			Green	Jade	Blue			
							-	

16.) Optionally, you can also remove the outline for each color box by selecting the color box for the other classifications under Symbol to open the Symbol Selector
 Dialogue Box. Under Outine Color: Select No Color.

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17.) Or you can change the outline color to match the fill color by selecting

Fill Color:	and select	More Colors
Fill Color:	and select	More Colors.

HSV 🗸

CMYK HSV



In the Color Selector Dialogue Box use the drop down box to select **RGB**.

Features Categories Quantities Graduated colors Graduated symbols Proportional symbols Dot density Charts	Fields Value: N Normalization: no	Symbol Selector	now values.		impon		
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Select **RGB** in the Color Selector Dialogue Box if it is not already selected and type the **RGB** numbers from the **Fill Color** in the Outline Color Dialogue Box. (Note: If you have **No Color** previously selected you may need to select a preset color for the **Outline Color** before changing to a custom color to open the **RGB** box.)



<u>Selecting Polygons Using Query (to select a land use or other attribute)</u>

To select polygons by certain attributes you can use the **Query Builder**. We will use the Rural Transition land use subcategory as an example.

1.) To open the	Query Builder right click on the layer and select Properties
2.) Select the D Query E	efinition Query tab Fields Definition Query Labels and select
3.) For selectiona.) In the Query double click	n by a single attribute: Builder Dialogue Box, select the attribute you want to use (ex. SUB_CAT) by ing on it.
b.) Click thec.) Select the value	Get Unique Values . Ilue you want to examine (ex. Rural Transition (1 unit per 5 acres to 1 un v))
Layer Properties	×
General Source Select Definition Query:	Query Builder × s Time HTML Popup OBJECTID_12
	SELECT * FROM New_Units_2017_Copy3 WHERE: SUB_CAT = 'Rural Transition (1 unit per 5 acres to 1 unit per 9.9 acres)' Clear Verify Help Load Save OK Cancel
	OK Cancel Apply

- d.) Click verify to see if there are errors. If there are errors clear the Query Builder and make sure the equation matches the one above (or is similar if choosing a different equation).
- e.) If the expression is verified, click on the Query Builder Dialogue Box.
- f.) Click on the Layer Properties Dialogue Box.
- g.) Skip to the last section of the tutorial: Calculating population growth for a selection

4.) For selection by multiple attributes:

- a.) In the Query Builder Dialogue Box, select the attribute you want (ex. ^{SUB_CAT}) by double clicking on it.
- b.) Click n once.
- c.) Click the parenthesis symbol once.
- d.) Select Get Unique Values
- e.) Select the attributes you want to use by double clicking on them (ex. "National Forest"). The attributes should show up inside the parentheses. Separate each attribute you select by adding a comma and a space. The formulas below are examples:

SUB_CAT IN('Active Open Space and Recreation', 'National Forest', 'National Park', 'Natural Preservation and Conservation', 'Other Forest Lands', 'Primary Forest Area')

SUB_CAT IN('Large Lot Residential (1 unit per 10 acres to 1 unit per 19.9 acres)', 'Low Density Urban Residential (1.1-3 Units/Acre)', 'Mixed Use/Planned Neighborhood (3.1-12 Units/Acre)', 'Residential (12+ Units/Acre)', 'Rural Transition (1 unit per 5 acres to 1 unit per 9.9 acres)', 'Traditional Single Family Residential (3.1-12 Units/Acre)', 'Urban Edge (1 unit per acre up to 1 unit per 4.9 acres)', 'Very Large Lot Residential (1 unit per 20 acres or more)')

eneral	Source	Select	Query Builder	×	Time	HTML Popus
Definition Query: SUB_CAT IN('Active O Preservation and Cons		ctive Oj d Conse	OBJECTID_12 OBJECTID_1 OBJECTID_2	^		
			OBJECTID SUB_CAT	~		
			= <> Like			
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	Query Bu	ilder	Is In Null Get Unique Values Go To: SELECT * FROM New Units 2017 Copy3 WHERE:			
			SUB_CAT IN('Active Open Space and Recreation', 'National Fore, 'National Park', 'Natural Preservation and Conservation', 'Other Forest Lands', 'Primary Forest Area')	est' ^		
			Clear Verify Help Load Sa	ive		
			OK Car	ncel		

- f.) Click verty to see if there are errors. If there are errors clear the Query Builder and make sure the equation matches the one above (or is similar if choosing a different equation).
- g.) If the expression is verified, click on the Query Builder Dialogue Box.
- h.) Click on the Layer Properties Dialogue Box.
- i.) Skip to the last section of the tutorial: Calculating population growth for a selection

Selecting Polygons within a County (or other area)

Next, we will select an area based on county boundaries. The same process could be used to examine population within an urban growth area or other boundary. For the purposes of this tutorial, we are interested in population growth in Thurston County. A county boundary layer can be downloaded from geo.wa.gov in the same way as the General Land Use layer, or from elsewhere online.

Export Data...

1. Select Thurston County from the County Boundary layer using Select by Attributes.

OBJEC NAME NAME		reate a ne	w selection		
Shape Shape	_Length _Area				
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>	>=	And	'San Juan' 'Skagit'		
<	< =	Or	'Snohomish' 'Thurston'		
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2. Right click on the county layer and select



3. Export selected features.



4. Add exported data to the map as a layer. The new layer shows the county boundaries of Thurston County.

ArcMap		×
	Do you want to add the exported data to the map as a layer?	
	Yes No	

5. Clip the population layer to the new Thurston County boundary layer using the clip tool from the ArcGIS Toolbox. A new layer will be added to the map showing population in Thurston County.

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- 6. Optionally, symbolize the new Thurston County population layer using the desired color gradient, as described previously.
- 7. Skip to the last section of the tutorial: *Calculating population growth for a selection* (If you used this selection method, you can skip steps 1 and 2)

Selecting Polygons Using Lasso

If you want to select an area to examine manually, (i.e. if you do not have established boundaries to query from, the Select by Lasso tool can be used.

1.) Make sure the layer you want to select is turned on and use the selection tool and select

the Select by Lasso tool.



2.) Click and hold on the map where you want to make your selection and draw the shape, release when finished.

Calculating population growth for a selection

The amount of growth can be calculated for an area of interest after it is selected by any of the above methods, or by any other method of selecting features.

1.) Right click on the layer you selected from and navigate to $\stackrel{\text{Selection}}{\rightarrow}$

Create Layer From Selected Features . (Note: Creating a layer from selected features will only have data from the selected features in the **Attribute Table** of the new layer.)



- 2.) A new layer including the selected features will show up in Table Of Contents **7** × that you may choose to symbolize following the previous symbology steps.
- 3.) Right click on the new layer and select Open Attribute Table

Statistics...

- 4.) Scroll to the year or range of years for which you would like to calculate growth (ex. <u>NEW_HU_17</u>).
- 5.) Right click on the column heading and select 2

6.) A new window will pop up showing a histogram and summary statistics for the selected column. These include sum, mean, minimum, maximum, standard deviation, and count. Sum gives the population growth for the selected area.

