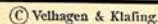
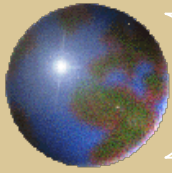


The Choropleth Map: How to Use it and Why

Michael P. Larson
OSU Cartography Services





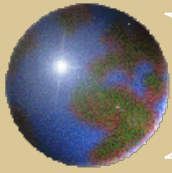


Why are we discussing Choropleth Maps?

Simple and easy to create

Widely used (some may even say over-used) and trendy

[Link](#)



Definition: Choropleth Map

A thematic map in which areas are distinctly colored or shaded to represent classes of a particular phenomenon. (esri GIS Dictionary)

Enumeration Areas

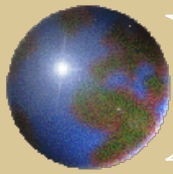
countries, states, counties, census tracts, etc.

Common Methods for Classification

Equal intervals/Equal steps method

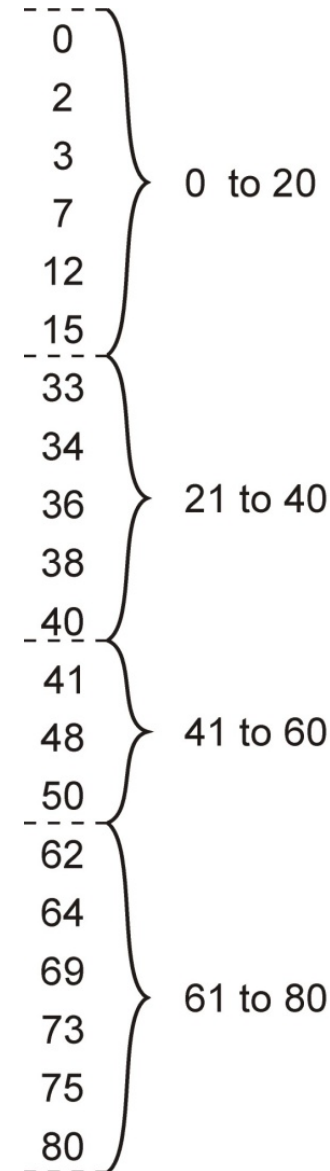
Quantile method

Natural breaks



Equal Interval/ Equal Steps Method

Each class occupies an equal interval along a number line.

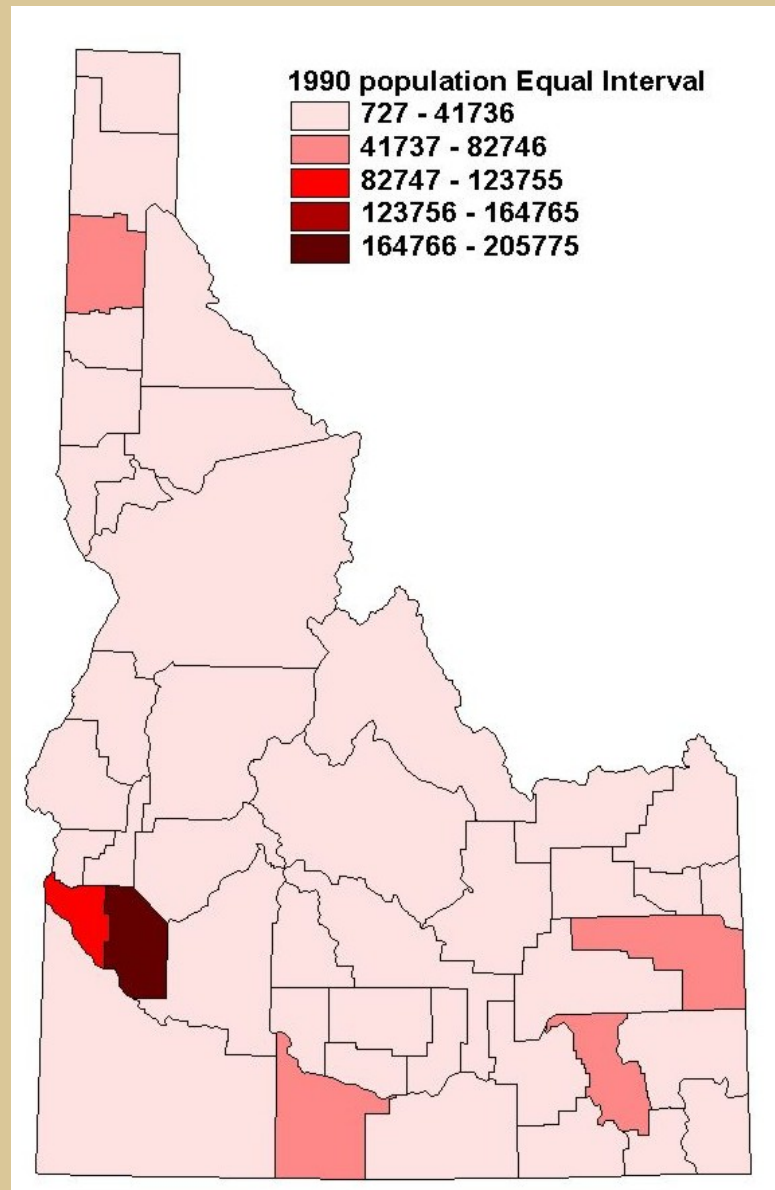
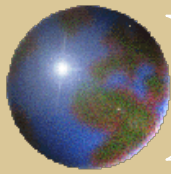


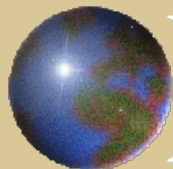
Equal Steps

Four Classes

Range 0 to 80

80 divided by 4 give a
class range of 20





Classification

Classification
Method: **Equal Interval**
Classes: **5**

Data Exclusion
Exclusion ... **Sampling ...**

Columns: **100** ☐ Show Std. Dev. ☐ Show Mean

Classification Statistics

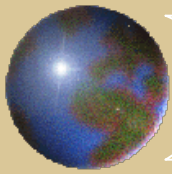
Count:	44
Minimum:	727
Maximum:	205775
Sum:	1006749
Mean:	22881
Median:	11285
Standard Deviation:	34768

Break Values %

41737
82746
123756
164765
205775

☐ Snap breaks to data values

OK **Cancel**



Quantile Method

Data are rank-ordered and equal numbers of observations are placed in each class.

0	Class 1	}
2		
3		
7		
12	Class 2	}
15		
33		
34		
36	Class 3	}
38		
40		
41		
48	Class 4	}
50		
62		
64		
69		
73		
75		
80		

Quantiles

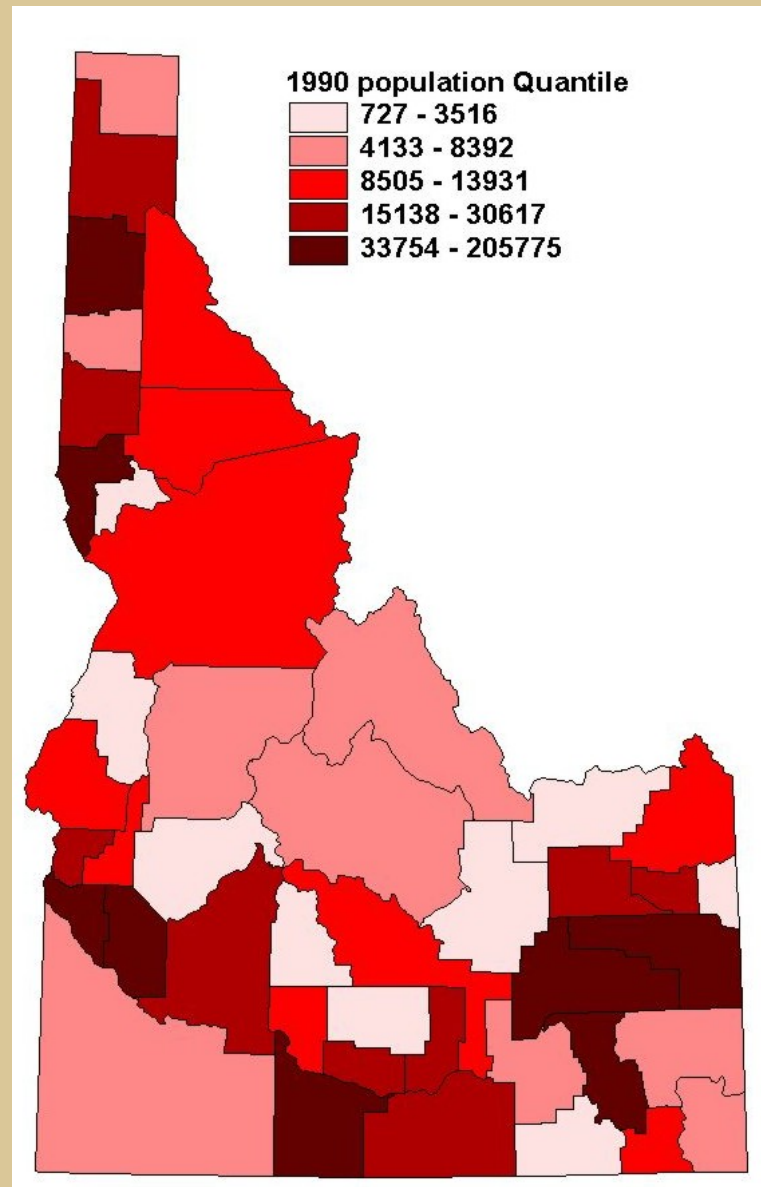
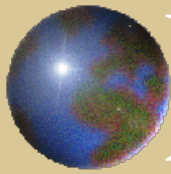
(Quartiles)

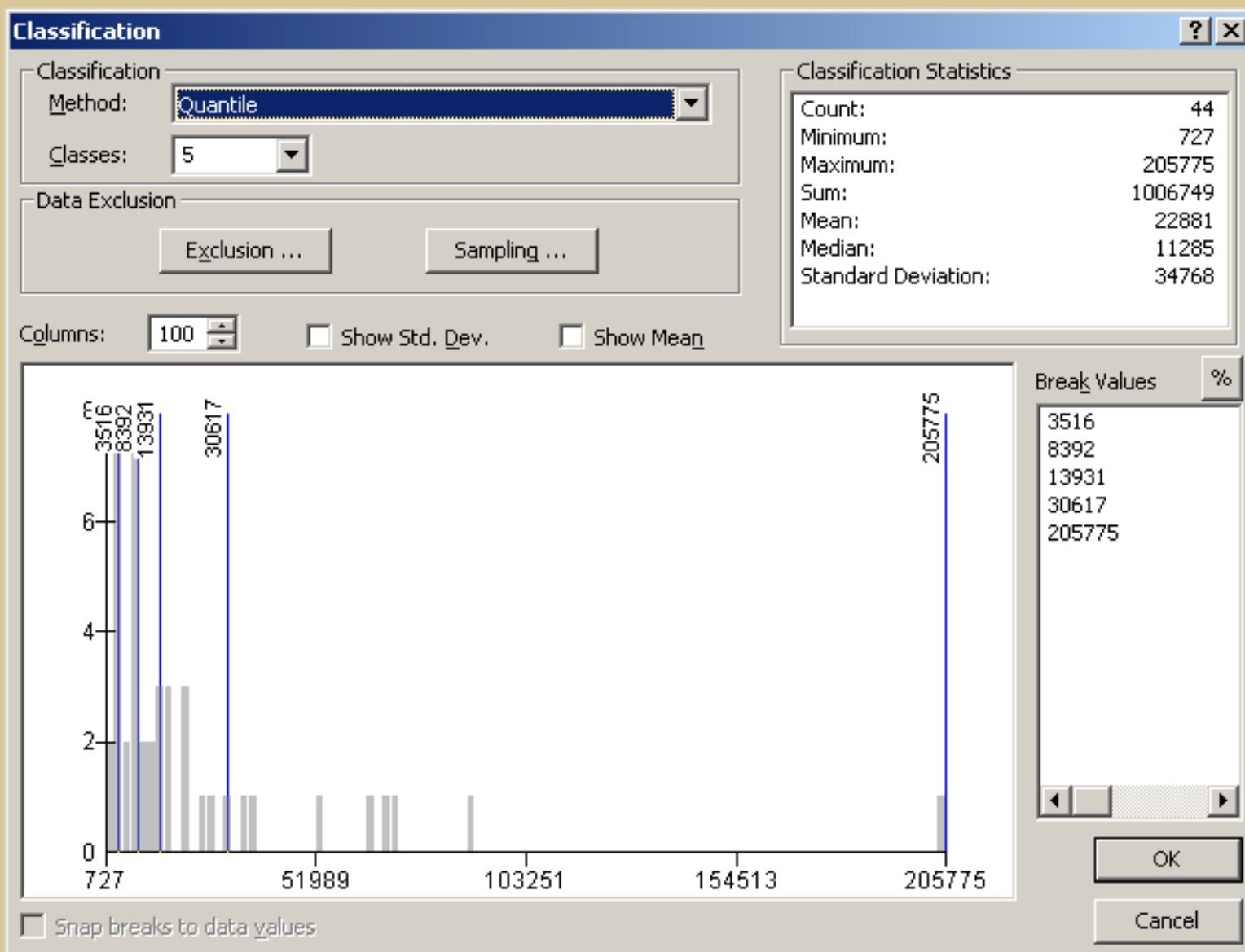
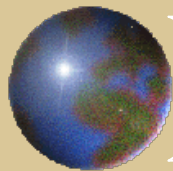
Four Classes

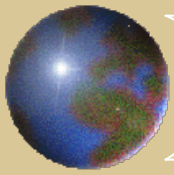
There are 20 data values

The number of data values divided by the number of classes

20 divided by 4 gives 5 data values per class

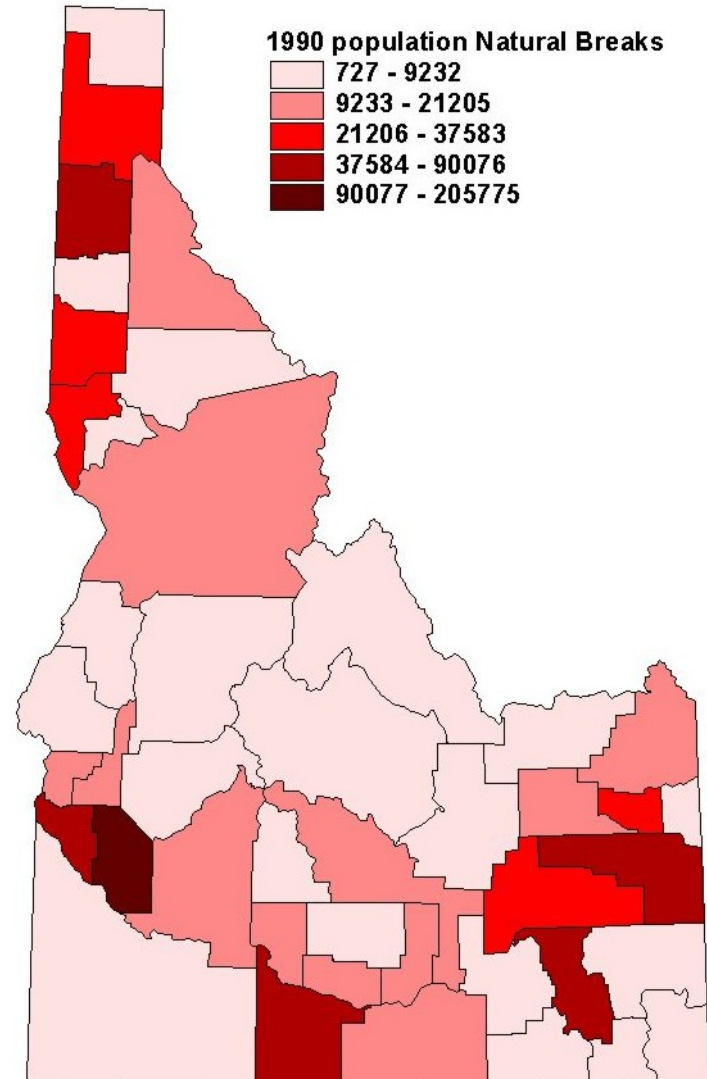


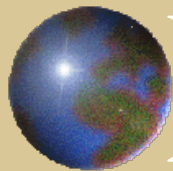




Natural Breaks Method

Defines classes based on natural occurring breaks or gaps in the data set





Classification

Classification
Method: **Natural Breaks (Jenks)**
Classes: **5**

Data Exclusion
Exclusion ... **Sampling ...**

Columns: **100** ☐ Show Std. Dev. ☐ Show Mean

Classification Statistics

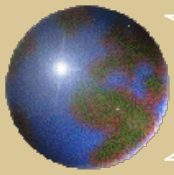
Count:	44
Minimum:	727
Maximum:	205775
Sum:	1006749
Mean:	22881
Median:	11285
Standard Deviation:	34768

Break Values %

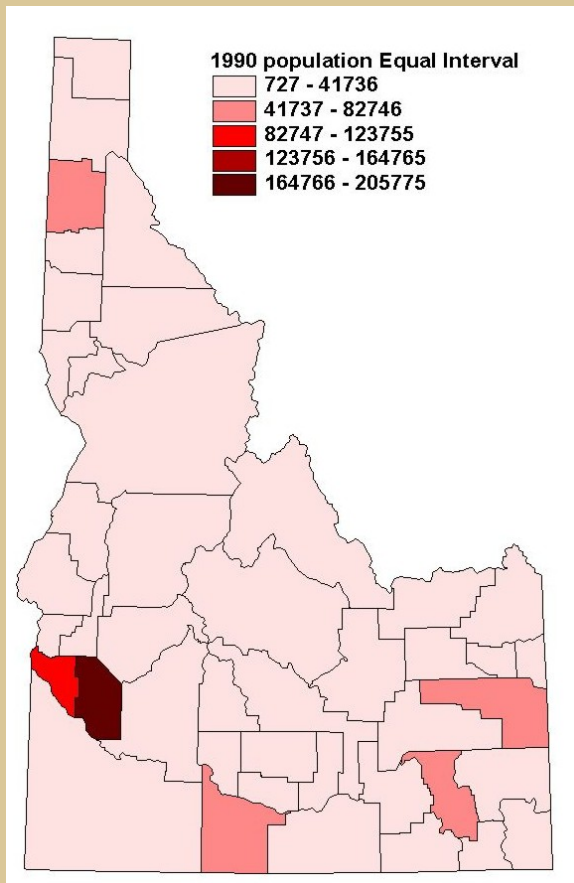
9232
21205
37583
90076
205775

☐ Snap breaks to data values

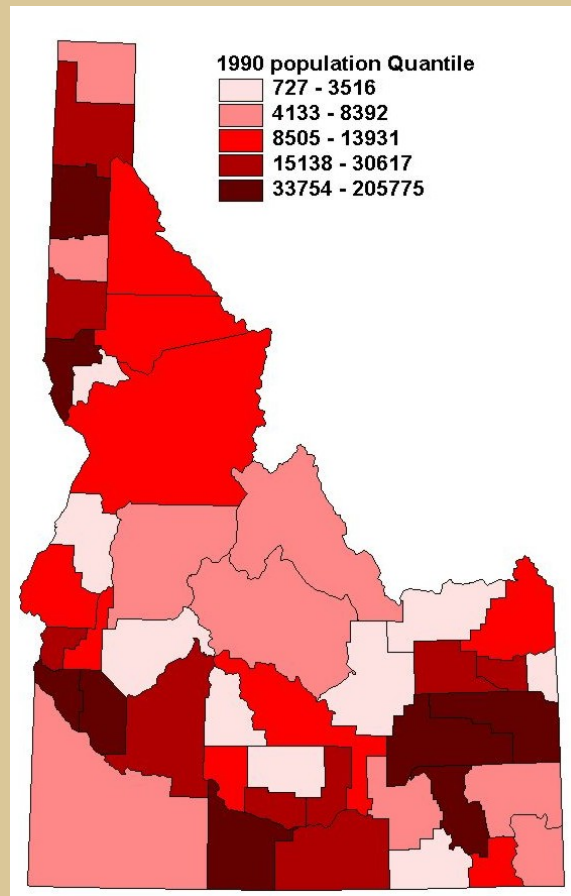
OK **Cancel**



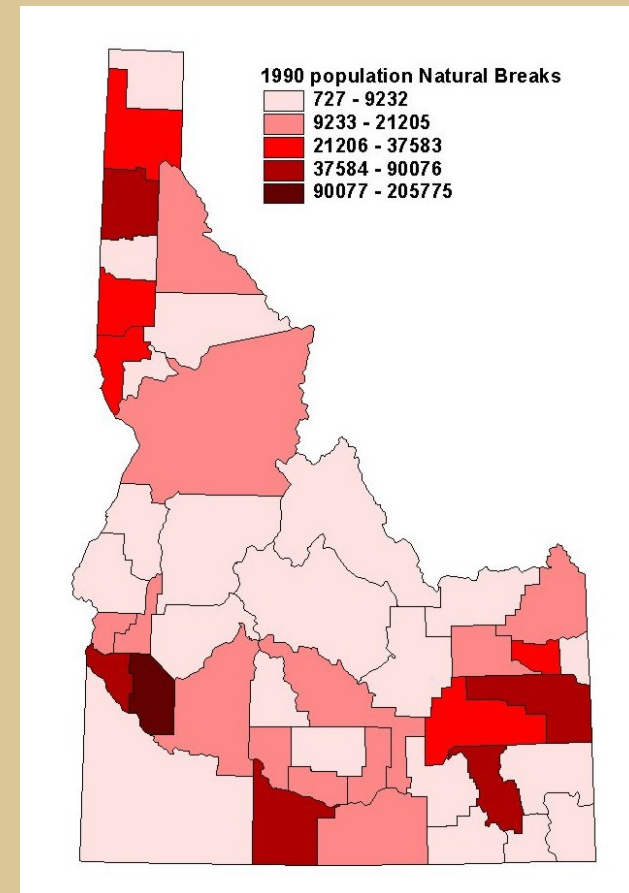
Equal Interval

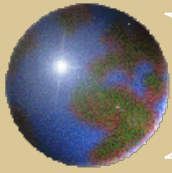


Quantile

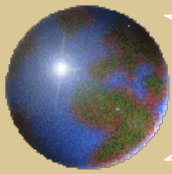


Natural Breaks





Limitations of Choropleth Maps:



Quantiles - Quartiles

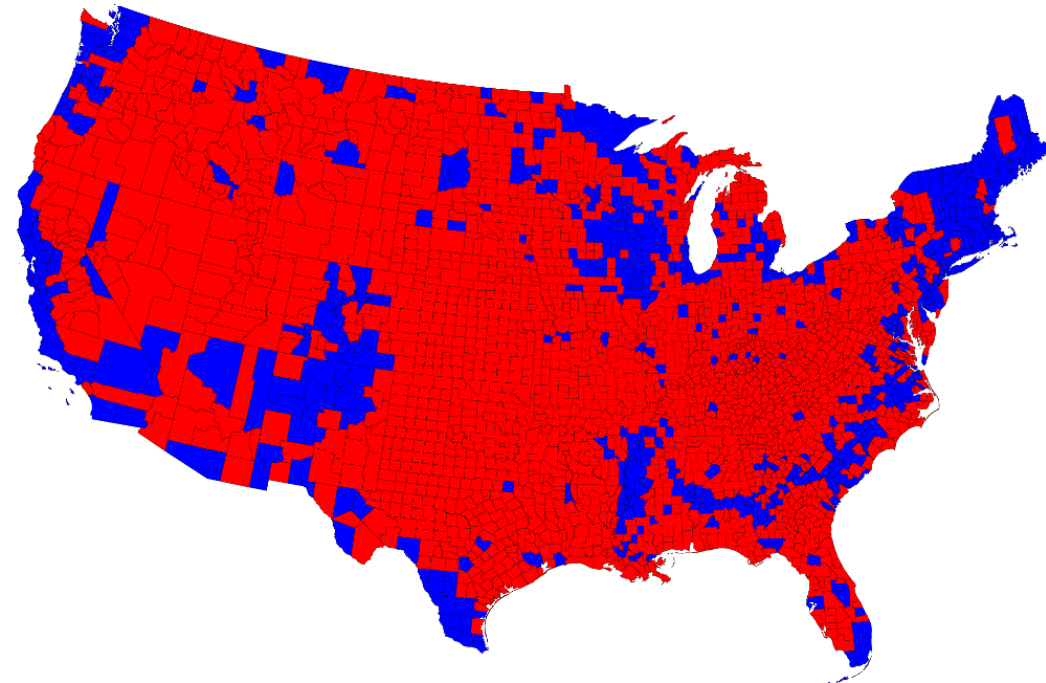
1 5 7 15 26 | 29 34 35 42 47 | 48 51 54 62 76 | 83 84 85 89 93

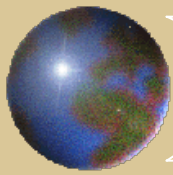
Equal Steps

1 5 7 15 | 26 29 34 35 42 | 47 48 51 54 62 | 76 83 84 85 89 93

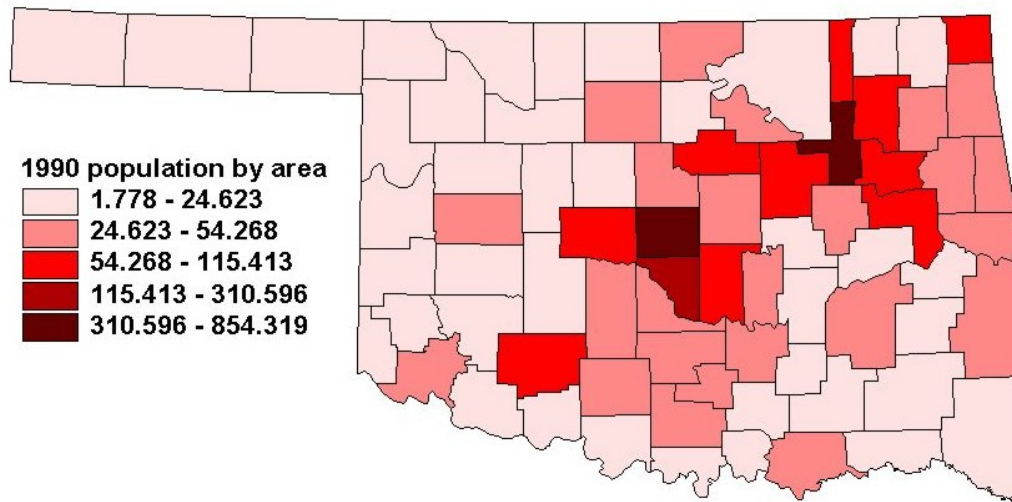
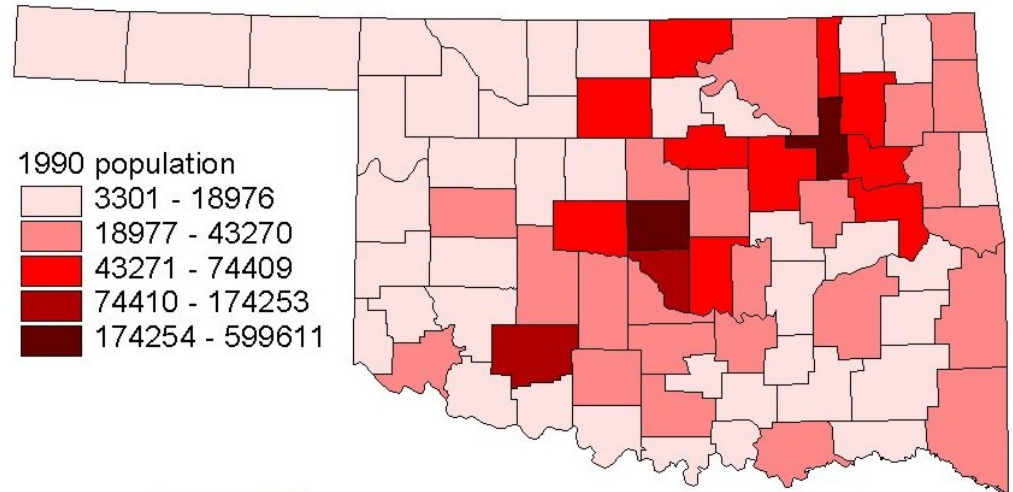
1-23 24-46 47-69 70-93

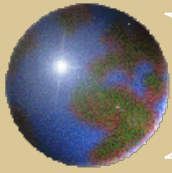
Individual data loss



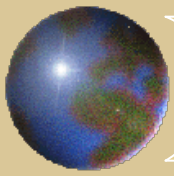


Unless enumeration areas are exactly the same size, densities, ratios or percentages must be used instead of absolute numbers.



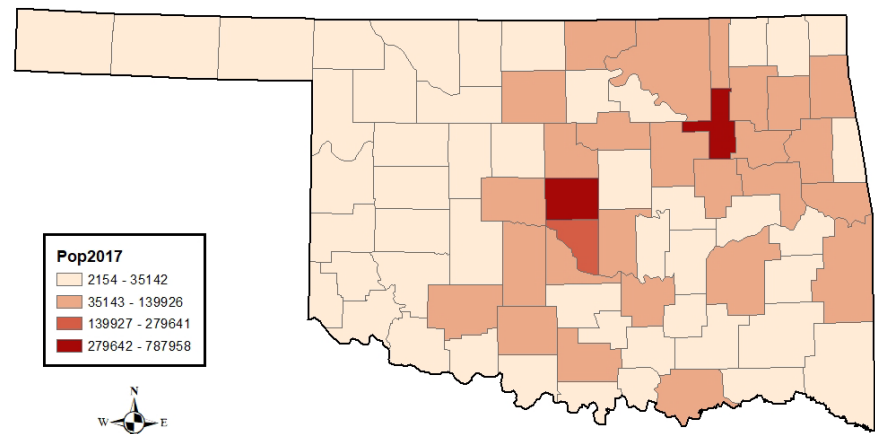


Choropleth Symbology: Dos and Don'ts



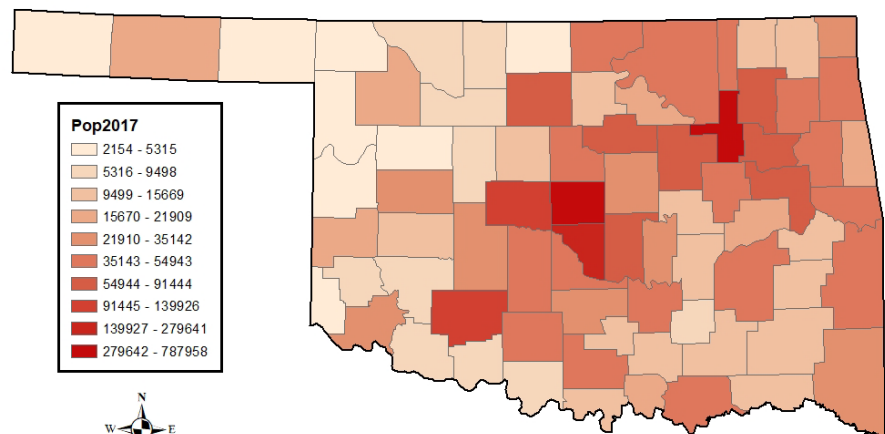
Choose the appropriate number of classes,
Usually no fewer than 3 classes and no more
than 7 classes.

Oklahoma, 2017 Population

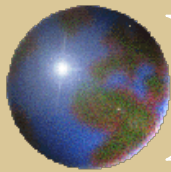


0 50 100 Miles

Oklahoma, 2017 Population



0 50 100 Miles



Layer Properties

General

Source

Selection

Display

Symbology

Fields

Definition Query

Labels

Joins & Relates

Time

HTML Popup

Show:

Features

Categories

Quantities

Graduated colors

Graduated symbols

Proportional symbols

Dot density

Charts

Multiple Attributes

Draw quantities using color to show values.

Import...

Fields

Value: Pop2017

Normalization: none

Classification

Natural Breaks (Jenks)

Classes: 32

Classify...

Color Ramp:

Sym...	Range	Label
	2154.000000 - 2689.000000	2154.000000 - 2689.000000
	2689.000001 - 3966.000000	2689.000001 - 3966.000000
	3966.000001 - 4878.000000	3966.000001 - 4878.000000
	4878.000001 - 5642.000000	4878.000001 - 5642.000000
	5642.000001 - 6183.000000	5642.000001 - 6183.000000
	6183.000001 - 7693.000000	6183.000001 - 7693.000000
	7693.000001 - 9031.000000	7693.000001 - 9031.000000
	9031.000001 - 9498.000000	9031.000001 - 9498.000000

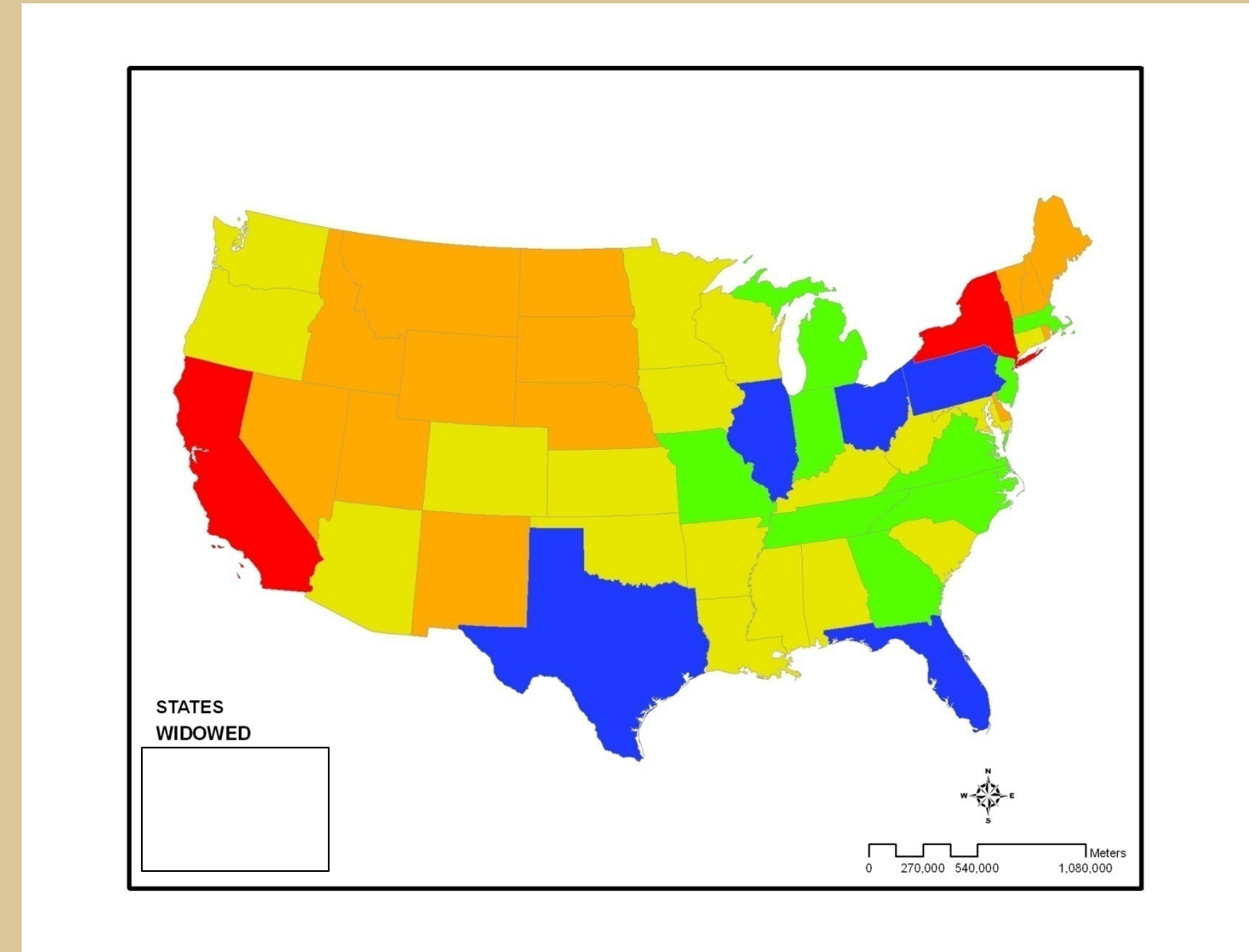
☐ Show class ranges using feature values

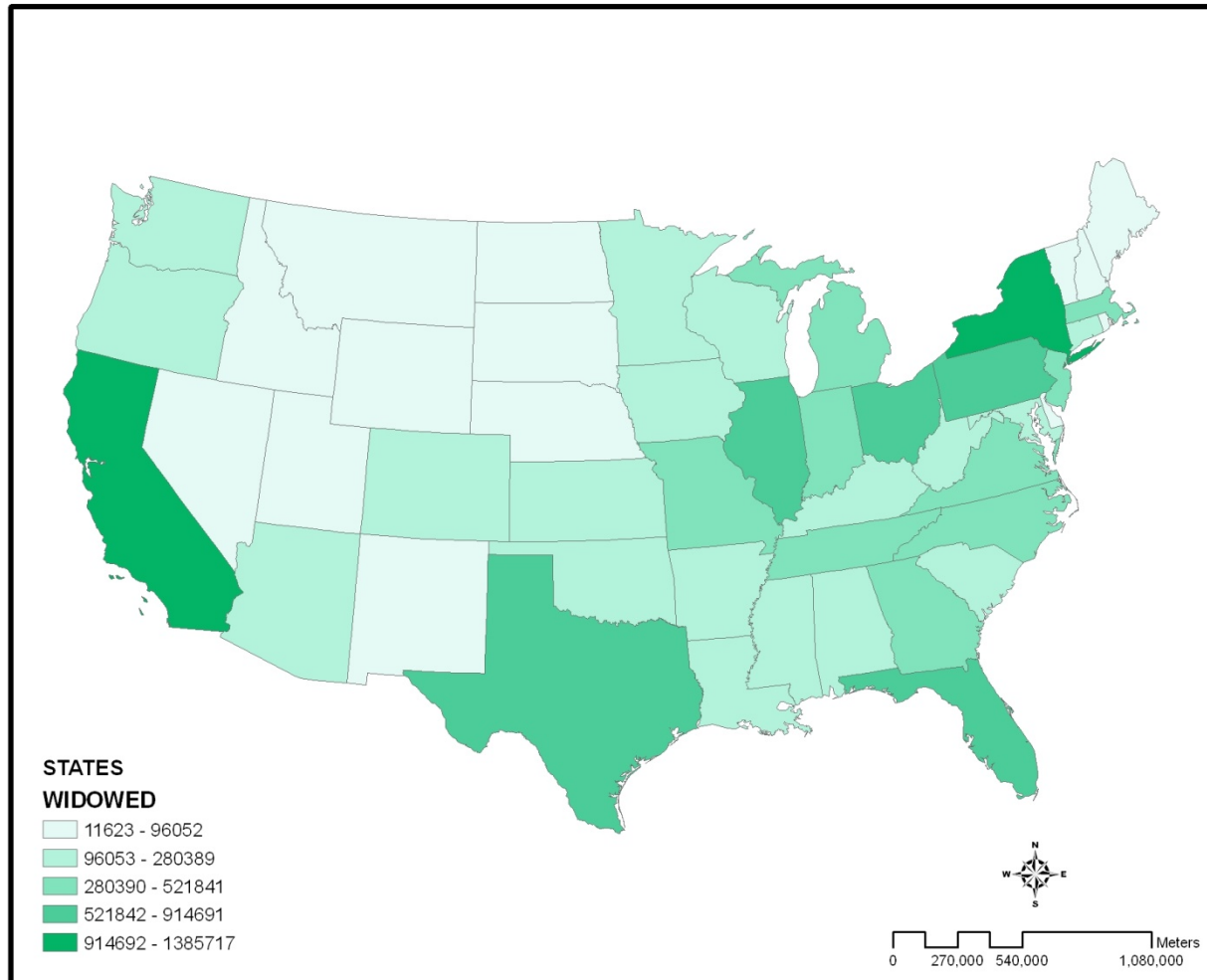
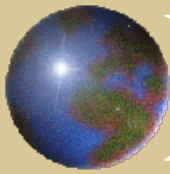
Advanced

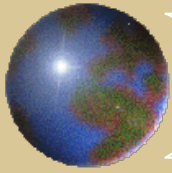
OK

Cancel

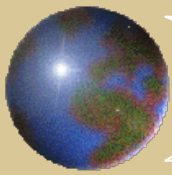
Apply



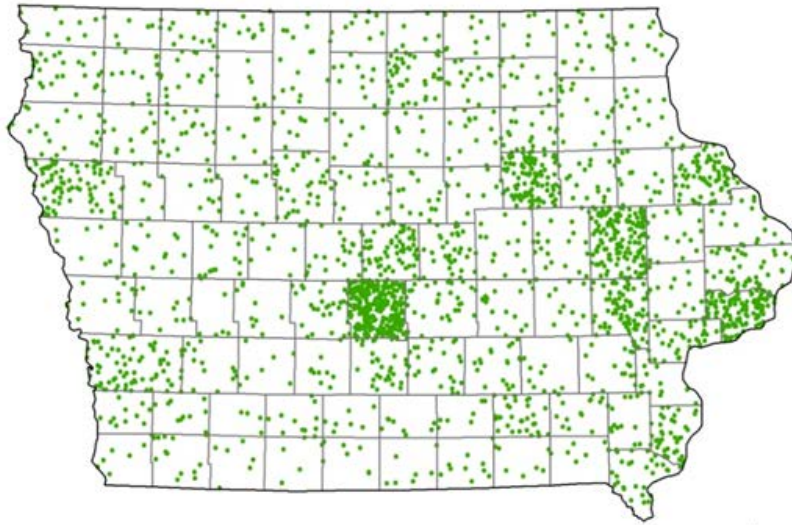




Other Types of Area and Density Maps



Iowa Population in 1990

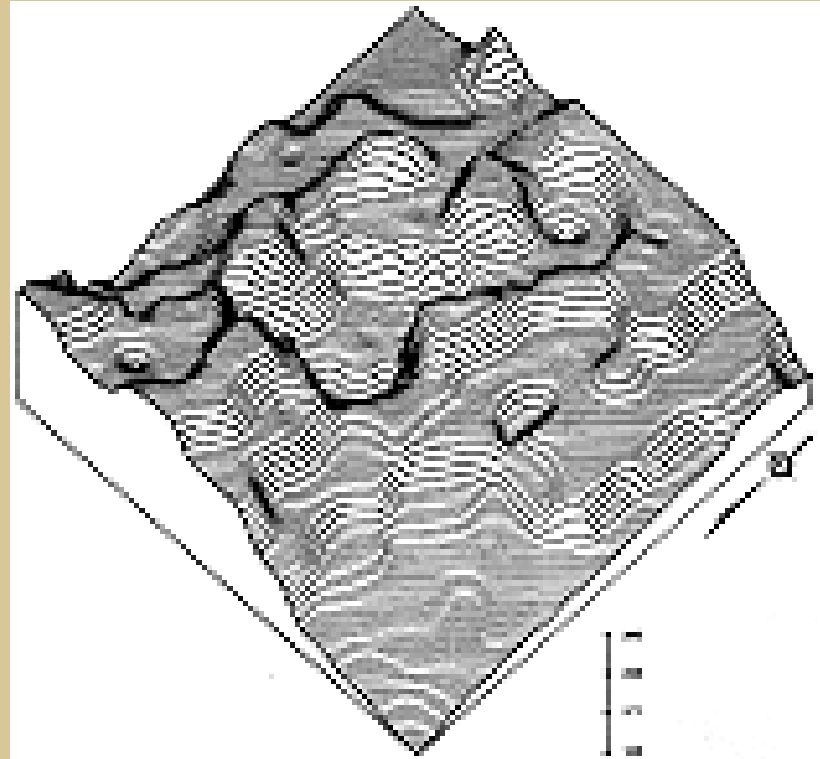


Iowa_Counties

1 Dot = 1,200

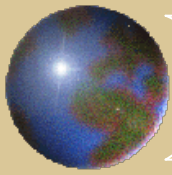
POP1990

0 25 50 75 Miles



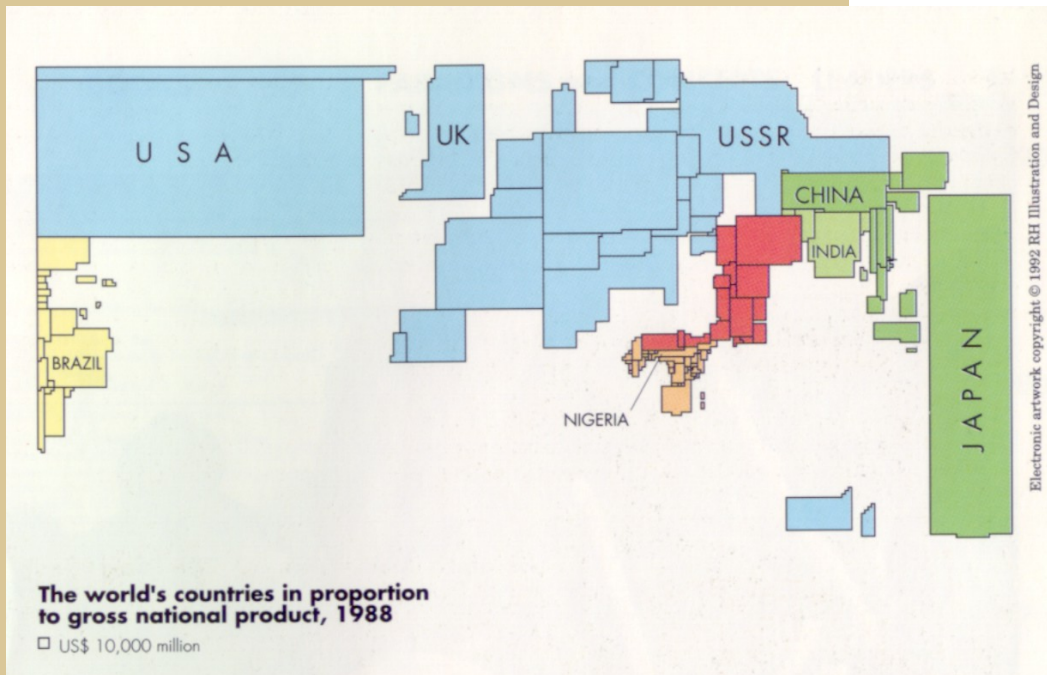
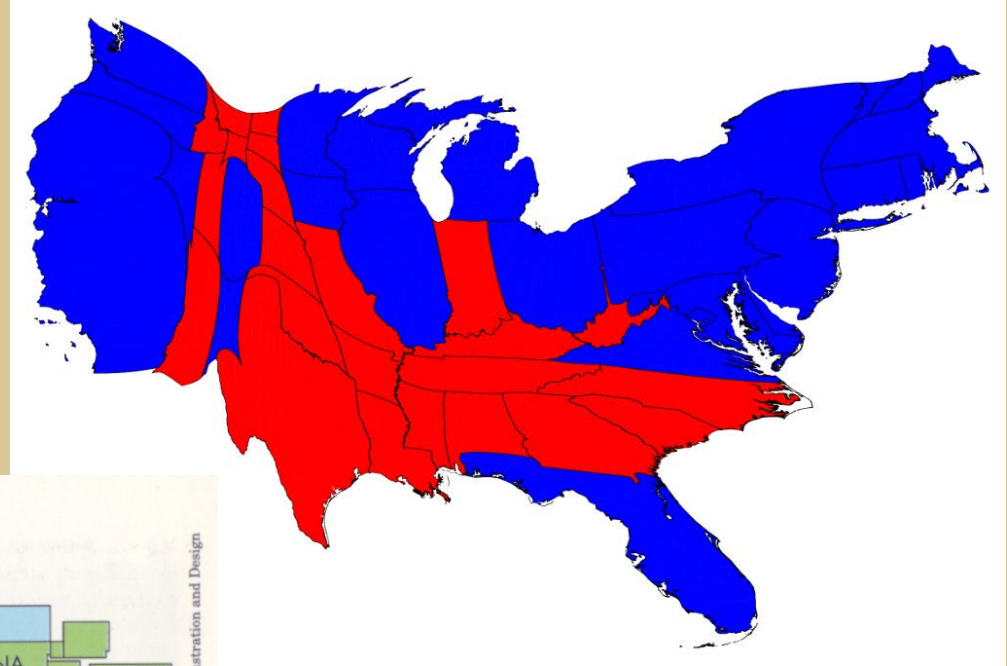
Dot Density map

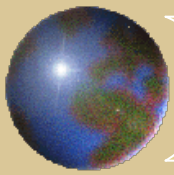
Surface map



Cartograms:

a map with enumeration
area sizes scaled to data





Multivariate Mapping:

Representing two or more variables on a map

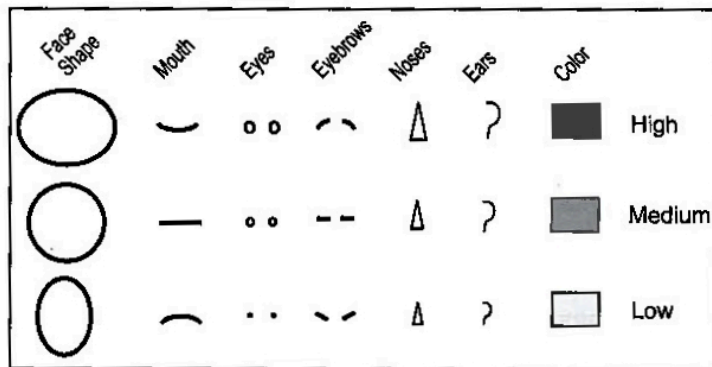
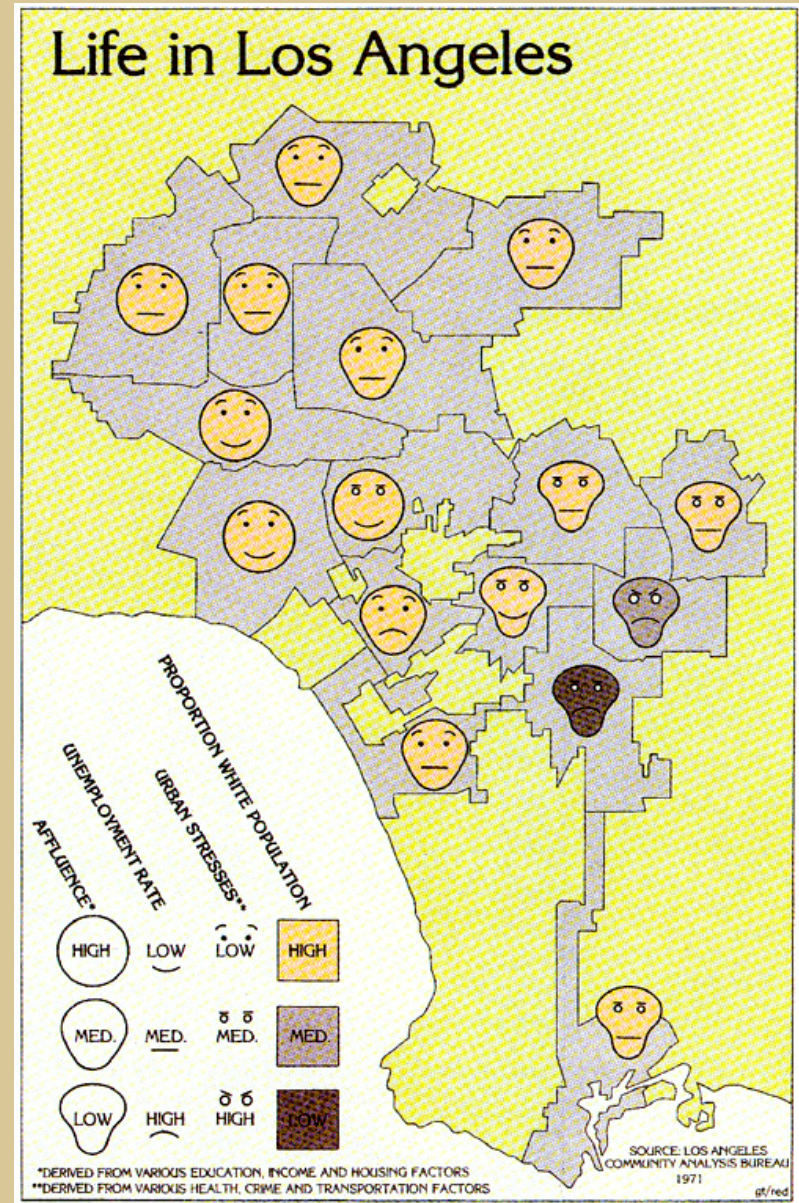
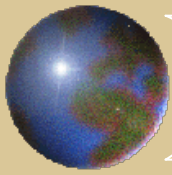


FIGURE 9.6. Chernoff faces can represent up to 15 variables. The chart here shows seven.





Choropleth maps – What have we learned?

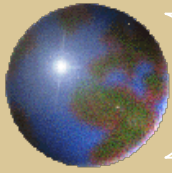
Choropleth mapping has become commonplace in part due to the ease of creation.

They are good at showing statistical data compiled on enumeration areas.

There are some limitations with data loss, being unable to see the internal distribution within enumeration areas, and additional limitations when comparing between units.

Chose colors and number of classes wisely.

Possibly consider using other types of maps.



Questions?