GIST 7128
ArcGIS 1: Introduction

Lecture 3
Symbolizing & Classifying Features

Module 3 Topics

- **Lecture**
  - Feature Symbolization
  - Feature Classification
- **Lab**
  - Chapter **7**. Symbolizing Features
  - Chapter **8**. Classifying Features
- **Project**
  - EastCity – Part **2**: Symbolize, Classify, and Label (5%)

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Basic Symbol Settings

Symbol properties depend on feature geometry type:

- **Point**
  - Shape
  - Color
  - Size
  - Angle
- **Line**
  - Color
  - Style
  - Width

- **Polygon**
  - Fill Pattern
  - Fill Color
  - Outline Width
  - Outline Color
- **Label**
  - Color
  - Font
  - Size
  - Style
- **Annotation**
  - Label + Angle, Spacing, etc. (later)

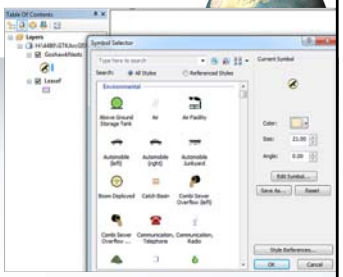
3

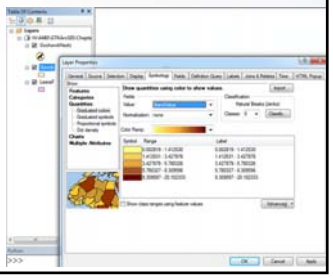
Symbolizing Features

Applying symbol style to a feature

Two methods of symbolization:

1. **Single Symbol**
   - Default symbolization
   - All features symbolized the same
   - Random selection from ESRI styles applied when data are added to map
   - Change default by clicking on symbol in ToC to open Symbol Selector
2. **Classifying on attribute values**
   - **Qualitative** – characteristics → "Categories" in ArcGIS
   - **Quantitative** – numerical values → "Quantities" in ArcGIS





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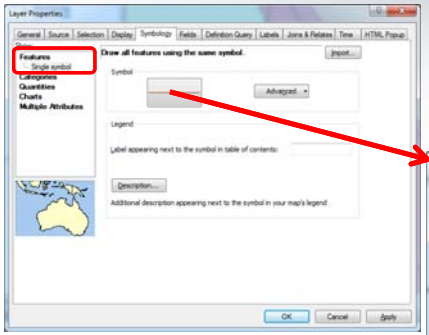
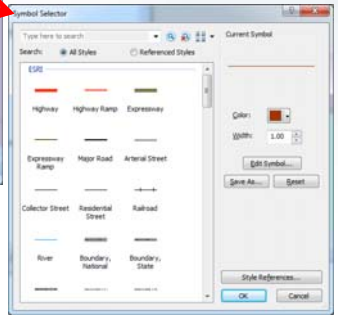
Symbolizing Features: Single Symbol



- All features symbolized in same way
- Default (and random)
- Show: Features > Single Symbol



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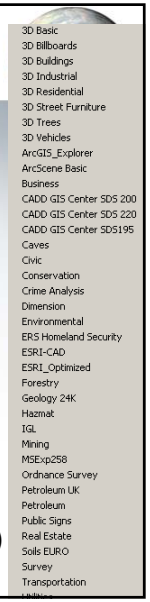
Symbolization Styles

- Symbols are grouped into **Styles**
  - Many different styles, usually industry-specific
- Style Examples:
  - Forestry, Weather, Real Estate, Crime,…
- Style Alternatives:
  - Default style is the ESRI style (basic symbols)
  - Other Styles can be referenced (loaded)
  - Also use ad hoc symbology or edit existing styles
  - Can create custom styles (Customize > Style Manager)
- Styles contain symbology for:
  - Labels
  - Points, Lines, Polygons
  - Color ramps
  - North arrows, scale bars, scale bar text (in layout view)
  - Anything you can display on a map



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Symbolizing Features: Classification

Symbolizing based on attribute value (classifying)

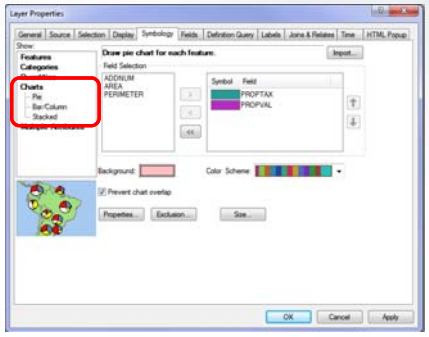
Categories *(qualitative)*
- Unique values*
- Unique values, many
- Match to… style

Quantities *(numeric)*
- Graduated colors*
- Graduated symbols
- Proportional symbols
- Dot Density

Charts
- Pie*
- Bar/Column
- Stacked

Multiple Attributes
- Quantity by category

* *to examine these in slides ahead* →



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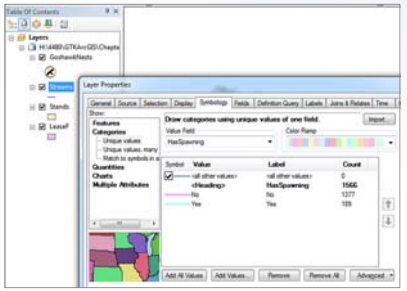
Classification: Categories > Unique Values

- Usually for data organized in a few categories
  - e.g. zoning, land cover, soil type, road surface, municipality type
- Can use for (discrete) numeric data
  - e.g. people/household, number of lanes, pipeline install. year
- Applied with a single attribute value
- Number of classes is defined by the data
  - i.e. number of unique values in the data
  - Should keep in range of 2 to about 12



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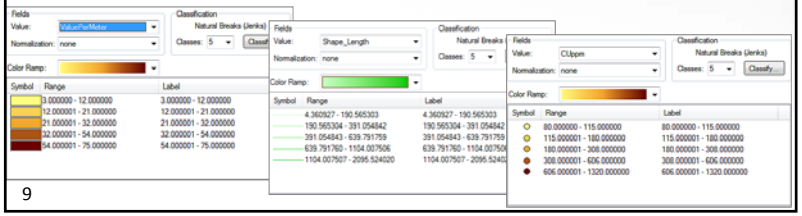
Classification: Quantities > Graduated colours

- For numeric data only
  - e.g. property value, stand volume, pipe diameter, well depth
- Can apply to point, line, and polygon data
  - Polygons would be graduated colour fills ("choropleth map")
  - Lines would vary in colour and possibly thickness
  - Points also vary in colour and possibly size
- Colour often varies from light (low value) to dark (high value)



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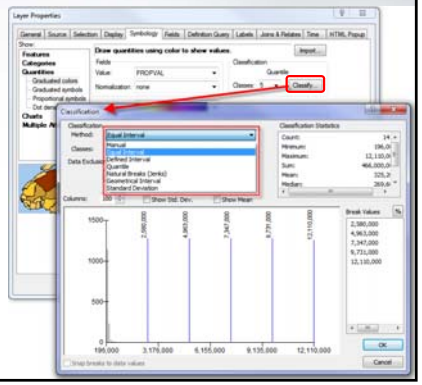
Classification: Quantities > Graduated colours

- User can select number of classes (ranges)
- Different **methods** to set upper/lower class limits:
  - **Manual**
  - **Equal Interval***
  - **Defined Interval***
  - **Quantile***
  - **Natural Breaks (Jenks)***
  - **Geometric Interval**
  - **Standard Deviation***
- Same rules for **Graduated symbols**

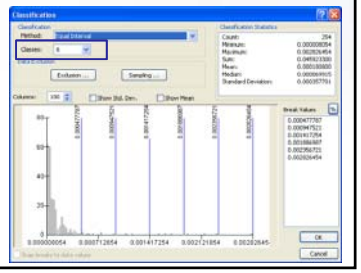


10 * *to examine in some detail, next →*

Classification: Quantities > Graduated colours

Method: Equal Interval

- Splits full range of attribute values into equal-sized sub-ranges, based on specified number of classes
- E.g: 3 classes for parcel value range of $100K..$1,000K:
  - → 490 parcels
  - → 7 parcels
  - → 3 parcels



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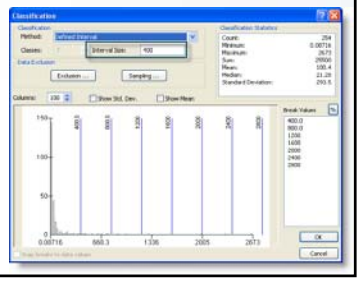
Classification: Quantities > Graduated colours

Method: Defined Interval

- Splits the full range of attribute values into equal-sized sub-ranges, based on specified interval value
- E.g: Interval of $150K for range of $100K..$1,000K:
  - $100 – 250K → 440 parcels
  - $251 – 400K → 50 parcels
  - $401 – 550K → 5 parcels
  - $551 – 700K → 2 parcels
  - $701 – 850K → 2 parcels
  - $851 – 1,000K → 1 parcel



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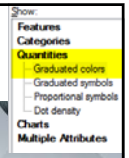
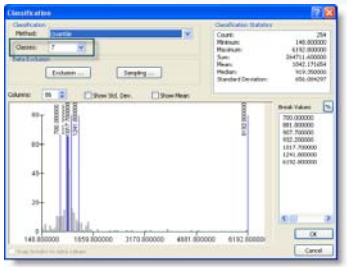
Classification: Quantities > Graduated colours



Method: Quantile

- Each class contains an equal number of features, based on specified number of classes
- E.g: 5 classes for value range of $100K..$1,000K, for total of 500 parcels:
  - $100 – 150K → parcels
  - $151 – 170K → parcels
  - $171 – 175K → parcels
  - $176 – 200K → parcels
  - $201 – 1,000K→ parcels



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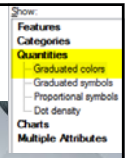
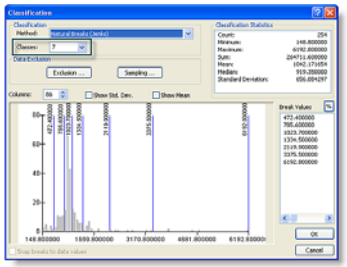
Classification: Quantities > Graduated colours



Method: Natural Breaks (Jenks)

- Classes created on natural groupings inherent in data, based on specified number of classes
  - Groupings will focus on natural "clusters" of data values to group similar values and maximize the interclass differences
- E.g: 5 classes for value range $100K..$1,000K, for total of 500 parcels:
  - $100 – 140K → 60 parcels
  - $141 – 175K → 240 parcels
  - $176 – 225K → 150 parcels
  - $226 – 350K → 40 parcels
  - $351 – 1,000K →10 parcels



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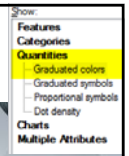
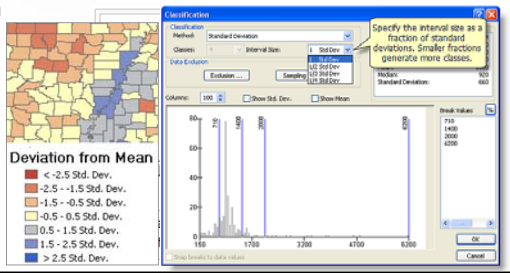
Classification: Quantities > Graduated colours



Method: Standard Deviation

- ArcMap calculates mean & standard deviation of values
- Classes created with equal value ranges, based on specified fraction of standard deviation (1, ½, ⅓, ¼)
- E.g: 1 SD for 500 parcel value range: $100K..$1,000K:
  - **Mean = $250K and SD = $40K**
  - Normal Distribution
  - $100 – 150K → 2
  - $150 – 190K → 10
  - $190 – 230K → 68
  - **$230 – 270K** → 340
  - $270 – 310K → 68
  - $310 – 350K → 10
  - $350 – 1,000K → 2
- Two hues →



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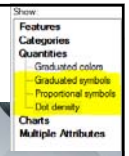
Classification: Quantities > Symbols & Dots



Alternatives to class-based colouring:

Graduated Symbols

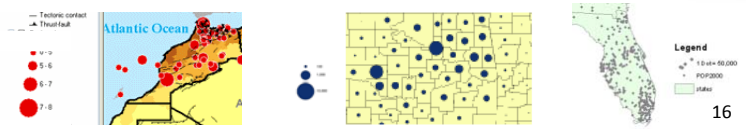
- Classes are represented by a symbol of a particular size
- All features within each class are drawn with the same symbol

Proportional Symbols

- Symbol size based on actual data value (except in legend)
- No classes; not ideal if too many values or too wide a range

Dot Density

- Each dot represents a specified value (e.g. 1 dot = 1,000 people)
- Polygon features only; dots distributed randomly



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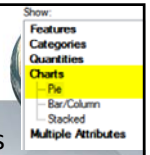
Classification: Charts > Pie



- For numerical data only, two or more attributes
- Attributes should have some relationship, e.g:
  - Grain production by county: barley, corn, flax, oats, wheat
  - Demographic: male/female *or* age groups *or* level of education
- All attributes must be in the same units
  - e.g. *not* ppm and ppb, *not* hectares and acres
- Area of pie chart can vary on sum of values
- Same rules apply for **Charts > Bar/Column**

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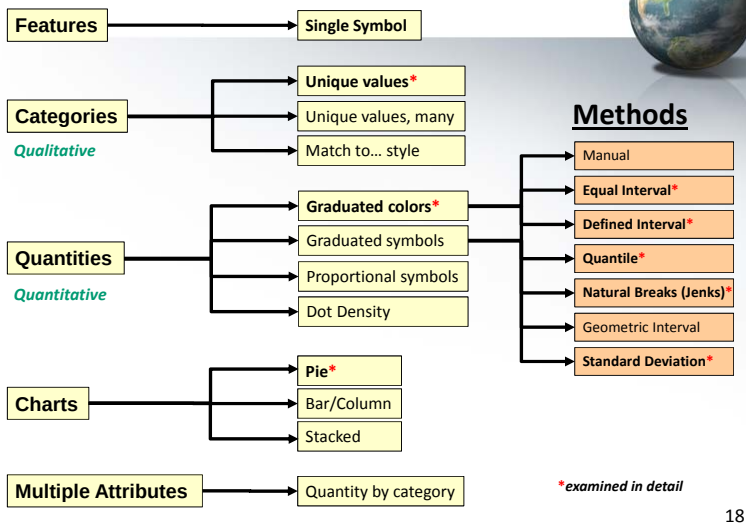
Symbolizing Features: Classification



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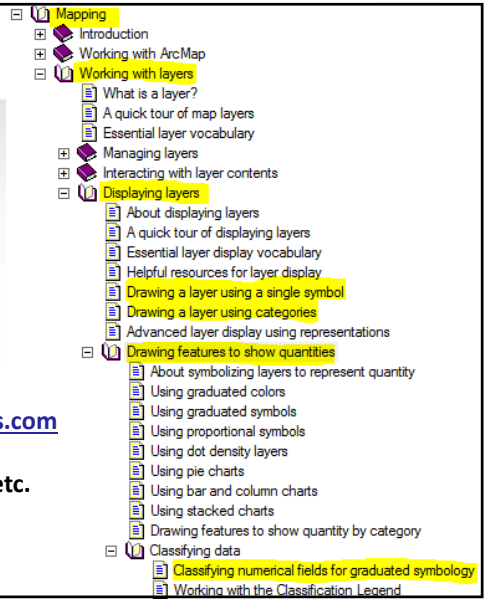
Symbolizing Layers info in ArcGIS Help

- **Excellent discussion of symbolizing and classification of data**
- **Also online at: http://resources.arcgis.com/en/help/main/10.2/**
- **Desktop > Mapping… etc.** (as shown at right)



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MXD and LYR files

- **MXD** = Map Document
  - Contains info for each layer in a map:
  - Location of data sources (Relative or Absolute)
    - Change to relative for this class and store MXD in data folder
  - Layer symbology settings (e.g. 5 classes, Jenks method)
  - Labelling and other settings too
- **LYR** = Layer File
  - Similar data as MXD but for single layer, separate from a map
- MXD and LYR files do *not* contain geographic data
  - Separate from a shape file, feature class, or coverage
- Save Map MXD file or Layer LYR files for future use
  - Only if you want to keep your layer settings and layout

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