GEOL 452/552
-
GIS for Geoscientists I

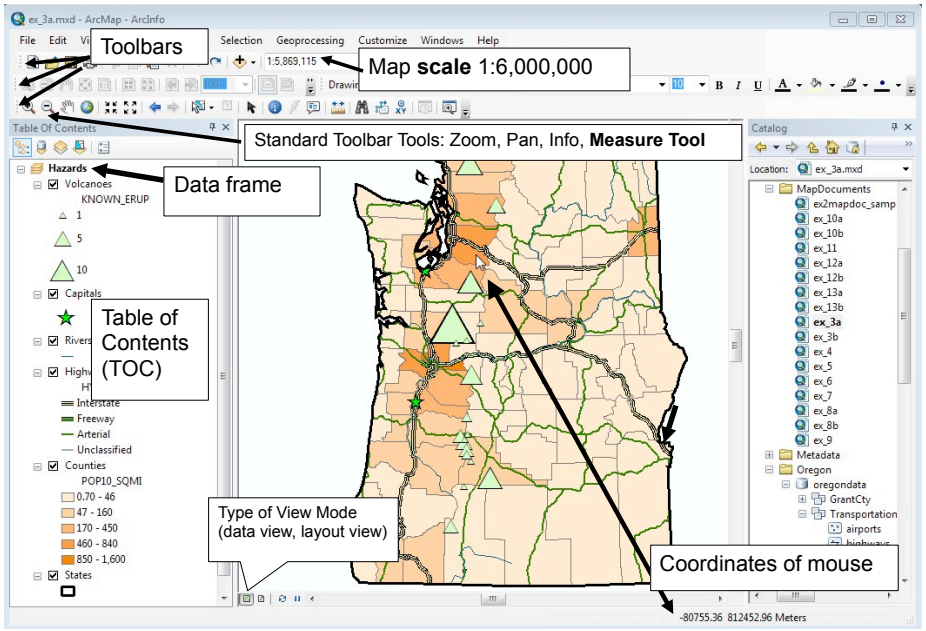
Lecture 4 (Chapter 1 and 2)

Today

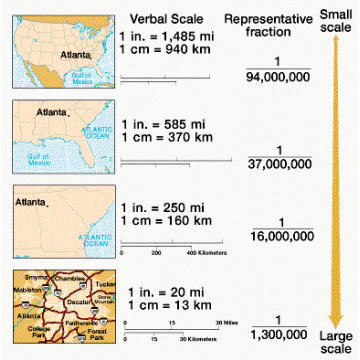
- Ch 2: Mapping GIS data (lectures 4, 5 and 6)
  - different types of data (also: next lecture)
  - how to show each data type in ArcMap
  - Start using ArcMap
- Ch 1 leftover : Map scales

- What does mapping GIS data mean?
- show location, outline of features and
- express **attribute value(s)** graphically (symbols, colors, etc.)
- "visualization" of GIS data on a map
- in the next lectures we'll go over different ways of mapping GIS data and explore ArcMap a bit
- but: you still need to go over ch. 2 tutorial !
- open mgisdata5\Map Documents\ex_3a.mxd (the one in your U:\ArcGIS folder!) in ArcMap now

ArcMap overview:

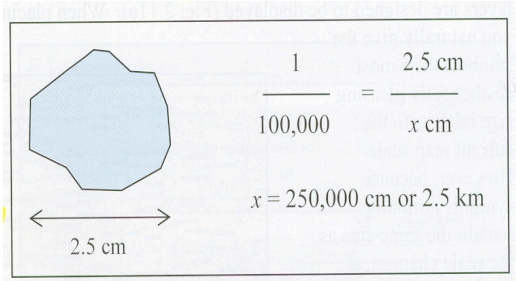


Map scale concepts



- What does a map scale of 1:1000 mean ?
  - 1 length unit (inch) on the **map** is
  - 1000 length units in **reality** (also inches!)
  - May need to convert: inches to miles (or km!)
- What's a "large scale" map? Is 1:1000 "larger" than 1:5000 ? (what does **zoom in** mean?)
  - compare the **ratio** (1 divided by xxxx) not the scale number
  - 1:1000 (0.001) is of "larger scale" then 1:5000 (0.0002)
  - Tip: in ArcMap, you can just punch in 20000 (for 1:20,000) as Map scale

- How to get physical size of a feature (lake) that is 2.5 cm wide when viewed on a 1:100,000 map ?
  - A) paper map: solve equation
  - B) ArcMap: Use Measure-ment tool



metric units 1 m = 1000 cm 1 km = 1000 m

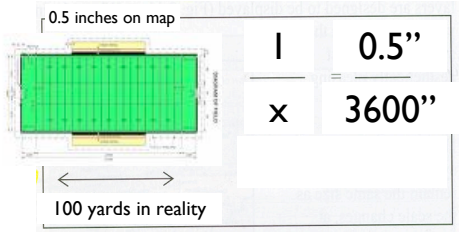
Calculating a paper map's scale by hand:

- **The Length of a 100 yard football field measures 0.5 inches on a map - what is the map's scale?**
- Real world length of 100 yards in inches is

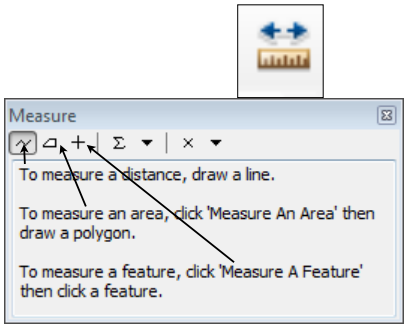
  100 yards * 36 in/yd = 3600 inches (see last page of text book for unit conversions)
- Set up the ratio - what is x in:
- 1 / x = 0.5 / 3600
- x / 1 = 3600 / 0.5

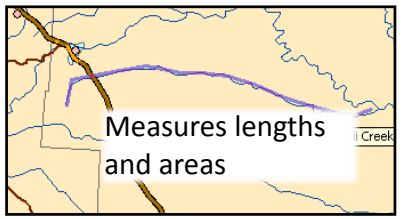
  x = 7200
- The map's scale is 1:7200

  "1 inch on map = 7,200 inches in reality"

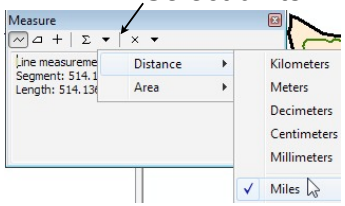


ArcMap: Measure tool

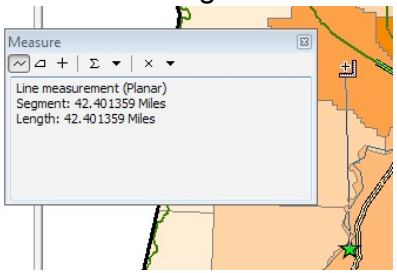




Select units:

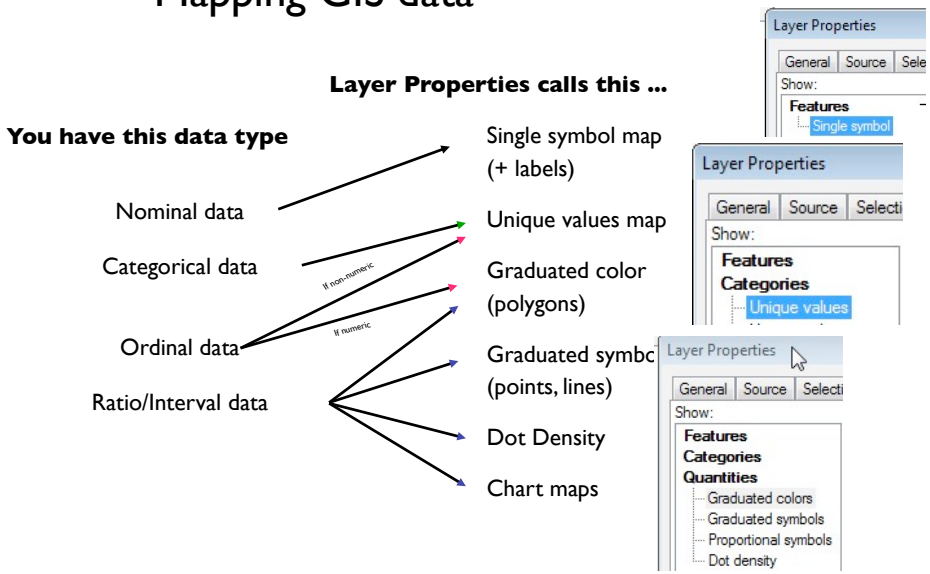


What's the distance between the cities with green stars?

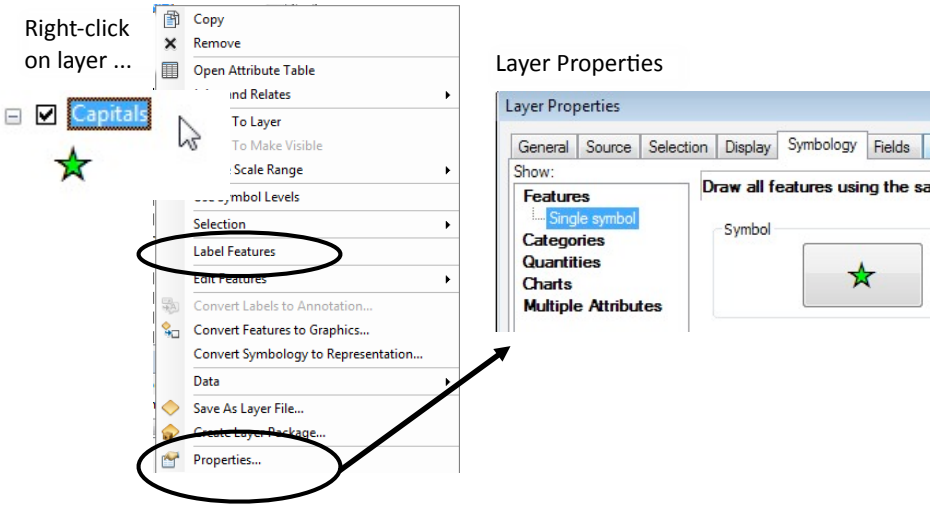


Hint: Abort from live "measuring tape" with Escape key

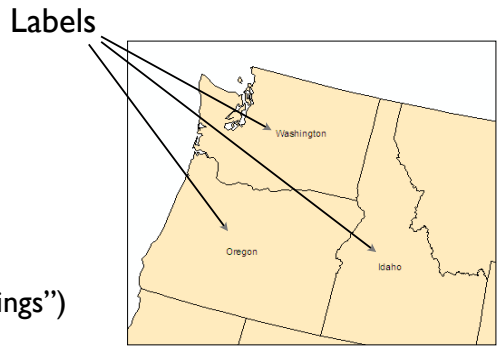
Mapping GIS data



Layer properties - this is where you define how to map an attribute



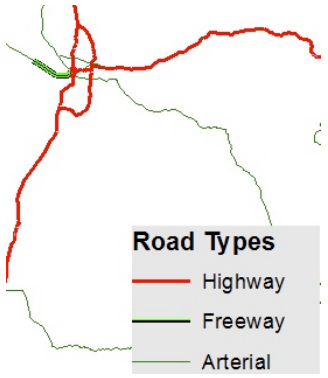
Nominal Data

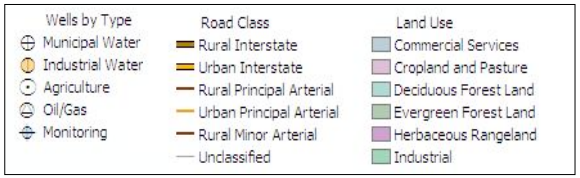


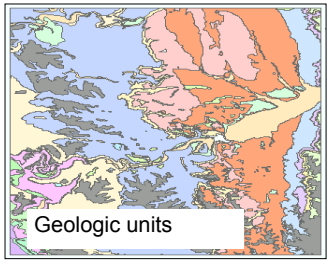
- Describes names of feature
- **Nom**inal data = names (words, computer-speak: "strings")
  - name of state, land owner, etc.
  - "Name": codes or indices (e.g. FIPS for counties, soil-codes, zip-codes)
  - Single symbol maps: same symbol / appearance
  - Labels: very simple way to show a feature's attribute value as text

Categorical Data

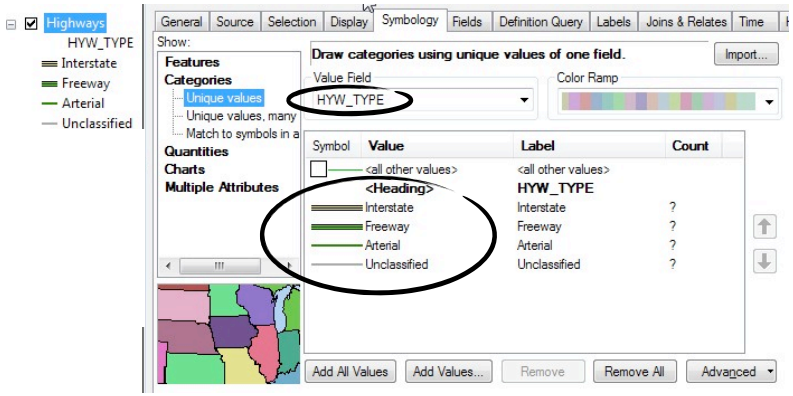
- Places features into distinct **categories** based on an attribute/ field (here: Road types)
- Different values (names, types) within each category ("Freeway")
- Examples: Landuse, types of crop or animals, geologic units
- ArcGIS: Symbolize as **Unique values** (limited number of types of objects)







Making a unique values (Categories) map



- Value field will show you all attribute fields
- It's up to you to select an attribute that contains categorical data (NOT numbers)
- Assigns a symbol (here: type of line) to each value

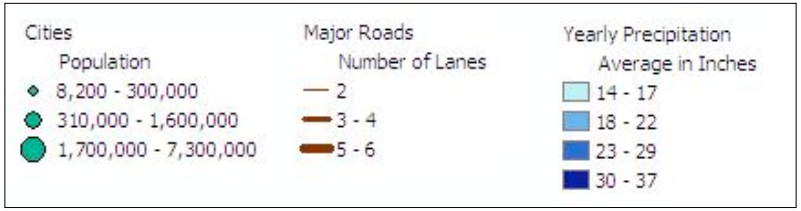
Numerical Data

Deals with numbers (Zip code? No!)

- Type A: **Ord**inal = rank (or **order**) (1., 2., 3., etc.)
  - Examples: Rankings of: state by population, universities, grades, taste
- Type B: Decimal numbers (5.1, 2.3) or integers (5, 1, 8)
  - Examples: Length, Temperature, $, population, rainfall
  - Interval vs ratio type: ratio needs a meaningful "0 point "(Celsius system vs. Fahrenheit or pH)

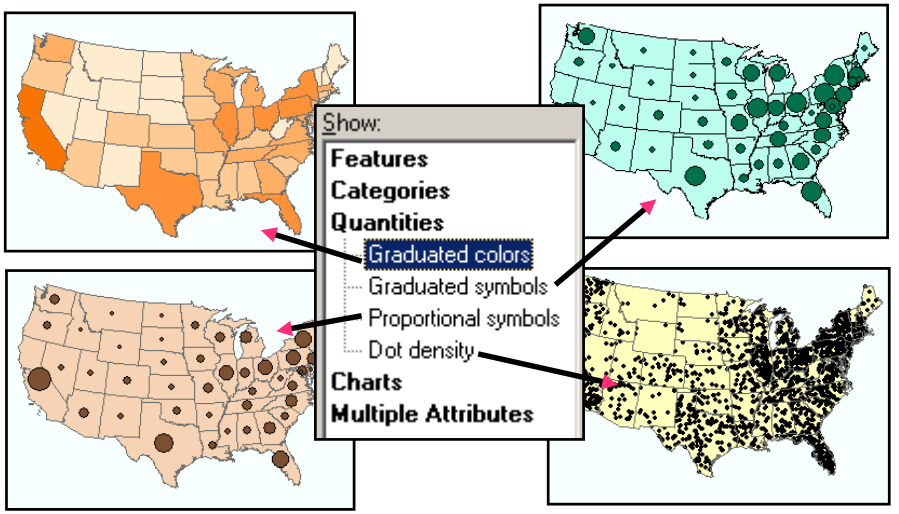
Mapping numerical data

- Interval and ratio data: need to make classes before mapping (need find **class** boundary, more next lecture)
- Show as variations in symbol size, thickness, or color (lightness, hue) or combinations



class boundaries: 14, 18, 23 and 30

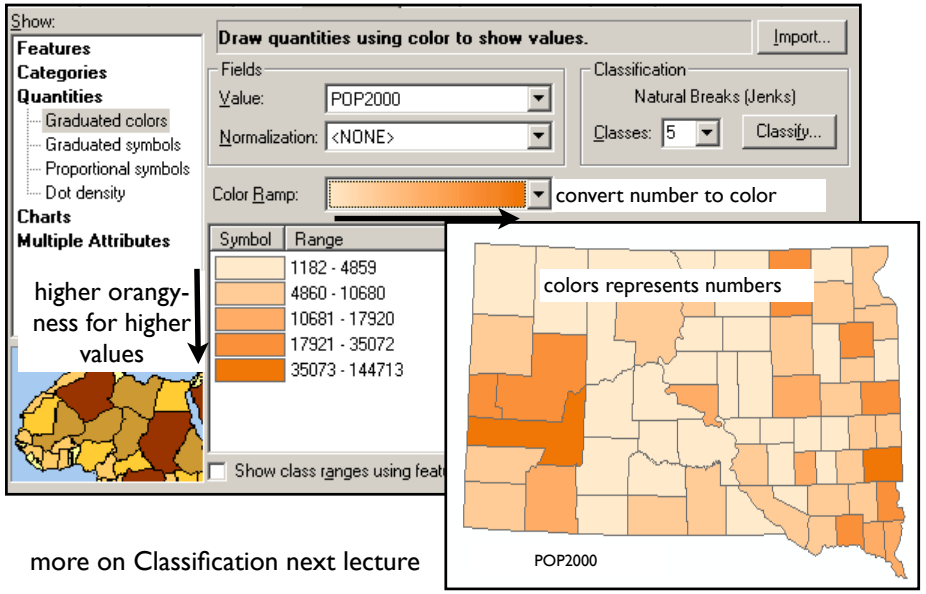
Types of maps symbolized as Quantities



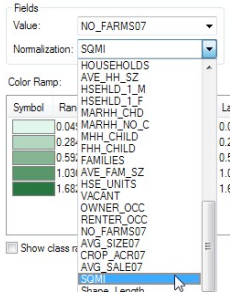
Graduated Colors/Symbols

- example: your features contain pollution values from 1 t 9
- How to **classify** numeric data into a few groups:
  - sort: 1,9,3,4,6,7,3,6,2,7,8 > 1,2,3,4,5,6,7,8,9
  - group: 1 – 3, 4 – 6, 7 – 9 > group 1, group 2, group 3
- Graduated **color**: each group get a color from a color ramp (green -> yellow -> red)
- Graduated **symbol**: increase a property (e.g. symbol size) of the symbol from small to large

Graduated color maps



more on Classification next lecture

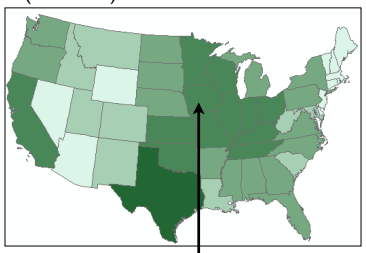


Normalizing

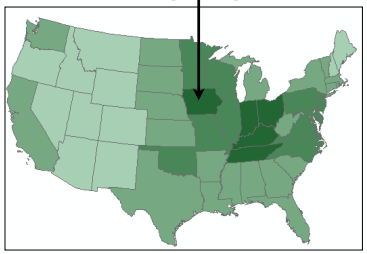
- on the fly, divides the attribute by <another attribute>
- Reason: fair comparison
  - <PERCENT OF TOTAL>
    - creates % from absolute numbers
  - By another field
    - Farm density: divided by area (by SQMI)
- You will need to use normalization in HW 2

next lecture: finish symbolization

(Absolute) Number of farms



Number of farms **per sq. mile**



Lab

- ch 2 tutorial: try to get to step 36 before next lecture
- complete ch 2 tutorial up to step 40
- HW 2 will be: ch 2, ex. 2-7 extra: 8
  - It's already on Blackboard but you have until Sept. 12 to hand it in (next 2 labs)
  - read HW2 instructions on Blackboard first! D
  - Don't only look at the book, I changed/added a couple of things!